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Equity Crowdfunding in the UK

Determinants of funding success and venture survival

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Dissertation of Master in Finance

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August 2017

In loving memory of my father

Biographical Note

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Acknowledgments

I would first like to thank my supervisor Prof. Doutora Ana Paula Serra, for the endless support, dedication and availability. She consistently allowed me to work on my own, which made me dig deeper into subjects I would otherwise leave unscathed, but was always there to steer me in the right direction whenever it was necessary. The door to her office was always open whenever I had a question about the research or the writing of this dissertation and Prof. Doutora Ana Paula Serra always knew how to guide me back onto the right track.

I would also like to thank Prof. Doutora Natércia Fortuna of the School of Economics and Management and Doutora Sofia Barreira, Postdoctoral Researcher at NIH¹, for the insight provided on data truncation and for introducing me to statistical tools, such as R and Stata.

I would also like to acknowledge M. Arch. Inês Barreira, for acting as the second reader of this thesis. I am very grateful to her for her very valuable comments and suggestions, which helped me improve the overall quality of my work.

Finally, I must express my deep gratitude to my friends and family for providing me with constant support and continuous encouragement. This dissertation would not have been possible without them.

¹ <https://www.nih.gov/>

Abstract

Crowdfunding is an alternative financing method which allows entrepreneurs to finance their ventures by raising small amounts of capital from a large number of individuals without conventional financial intermediaries. The crowdfunding phenomenon encompasses heterogeneous financing models, such as donation, reward, lending, invoice, equity and hybrid.

Our study describes and analyses 135 financing operations from one of the major crowdfunding platforms in the UK (Crowdcube) over the period from January 2013 to December 2014. We estimate the impact of venture quality signals (equity retention, human and social capital), levels of uncertainty, tax benefits and investor's behaviour on financing success and on the likelihood of post-campaign short-term venture survival. The results from our analysis suggest that higher levels of entrepreneur's equity retention, larger teams of directors and more detailed information about the company's strategy have a positive impact on the financing operation. Furthermore, higher amounts of equity retention by the entrepreneur, higher levels social capital and qualifying for the Seed Enterprise Investment Scheme are associated with post-campaign short-term venture survival.

Keywords: Crowdfunding, Finance, Fundraising, Entrepreneurship.

JEL-Codes: G21; G23; G24; G32.

Resumo

O financiamento colaborativo é um método de financiamento alternativo que permite o financiamento de projetos através da angariação de pequenos montantes de capital provenientes de um grande número de indivíduos, sem recurso a intermediários financeiros. O conceito de financiamento colaborativo abrange diferentes modelos de financiamento como, por exemplo, os modelos de donativo, recompensa, empréstimo, factoring, capital e híbrido.

O presente estudo descreve e analisa 135 operações de financiamento de uma das maiores plataformas de financiamento colaborativo do Reino Unido (Crowdcube) ao longo do período entre janeiro de 2013 e dezembro de 2014. Estimamos o impacto dos sinais de qualidade do projeto (retenção de capital, capital humano e social), níveis de incerteza, benefícios fiscais e comportamento dos investidores no sucesso da operação de financiamento e na sobrevivência das empresas financiadas. Os resultados da análise conduzida indicam que níveis mais altos de retenção de capital por parte dos empreendedores, equipas com um número de diretores mais elevado e informação detalhada sobre a estratégia da empresa têm um impacto positivo na operação de financiamento. Adicionalmente, a retenção de mais capital por parte dos empreendedores, a criação de parcerias com outras empresas e o acesso a benefícios fiscais (*Seed Enterprise Investment Scheme*) estão associados à sobrevivência das empresas, no curto prazo após a campanha de financiamento.

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1. Introduction

Following the 2008's financial crisis many entrepreneurs and early-stage companies struggled to find funding (Belleflamme *et al.*, 2014), as banks tightened their lending criteria and investments from venture capital firms became scarcer (Mason and Harrison, 2015).

Net lending to SME's in the UK was negative from 2009 to 2015 (Bank of England, 2016), deterring new business creation and growth and leading entrepreneurs to look for new sources of financing.¹

In this context, crowdfunding has established itself as an alternative financing method which allows entrepreneurs to raise funds directly from individuals (known as the "crowd") bypassing conventional financial intermediaries.

Since its inception, crowdfunding has allowed thousands of entrepreneurs to bring their projects to life. Massolution (2015) estimated that in 2015 the worldwide crowdfunding fundraising volume was of US \$34 billion, with peer-to-peer lending raising US \$25 billion, reward and donation crowdfunding raising US \$5.5 billion and equity crowdfunding taking the remaining US \$2.5 billion. This represents an increase of 109% over the previous year fundraising volume of US \$16.2 billion (Market Wired, 2015) and puts crowdfunding worldwide fundraising volume at roughly 40% the size of UK's gross bank lending to small and medium enterprises for that same year.²

Agrawal *et al.* (2013) state that by easing the way in which capital demand meets supply, financial innovations can improve the efficiency of financial markets. In this sense, crowdfunding innovates by closing the gap between lenders and borrowers and enabling new investment opportunities, such as lending based assets, which in the past have only been available to banks and large institutions. However, despite all its potential benefits, crowdfunding may aggravate some problems which are prevalent in financial markets, such as information asymmetries, as it removes conventional financial intermediaries.

¹ See Appendix Figure A.1.

² According to Bank of England (<http://www.bankofengland.co.uk/statistics/Pages/bankstats/>) UK's bank gross lending to SMEs was of approximately US \$84 billion in 2015 (exchange rate from www.irs.gov).

While venture capital firms and business angels rely heavily on due diligence and personal relationships to support the valuation of their equity positions (Cumming et al., 2015a), which alleviates the issue of information asymmetries, in equity crowdfunding only a limited set of information is disclosed online and entrepreneurs have few opportunities to interact with their potential investors (Vismara, 2016). Additionally, crowdfunders are expected to be less equipped to deal with information asymmetries and governance issues, as they typically lack the required experience and capability to evaluate different investment opportunities (Ahlers et al., 2015). Furthermore, their opportunity to conduct due diligence is limited by high fixed costs (Agrawal et al., 2013).

These issues would likely deter investors from investing in equity crowdfunding. Yet numerous crowdfunding platforms are emerging throughout the world (World Bank, 2013). Recent studies (Zhang et. al, 2015; Zhang et. al, 2016) have identified 257 active platforms in the Americas, 255 in Europe (65 from the UK) and 503 in Asia.

Our research focuses on equity crowdfunding in the UK, which has the most developed pure equity crowdfunding market (Vismara, 2016). We provide evidence on the impact of venture quality signals, levels of uncertainty and tax benefits on the financing success and on the likelihood of post-campaign short-term venture survival. We complement the works of Mollick (2014) who studied the dynamics of reward based crowdfunding, of Ahlers's (2015) research on signalling in equity crowdfunding, and of Hornuf and Schwienbacher (2015) who analysed German equity crowdfunding platforms operations.

We analyse a sample of 135 crowdfunding campaigns- These were hand collected from the crowdfunding platform Crowdcube³, one of the global leaders in the equity crowdfunding setting (Vismara, 2016).

Apart from this chapter, this dissertation is structured as follows: in chapter 2, we review the literature, presenting crowdfunding's main concepts and an overview of previous studied aspects. In chapter 3 we outline our hypotheses. Sample and methodology are presented in chapter 4. Chapter 5 includes the results of our model estimations. Chapter 6 concludes.

³ www.crowdcube.com

2. Literature Review

The purpose of this chapter is to review the relevant literature to provide a better understanding of our topic. In this context, we present the main concepts of crowdfunding and its most relevant aspects.

2.1 Crowdfunding

Mollick (2014) noted that the literature regarding crowdfunding is relatively scarce but it is significantly increasing, which is clear when we look at the amount of literature that has been released over the last couple of years. Between 2010 and 2016, 585 articles were published, which represents a growth of 84% over the last 2 years and demonstrates an increasing interest in this alternative finance method. ¹

2.1.1 Crowdsourcing

Although the concept of crowdfunding can be tracked throughout the centuries, with the U.S. Statue of Liberty providing a good example of a project financed through crowdfunding in 1865², most researches pin crowdfunding to another recent concept which was first introduced and defined in 2006 by Howe³ in Wired Magazine (Moutinho and Leite, 2012), named crowdsourcing.

Howe (2008) defines crowdsourcing as “the act of taking a task traditionally performed by a designated agent (such as an employee or a contractor) and outsourcing it by making an open call to an undefined but large group of people”. In the case of crowdfunding, the task of financing is outsourced to the crowd, a large group of individuals who are willing to use their spare dollars, pounds and pesos to fund these new projects (Howe, 2008).

2.1.2 Definition

Crowdfunding can be defined as “the efforts by entrepreneurial individuals and groups – cultural, social, and for-profit – to fund their ventures by drawing on relatively small

¹ Search made using Scopus database. The same search from 2010 to 2014 identifies 318 articles related to crowdfunding.

² www.libertyellisfoundation.org/statue-history

³ Jeff Howe (June 2006), The Rise of Crowdsourcing, WIRED. <http://archive.wired.com/wired/archive/14.06/crowds.html>

contributions from a relatively large number of individuals using the internet, without standard financial intermediaries” (Mollick, 2014).

The definition proposed by Mollick (2014) aims to complement Lambert and Schwienbacher’s definition (2010), which presents crowdfunding as “an open call, essentially through the Internet, for the provision of financial resources either in form of donation or in exchange for some form of reward and/or voting rights in order to support initiatives for specific purposes”. Mollick (2014) stresses that even though this definition is quite broad it potentially leaves out examples that scholars in various fields have labelled as crowdfunding, such as internet peer-to-peer lending and fundraising drives.

Mollick’s (2014) statement illustrates one of the issues scholars find when trying to define crowdfunding, as the concept encompasses many business models, which differ in terms of complexity and investor return (Hemer, 2011).

Despite this, most widely used definitions revolve around the same concept, as crowdfunding is described as the act of raising external finance from a large number of individuals, known as the crowd, where everyone provides a very small amount of capital to meet a larger funding aim and bring an entrepreneur’s project to life (Belleflamme and Lambert, 2014).

2.1.2 Taxonomy

Even though crowdfunding is a relatively recent phenomenon, it already encompasses several heterogeneous business models, with different levels of complexity and investor return (Hemer, 2011).

The European Commission (2016) presents six different crowdfunding models: donation-based, reward-based, investment-based, lending-based (also known as crowdlending, peer-to-peer or marketplace lending), invoice trading and hybrid. ⁴

⁴ These categories are given by the type of return investors receive.

Donation-based

Donation-based crowdfunding can be defined as a crowdfunding model through which individuals donate a small amount of money to meet the larger funding aim of a project while receiving no financial or material return (EU Commission, 2016).

Projects associated with this type of crowdfunding are normally based on philanthropic or civic motivations and generally only provide immaterial rewards, such as a thank-you e-mail or an artist's autograph (Hemer, 2011), but can also provide tokens of appreciation with no material value, such as stickers or t-shirts advertising the project.

Figure 1 –Total Worldwide Funding Amount Pledged in 2015 by category⁵



As illustrated in Figure 1, donation-based crowdfunding was the second largest model in terms of funding volume in 2015 raising a total amount of US \$2.85 billion, resulting in an annual growth rate of 46%.

Novo Banco Crowdfunding⁶, Global Giving⁷, and Fundrazr⁸ are examples of platforms that use this crowdfunding model.

⁵ Adapted from Massolution 2015 Crowdfunding Report

⁶ <https://novobancocrowdfunding.ppl.pt/>

⁷ <https://www.globalgiving.org/>

⁸ <https://fundrazr.com/>

Reward-based

The reward-based crowdfunding model allows individuals to donate to a project or business and receive a non-financial reward in return, such as goods or services, at a later stage in return for their financial contribution (EU Commission, 2016).

Depending on how the financing process is handled, the model can additionally be divided into two sub-categories, the “all-or-nothing” and the “keep what you raise” (Sousa and Oliveira, 2015). In the “all-or-nothing” model the entrepreneur will only receive financing if he reaches the established target, meaning that by “falling short” he will not receive any financing and funds will be returned to the funders, while in the “keep what you raise” model, funds are transferred to the entrepreneur even if he fails to meet the established target amount.

Kickstarter⁹, Indiegogo¹⁰ and PPL¹¹ are good examples of reward-based crowdfunding platforms. Kickstarter is the most famous in this category, mainly due to campaigns like Pebble Watch which gathered US\$ 10M from an initial goal of US\$ 100K and Star Citizen which managed to raise US\$ 2M from Kickstarter¹², from an initial goal of US\$ 500K, before going on to raise an additional US\$130M through the creator’s website¹³.

Massolution (2012) states that donation and reward-based models are best suited for campaigns that appeal to funders’ personal beliefs and passions, due to the fact that these models do not offer any financial return.

In terms of funding volume, reward-based crowdfunding managed to raise US \$2.64 billion according to Massolution’s 2015 report, which represents 8% of the total worldwide crowdfunding volume and a growth of 98% when compared with 2014.

Investment-based

In investment-based crowdfunding, companies raise financing by issuing equity or debt instruments to crowdfunders through a crowdfunding platform (EU Commission, 2016).

⁹ <https://www.kickstarter.com/>

¹⁰ <https://www.indiegogo.com/>

¹¹ <https://ppl.com.pt/pt>

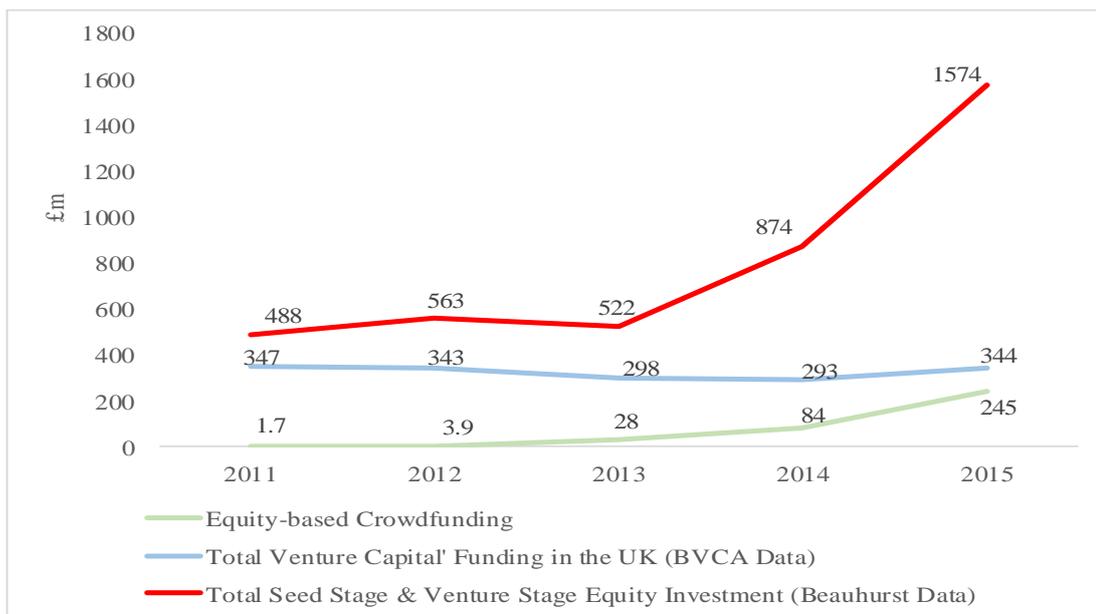
¹² www.kickstarter.com/projects/cig/star-citizen

¹³ <https://robertsspaceindustries.com/funding-goals>

This crowdfunding model is the most complex in the spectrum of crowdfunding instruments (Hemer, 2011) and has generated a lot of regulatory concerns, leading to some difficulties in its implementation in several countries.

Belleflamme and Lambert (2014) addressed these regulatory concerns in 2014 and called out for the urgent need for regulatory framework concerning the sale of securities and investor/consumer protection. The main concerns of the authors were related to issues such as fraud, false advertising and the way platforms handle payments, as these issues can undermine the potential of crowdfunding. In this context, the FSA released regulation for this segment of crowdfunding in 2014¹⁴, while SEC released the Title III of the Jobs Act in 2015¹⁵ and CMVM approved the Portuguese regulation in 2016¹⁶.

Figure 2 - Equity-based Crowdfunding in the Context of VC/ Equity Investment in the UK (2011-2015)¹⁷



As illustrated in Figure 2, equity-based crowdfunding is quickly catching up to venture capital funding in the UK (Zhang et al., 2016), as this segment of crowdfunding as experienced high levels of growth over the last couple of years

¹⁴ Source: www.fca.org.uk/news/press-releases/fca-launches-call-input-crowdfunding-rules

¹⁵ Source: www.sec.gov/news/pressrelease/2015-249.html

¹⁶ Source: www.cmvm.pt/pt/Legislacao/Legislacaonacional/Regulamentos/Pages/Regulamentos.aspx?pg

¹⁷ Adapted from Zhang et. al, 2016 - The 2015 UK Alternative Finance Industry Report.

According to Massolution 2015's Industry Report, investment-based crowdfunding raised US \$2.56 billion worldwide in 2015¹⁸, an increase of 130% over 2014's funding volume.

Seedrs¹⁹ and Crowdcube, two UK investment based crowdfunding platforms, are good examples of equity-based crowdfunding platforms, having raised by the end of 2016 a total of US \$135.75 million and US \$317.5 million respectively.²⁰

Lending based

Lending-based crowdfunding platforms (also known as peer-to-peer lending platforms) allow companies or individuals to obtain funding from the public in the form of a loan agreement (EU Commission, 2016), granting individual investors access to an asset class that historically has only been available to banks and large institutions.

This segment of crowdfunding can be divided into three separate models, which depend on the type of consumer and on the type of loan provided:

- Peer-to-Peer business lending are secured and unsecured debt-based transactions between individuals/institutions and businesses with trading history (Zhang et al., 2016);
- Peer-to-Peer business lending (Real Estate) are property-based transactions between individuals/institutions and property developers (Zhang et al., 2016);
- Peer-to-Peer Consumer lending are debt-based transactions between individuals/institutions and an individual (Zhang et al., 2016);

Additionally, investments of this nature can also be categorized according to their level of risk, which is generally assessed by the crowdfunding platform and made available to crowdfunders, allowing them to make an informed investment decision. In this sense, lending based crowdfunding platforms perform an analysis of the borrower, assessing the credit risk of the loan, establishing a credit rating and accordingly assigning an appropriate interest rate to each loan.

¹⁸ Note: The value reported by Massolution for investment based crowdfunding includes equity and debt based securities, alongside real estate crowdfunding.

¹⁹ <https://www.seedrs.com/>

²⁰ Data taken from www.crowdsurfer.com and exchange rate taken from IRS (www.irs.gov/).

This is the largest segment of crowdfunding in terms of fundraising volume, as peer-to-peer lending managed to raise US \$25.1 billion in 2015 (Massolution, 2015), which represents approximately 74% of 2015's total funding volume and a year-over-year growth of 126%.

Examples of lending-based crowdfunding platforms include the highly successful Lending Club²¹, which was founded in 2006 and has issued US \$26 billion in loans, while other examples include Prosper²², Funding Circle²³ and Raize²⁴.

Invoice Trading

Invoice Trading crowdfunding is a form of asset-based financing whereby businesses sell unpaid invoices or receivables, individually or in a bundle, to a pool of investors through an online platform (EU Commission, 2016).

This type of model has rarely been addressed in the available literature, but values for its 2015's volume in Europe have been presented in the EU Commission report, suggesting that it managed to raise US \$371,4 million²⁵ through one single platform, Syndicate Room²⁶.

Syndicate Room describes the concept as “the process whereby cash is advanced to firms against the sales invoices their customers have yet to pay. Increasingly, that cash comes from individual investors investing via online platforms”.

Hybrid

Hybrid models of crowdfunding are those that combine elements from other types of crowdfunding (EU Commission Report, 2016).

FundedbyMe²⁷ and Breakaway Funding²⁸ are examples of this sort of platform.

²¹ www.lendingclub.com

²² www.prosper.com

²³ www.fundingcircle.com/uk/

²⁴ <https://www.raize.pt/>

²⁵ Exchange rate from € to \$ taken from IRS (<https://www.irs.gov/individuals/international-taxpayers/yearly-average-currency-exchange-rates.>)

²⁶ www.syndicateroom.com/

²⁷ <https://www.fundedbyme.com/en/>

²⁸ <http://www.breakawayfunding.com/>

2.2 The Entrepreneur's Financing Choice

One of the most important decisions entrepreneurs must take when starting a company or implementing a new project is the choice of which type of financing to use.

According to Myers and Majluf (1984) who introduced the *pecking order theory*, existing shareholders and managers acting on their behalf have more information about their company's value and risks than outside investors, and as such, they will opt to use internal funds first, followed by debt and then equity securities, as issuing new shares may signal an overpricing of outstanding shares, while issuing debt securities may signal that the company is under financial distress.

This issue is of most relevance for start-ups and early-stage companies, where information asymmetries are high and the entrepreneur's choice of capital structure is very limited (Voorbraak, 2011). Entrepreneurs generally tend to use their own money or turn to family and friends for early-stage financing needs, but as the company grows additional funding is required, forcing entrepreneurs to search for other sources of funding (Sousa and Oliveira, 2015). At this stage, entrepreneurs can either turn to equity or debt financing, such as venture capital, business angels or bank loans to satisfy their financing needs, but these normally require a financial track record, stable cash flows or collateral, something start-ups and early stage companies generally lack (Schwienbacher and Larralde, 2010).

The financial crisis of 2008 aggravated this issue even further, as banks loans, which are the most prominent method of financing for small companies and entrepreneurs (Voorbraak, 2011; Sousa and Oliveira, 2015), have become harder to obtain due to stricter restrictions on lending, while venture capital and angel finance investments have also decreased (Tomczak and Brem, 2013; Zhang et al. 2016), limiting the entrepreneurs' access to financing even more.

This situation allowed crowdfunding to present itself as alternative financing solution for new enterprises and projects, as lenders have access to a larger pool of borrowers, which, alongside funding, can also provide feedback and new ideas, adding some extra value to this type of financing, as these ideas can help to increase the overall quality of the project.

Timeframe

Should the entrepreneur opt to use this financing model, he must decide on which type of crowdfunding is more appropriate, while taking into consideration which type of return the company can offer its investors and the timeframe of the financing process.

Kappel (2009) distinguishes two types of crowdfunding based on the timeframe of the funding process, which he named ex-ante crowdfunding and ex-post facto crowdfunding.

In ex-ante crowdfunding, the entrepreneur receives financial support on the front end to assist in achieving a mutually desired result (Kappel, 2009). Obama's 2008 presidency campaign is a clear example of this type of crowdfunding, as the US President managed to raise three quarters of a billion dollars, mainly through small donations over the internet. Ex-post facto crowdfunding sits on the other side of the spectrum, as the financing process takes place after the product is completed, with funding being given in exchange for a completed product. An example of this type of crowdfunding is Radiohead's album *Rainbows*, in which the band funded the project on its own and used ex post facto crowdfunding to recoup its costs.

After analysing both types of crowdfunding, Kappel (2009) concludes that ex-post facto crowdfunding offers very little to entrepreneurs that lack a pool of supporters, stating that Radiohead's strategy only worked because they had the required financial resources to fund their album and an established fan base to support them, while ex-ante can allow unknown entrepreneurs to bring their projects to life by letting their ideas talk for them.

Investor's Return and Capital Requirement

The entrepreneurship choice regarding the type of investor's return and capital requirement is addressed by Belleflamme *et al.* (2014). The author develops a model through which he determines that entrepreneurs prefer reward-based crowdfunding (which the author refers to as pre-order) if the project initial capital requirement is relatively small, and a profit-sharing or equity model otherwise.

The model assumes that the entrepreneur enjoys a monopoly position (as the product is unique), that consumers know the characteristics of the product before purchase and the existence of something the authors name as community benefits, which are benefits generated from community-based experiences, such as the sense of being part of the first

group of individuals to obtain a specific product or the gratification felt by assisting in bringing a project to life, and which, according to the authors, have an important weight on the crowdfunders decision to invest.

Additionally, Belleflamme *et al.* (2014) state that when crowdfunding is reward-based, community benefits stem directly from the consumption experience, while in profit sharing, community benefits are more related to the investment than to consumption, as becoming a consumer is an option, not a requirement.

With this, Belleflamme *et al.* (2014) conclude that contributors to the crowdfunding mechanism are not regular investors or consumers, as they are not purely driven by financial return and have other intrinsic motivations.

2.3 Impact on Financial Markets

Crowdfunding is a financial innovation for early-stage businesses (Agrawal *et al.*, 2013) which reduces the transaction costs of financing by closing the gap between lender and borrower through the use of on-line platforms, removing conventional financial intermediaries.

Agrawal *et al.* (2013) state that because crowdfunding has a lower cost of capital and grants the entrepreneur access to more information, such as investors/consumer interest, product feedback and research and development ideas, creators may opt to use this form of financing over conventional methods, such as bank loans.

Through crowdfunding, entrepreneurs are matched with global network of individuals who have the highest willingness to pay for equity in their venture (or for early access to their new product), creating a setting that reduces the impact of geographic location on the financing operation (Agrawal *et al.*, 2011).

When looking at Sellaband, an online platform that enables unsigned musicians to raise financing to produce an album, Agrawal *et al.* (2011) find that the range between artists and funders is of approximately 3,000 miles, a radius 42 times larger than the average range reported by Sorenson and Stuart (2005) for the venture capital setting, and also considerably larger than what Sohl (1999) and Wong (2002) report for angel investors,

as these authors state that in general more than 50% of financed entrepreneurs are within half a day of travel in the business angels' setting.

This alleviation of distance-related economic frictions is one of the main benefits of crowdfunding, but as we stated before, this alternative finance method is not without its problems.

One matter that has been prominently associated with crowdfunding is information asymmetry, as entrepreneurs regularly have more information about the project than investors do and there is no public information available on the venture.

Asymmetric information may create issues such as agency costs, moral hazard and adverse selection (Sousa and Oliveira, 2015), which crowdfunders are less equipped to deal with (Vismara, 2016).

Jensen and Meckling (1976) describe agency relationships as a contract under which the principal allows the agent to perform some service on their behalf, which involves delegating some decision-making authority to the agent.

Taking this definition into a crowdfunding environment, we can define the principals as the crowdfunders and the agent as the entrepreneur, as crowdfunders give their funds to the entrepreneur and allow him to develop the project on their behalf.

If we assume that both parties in the relationship have the intent to maximize their utility, there is good reason to believe that entrepreneurs will not always act in the best interests of crowdfunders. In this setting, both agent and principal are expected to incur positive monitoring and bonding costs (both nonpecuniary and pecuniary), such as non-compete agreements and employee stock options, and in addition there will be some divergence between the agent's decisions and the decisions that would maximize the principal's welfare (Jensen and Meckling, 1976).

The impact of this problem is exacerbated in the case of crowdfunding, as usually there is no direct active control mechanism that investors can use (Sousa and Oliveira, 2015), which leads us to another important issue, moral hazard.

The concept of moral hazard has been employed in various ways for more than 200 years and can, for example, be illustrated as the tendency for insurance plans to encourage risky behaviour that increases the probability of insured loss (Dembe and Boden, 2000).

In a crowdfunding setting, entrepreneurs bear no significant financial risk of their own, leaving them with little incentive to act in the best interest of their investors.

Lastly, there is the issue of adverse selection, which occurs when the potential borrowers who are the most likely to produce adverse outcomes are the ones that are most actively seeking out financing, given that other funding methods are not available, and thus are the most likely to be selected.

This issue is aggravated by the difficulty in distinguishing good quality from bad quality projects in the business world, which may allow adverse selection to ultimately drive good quality ventures out of the market due to the number of low quality companies looking for financing (Akerlof, 1970).

The cost of adverse selection must therefore include the financial cost incurred by the those who invest in low quality companies, or by those who are misled by dishonest entrepreneurs, and the loss incurred from driving good quality business out of the market (Akerlof, 1970).

These issues are common to all forms of financing, but as we previously mentioned, not only are information asymmetries more severe in the crowdfunding setting, but also crowdfunders are less equipped to deal with them (Vismara, 2016) and due to high fixed costs, have limited opportunity to conduct the necessary due diligence (Agrawal et al., 2013).

2.4 Signalling

“Where substantial information asymmetries exist and where the supply of poor projects is large relative to the supply of good projects, venture capital markets may fail to exist”.

Leland and Pyle (1977)

The issues addressed by Leland and Pyle (1977) are especially relevant in the crowdfunding setting, as potential investors are less likely to have the necessary expertise

to evaluate investment decisions and due to high fixed costs, have little chance to conduct the necessary due diligence and monitoring (Ahlers et al., 2015).

Despite all this, entrepreneurs have been able to obtain financing through crowdfunding and the number of crowdfunding platforms keeps increasing (World Bank, 2013), so crowdfunders have somehow been able to infer venture quality using the limited venture information provided by crowdfunding platforms, which generally only includes the venture's basic information (name, incorporation date), team composition, market overview and business plan (which may include financial forecasts and exit strategy).

This means that while potential investors may not be able to observe quality of young companies directly (Ahlers et al., 2015), they can use quality signals to evaluate the venture and make their investment decision. Previous works are consistent with this idea (Baum and Silverman, 2004; Connelly et al., 2011; Mollick, 2014; Hornuf and Schwienbacher, 2015; Ahlers et al., 2015; Vismara, 2016), as researchers have found that in markets where levels of information asymmetries are high, the ability to signal quality to potential investors is essential in obtaining finance (Vismara, 2016).

In this sense, quality signals can include the ownership structure of the venture (Leland and Pyle, 1977; Ahlers et al., 2015), board characteristics (Macmillan et al., 1985; Baum and Silverman, 2004; Ahlers et al., 2015), social connections (Baum and Silverman, 2004; Nofsinger and Wang, 2011; Chua et al., 2010; Vismara, 2016) and intellectual capital (Baum and Silverman, 2004).

This reduction of information asymmetries between two parties is at the heart of signalling theory (Connelly et al., 2011) and has often been used as a research framework under which entrepreneurship finance is investigated (Vismara, 2016).

Ahlers et al. (2015) were the first to apply this theory to equity crowdfunding, followed by Vismara (2016). Both authors find that in an equity crowdfunding setting the crowd does in fact base their investment decisions on venture quality signals, as companies that signal higher quality are more likely to be funded.

Additionally, Mollick's (2014) study of crowdfunding dynamics shows that the crowd and venture capital firms respond to quality signals in similar way, and that crowdfunding

alleviates some of the geographic and gender biases associated with venture capital firm's assessment.

Herding in crowdfunding

In finance herding can be defined as a situation under which investment is driven by group psychology, as individuals all gravitate to similar investments and possibly ignore substantial private information (Scharfstein and Stein, 1990).

In the crowdfunding setting herd behaviour has been addressed by several authors who find that there is evidence of herding in the funding process of equity-based crowdfunding (Agrawal et al., 2011; Hornuf and Schwienbacher, 2015) and peer-to-peer lending (Zhang and Liu, 2012), as individuals are more likely to invest when the funding target is close to be met.

Hornuf and Schwienbacher (2015) find that unlike reward-based crowdfunding which presents a U-shaped investment pattern, crowdfunding (investment-based crowdfunding) presents a L-shaped pattern, a result that echoes the findings of Agrawal et al. (2011) on Sellaband. This type of investment pattern is also supported by research conducted on consumer behaviour in the digital economy, as the large amount of information limits consumer's attention over time (Hornuf and Schwienbacher, 2015) and herding results from the gravitation towards products which are referred more often by the general population.

The authors also conclude that, based on the data collected from German equity-based crowdfunding platforms, projects generally succeed by small margins or fail by large amounts, with goal size being negatively correlated with success, and that geography appears to be linked to the nature and success rate of projects.

2.5 After the Campaign

Since most crowdfunding studies have focused on the funding process, little is known about what happens after the campaign, as to the best of our knowledge, only Mollick and Kuppuswamy (2014) and AltFi Data (2015)²⁹ have addressed this issue so far.

²⁹ <http://www.altfidata.com/>. AltFi Data Ltd. is a company which provides data analytics for finance.

Mollick and Kuppuswamy (2014) find that in the context of reward-based crowdfunding fraud is rare, but delays are not, with most projects being delivered late. A problem which is exacerbated in large and overfunded projects, mainly due to the unexpected demand (Mollick and Kuppuswamy, 2014).

A clear example of this issue is the videogame Start Citizen, which was expected to release in 2014 and up until now (July 2017) remains in development (mainly due to the increasing number of added features that resulted from the campaign stretch goals).

AltFi Data (2015) report focuses on United Kingdom companies that completed a successful equity crowdfunding campaign, and demonstrates that as of November 2015 over 80% of these companies were still trading. The report states that these results are impressive, especially when considering that a previous report from RSA (2014)³⁰, indicates that 55% of Small and Medium Enterprises (SMEs) do not survive more than five years.

³⁰ <https://www.rsagroup.com/>

3. Hypotheses Development

In this section, we develop our research framework (based on Ahlers et al. [2015] framework) and present our hypotheses for the connection between venture quality signals, venture financing success and post-campaign short-term survival.

3.1 Equity Crowdfunding

Equity crowdfunding allows firms to issue equity to satisfy their capital needs, as the funds raised through this method go directly into developing a sustainable firm and are not restricted to a product or service (Hornuf and Schwienbacher, 2015).

In this instance, incentives for participating in crowdfunding are mainly financial, as becoming a consumer of the products offered by the company is merely an option (Belleflamme et al., 2014), and information asymmetries surrounding the venture's ability to generate future cash flows are more important, making equity crowdfunding the best setting for studying entrepreneurial signalling to small investors (Ahlers et al., 2015).

When investors try to evaluate the value of a start-up or of a young company, there is no way to directly observe the company's ability to generate future cash flows (Spence, 1973), and as such, they must rely purely on quality signals to make their investment decision.

In this context, we use signals which are available to all potential investors, either through the company's campaign page or associated pages, such as Companies House¹, and measure success on two different stages: financing and post-campaign survival, using three distinct proxies: funding ratio, number of investors and survival.

3.2 Measures of success

In line with previous studies (Ahlers et al., 2015; Vismara, 2016), we use *funding ratio* as a dependent variable to understand the impact of quality signals, tax benefits and levels of uncertainty in the company's ability to raise financing, and *number of investors* to capture the impact of these variables in the company's capability to reach a diffuse set of

¹ <https://www.gov.uk/government/organisations/companies-house> - Companies House is an UK executive agency sponsored by the Department for Business, Energy & Industrial Strategy, which registers company information and makes it available to the public.

investors, as existing shareholders give more value to the entry of a disperse set of stockholders than they value blockholders (Vismara, 2016).

Additionally, as we also measure success by the company's ability to avoid short-term financial distress, such as administration, liquidation and dissolution, we use the dependent variable *survival*, which indicates whether a company managed to avoid financial distress up until January 2017, and understand how quality signals are associated with venture's post-campaign survival.

3.3 Equity Retention

Leland and Pyle (1977) argue that an entrepreneur's willingness to invest in its firm's equity acts as a signal of the quality of the firm's information and of the assets selected based on this information. An entrepreneur who is confident about the projects' ability to generate positive cash flows will retain as much equity as possible, while firm owners who are not as confident about their firm's potential will try to raise capital by selling higher portions of equity (Ahlers et al., 2015; Vismara, 2016).

Hypothesis 1a²: Retaining equity is a quality signal and is therefore positively associated with financing success.

Equity retention also gives entrepreneurs additional financial motivation for the venture to succeed, as these will incur loss of personal wealth if the project fails (Wilson and Altanlar, 2014).

Hypothesis 1b: Retaining equity indicates higher firm quality and provides extra motivation for success therefore leading to higher odds of survival.

3.4 Herding Behaviour

As we previously mentioned, herding behaviour in crowdfunding has been addressed by several authors (Agrawal et al., 2011; Zhang and Liu, 2012; Hornuf and Schwienbacher, 2015) who found evidence of a correlation in investments that result from interactions among investors.

² Hypotheses labelled as "a" refer to the impact of that variable in financing and hypotheses labelled "b" refer to its impact on firm survival.

Hornuf and Schwienbacher (2015) find that investments from larger or more sophisticated investors are taken as a quality signal by other potential investors, which leads to a higher probability of a successful campaign.

Additionally, as large investments push funding closer to the required target, investor participation is also expected to increase, as individuals are more likely to invest if the funding goal is almost reached (Agrawal et al., 2011; Zhang and Liu, 2012; Hornuf and Schwienbacher, 2015).

Hypothesis 2: Large investments signal quality to other investors and are positively associated with financing success.

3.5 Human Capital

When addressing venture capital signals is almost impossible not to address the effect of human capital due to the impact manager's decisions have on the venture's future.

It is expected that a manager who has less experience or no knowledge about running a company, or about the market itself, will likely lack the expertise to make the venture succeed.

This issue has been addressed by several authors in entrepreneurial finance (Macmillan et al., 1985; Gartner et al., 1998; Baum and Silverman, 2004; Ley and Weaven, 2011; Ahlers et al., 2015) who argue that entrepreneur experience and familiarity with the target market are essential for obtaining financing and making the company thrive (Wilson and Altanlar, 2014).

Board diversity is another aspect of human capital which has been addressed regularly in the context of venture quality, especially in what concerns gender diversity in boards, as authors state that, for example, female directors can add value to the board by bringing extra dimensions of human and social capital, contributing to and changing group dynamics (bonding and bridging) and through their monitoring role (Adams and Ferreira, 2009). Wilson and Altanlar (2014) find that diverse boards had lower probability of failure, possibility due to different experiences and backgrounds which allowed for different perspectives of existing issues. Singh et al. (2001) find that the presence of

women on boards changed group dynamics and improved communication, decision making and board effectiveness.

In this context, we argue that similarly to what happens in the venture capital market, higher levels of qualified human capital increases the probability of a successful capital raising operation in the crowdfunding setting and increases the firm's probability of avoiding short-term financial distress.

Hypothesis 3a: Higher levels of qualified human capital are positively associated with financing success.

Hypothesis 3b: Higher levels of qualified human capital are positively associated with a higher probability of survival.

3.6 Social Capital

Previous studies indicate that interfirm alliances have a positive impact on investors funding decisions (Gartner et al., 1998; Baum and Silverman, 2004; Chua et al., 2010). These alliances provide numerous advantages mainly associated with direct or indirect access to complementary resources and knowledge, which alter the opportunities and constraints faced by early stage companies (Baum and Silverman, 2004) and increase the odds of survival (Wilson and Altanlar, 2014).

Additionally, Chua et al. (2010) find that the reputation built by directors, while forming these social ties, can be used to reduce information asymmetries and improve the likelihood of a successful venture.

As such, we argue that these partnerships can work in a similar way in a crowdfunding setting, with partnerships increasing the likelihood of funding success and venture survival.

Hypothesis 4a: Interfirm alliances are positively associated with financing success.

Hypothesis 4b: Interfirm alliances are positively associated with a higher probability of survival.

3.7 Financial Forecasts

Per the Ellsberg paradox in decision theory from 1961, people generally prefer taking risks when they know the set of possible events and respective probabilities instead of just having an ambiguous alternative. An argument which is in line with Epstein and Schneider (2008) statement, that investors “dislike assets for which information quality is poor, especially when the underlying fundamentals are volatile”

In this sense, the provision of financial forecasts, which includes a disclosure the entrepreneurs vision and expectations, including any drawdown risks (Michael, 2009), decreases uncertainty and increases the probability of obtaining a higher funding ratio and a higher number of investors.

We also argue that by preparing these financial forecasts, entrepreneurs increase their level of preparedness and therefore increase the chances of venture success (Gartner et al., 1998).

Hypothesis 5a: The provision of financial forecasts is positively associated with financing success.

Hypothesis 5b: By preparing and providing financial forecasts, firms increase their preparedness and therefore increase the odds of venture survival.

3.8 Tax Benefits

In the UK, there are two types of tax benefits which were created to encourage investments in small and early stage start-up businesses (Seed Enterprise Investment Scheme) and in smaller higher-risk trading companies (Enterprise Investment Scheme).

These tax benefits provide a tax relief of 30% (EIS) and 50% (SEIS) of the amount investment, alongside 45% loss relief on capital at risk and capital gains relief, assuming investors hold the shares for three years.

This set of characteristics greatly decreases the risk of these investments and as such is expected to increase an investors willingness to invest in companies which provide them with this type of benefit.

It is also important to note, that although companies can qualify for both types at the same time, in EIS relief can be claimed up to a maximum of £1,000,000 per investors³, while in SEIS investors can place a maximum of £100,000 in a single tax year and the company can only raise a maximum of £150,000 under this scheme⁴.

Additionally, we must also note that these tax benefits were created to compensate for the high-risk profile of this type of companies, which means that firms that qualify for these investment schemes have a higher likelihood of falling under financial distress.

Hypothesis 6a: Tax benefits are positively associated with financing success.

Hypothesis 6b: Companies which qualify for EIS and SEIS are high-risk companies and, as such, are more likely to fall under financial distress.

³ <https://www.gov.uk/government/publications/the-enterprise-investment-scheme-introduction/enterprise-investment-scheme>

⁴ <http://www.seis.co.uk/about-seis>

4. Sample and Methodology

In this section, we present our sample and methodology, alongside the descriptive statistics of our sample.

4.1 Dataset Construction

The main objective of our study is to understand the impact of venture quality signals (equity retention, human and social capital), uncertainty and tax benefits on the financing operation in the equity crowdfunding setting and to analyse the relationship between these factors and the company's likelihood of financial distress.

In this sense, we hand collected from Crowdcube¹ a sample which consists of 135 successful equity crowdfunding pitches published on the platform between January 1st, 2013 and December 31st, 2014. This sample allows us to tackle success on multiple levels, as since 2013 Crowdcube has allowed companies to use a “keep what you raise” system, which means that funding was not locked to 100% like it was in previous years, allowing companies to use both overfunding and underfunding in the financing operation. Additionally, by using a sample which consists of pitches from 2013 and 2014 we can also study the aftermath of the campaign, to analyse the relationship between quality signals and the company's ability to avoid short-term financial distress, as the “honeymoon period” for these companies, which is the period in which the company is given time to build its debt before it incurs any real danger of being in financial distress, of 2 years finishes by the end of 2016 (Hudson, 1987).²

To the best of our knowledge, this is the first study that addresses both these issues using signalling theory framework for an equity crowdfunding setting.

4.2 Methodology and Model Specification

4.2.1 Dependent Variables

As we previously stated, we measure success on two different levels: financing and post-campaign survival, using three distinct dependent variables as proxies: *funding ratio*, *number of investors* and *survival*.

¹ <https://www.crowdcube.com/companies>

² Note: This data was stored in Excel and analysed using Stata.

- *Funding ratio (FR)* is measured as the percentage of capital collected (total funding over target), capturing the company's ability to raise financing, and was retrieved directly from the company's campaign page.
- *Number of investors (NI)* counts the number of individual investors that invested in a crowdfunding pitch, as reported in the respective campaign page, demonstrating the companies' ability to reach a diverse set of shareholders.
- *Survival (SV)* is a dummy variable which takes the value of 1 if the company managed to avoid financial distress, such as liquidation, dissolution and administration, up until January 2017 and 0 otherwise. The information for this variable was retrieved in February 2017 from the Companies House website, which registers company information and makes it available to the public.

4.2.2 Explanatory Variables

Due to the different settings under which we study success, we use two different sets of explanatory variables, based on theoretical background established in the hypothesis development chapter³, one for the financing analysis (funding ratio and number of investors) and another one for the post-campaign survival analysis.

For our financing analysis, we use the following variables:

- *Equity Offering*: in line with previous studies, we use equity offering, which is the amount of equity offered in a pitch, as a proxy for equity retention (*ER*) (Ahlers et al., 2015; Vismara, 2016). This variable was retrieved directly from the company page and can be easily accessed by all investors.⁴
- *Largest Investment/Target*: The largest investment value is reported on the main page of the pitch, which demonstrates the importance given to this information. In this sense, we use this variable as a proxy for herding behaviour (*HB*) on the financing operation.
- *Director experience*: the average difference between the campaign date and the date in which the company's directors were initially registered in the Companies House registry. This variable is widely regarded as an important signal of a start-

³ Note: For previous studies methodology check Appendix Table A.1.

⁴ This variable has a -1 correlation with equity retention, meaning that an increase of 1% in equity offered is equal to a decrease of 1% in equity retention.

up potential and considered to increase the likelihood of obtaining financing (Zacharakis and Meyer, 2000; Baum and Silverman, 2004).

- *Team Size*: this variable captures the amount of human capital (Ahlers et al., 2015), and is measured as the number of active directors registered at Companies House at the start of the campaign.
- *Female board participation*: number of female directors over total directors registered at Companies House at the start of the campaign.
 - *Director experience, Team Size and Female Board participation are proxies for Human Capital (HC)*.
- *Partnerships*: we use the dummy variable *partnerships* to measure the impact of social capital (*SC*), which takes the value of 1 if the firm presented a partnership in its crowdfunding pitch, and the value of 0 otherwise.
- *Financial Forecasts (FF)*: similarly to Ahlers et al. (2015), we use a dummy variable to measure the impact of providing financial forecasts, which is set to 1 if the company provides a financial forecast document in the campaign page, and 0 otherwise.
- *EIS and SEIS*: we use two dummy variables as proxies for tax benefits (*TB*), EIS and SEIS, which take the value of 1 if the company provides the respective tax relief, and 0 otherwise. These variables were retrieved from the company's campaign page, as Crowdcube puts some emphasizes on this information.

For the survival analysis we use *Equity Offering, Director Experience, Female Board Participation, Team Size, Partnerships, Financial Forecasts, EIS, SEIS*⁵ and *Honeymoon Period (HON)*, a dummy variable (0/1) which is set to one if the company was younger than two years old (Hudson, 1987), according to Companies House, at the start of the campaign.

Control variables

In line with previous studies (Mollick, 2014; Ahlers et al., 2015; Vismara, 2016) we control for target amount (*ln_Target*) as a measurement of project size (Ahlers et al.,

⁵ The measurements for these variables are the same for both regressions.

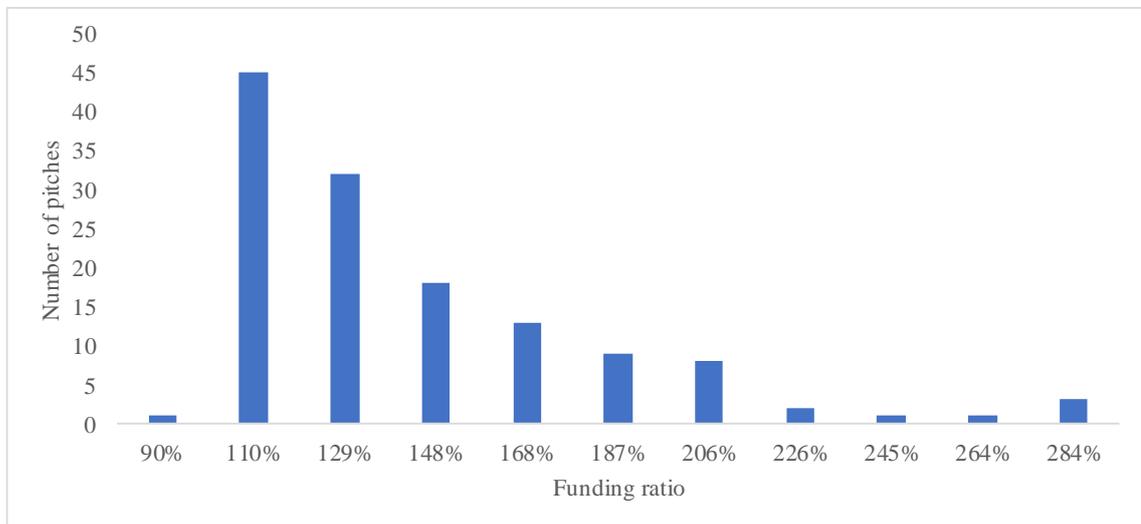
2015; Vismara, 2016) in our financing regressions and use *industry fixed effects* in all regression models.⁶

Additionally, we control for *year effects* in our survival regression analysis, as companies which were funded in 2013 have had more time to run into financial distress.

4.2.3 Financing Analysis Model

Because Crowdcube only keeps a public record of funded companies, the lowest funding ratio in our sample is of 90%, there is an issue of data truncation in our sample, as illustrated in Figure 3.

Figure 3 - Funding ratio histogram



Data truncation occurs when the range of the observable values for both dependent and independent variables are missing if the dependent variable is above or below a certain threshold (Brooks, 2014). In this case, the Ordinary Least Squares (OLS) will not be an appropriate approach to analyse the sample, as it would yield biased and inconsistent parameter estimates (Brooks, 2014), which means we must use a maximum likelihood approach like the truncated regression.

This issue also affects our second dependent variable, *number of investors*, as the lowest value in our sample is of 8 investors, while evidence from previous studies (Mollick, 2014; Ahlers et al., 2015; Sousa and Oliveira, 2015; Vismara, 2016) suggests that some projects cannot get funding from a single investor. As such, and due to the truncation on

⁶ Both target and industry are reported in the campaign pages.

funding ratio, we must assume that the population can have projects for which the number of investors is below 8 (with a minimum of 0), meaning that our sample for number of investors is also truncated from below, leading us to use the truncated regression model in this case as well.

In this context, and based on the previously established research framework, we use the dependent variables *funding ratio (FR)* and number of investors (*NI*) of our truncated regression model are truncated from below at 0.9 and 8 respectively, and the independent variables equity retention (*ER*), herding (*HB*), human capital (*HC*), social capital (*SC*), financial forecasts (*FF*) and tax benefits (*TB*).

$$FR_i = \beta_0 + \beta_1 ER_i + \beta_2 HB_i + \beta_3 HC_i + \beta_4 SC_i + \beta_5 FF_i + \beta_6 TB_i + \varepsilon_i$$

$$NI_i = \gamma_0 + \gamma_1 ER_i + \gamma_2 HB_i + \gamma_3 HC_i + \gamma_4 SC_i + \gamma_5 FF_i + \gamma_6 TB_i + \eta_i$$

4.2.4 Survival Analysis Model

Our aim in the post-campaign survival regression analysis is to understand the relationship between post campaign short-term survival and our explanatory variables.

In this case, as our dependent variable can only take the value of 0 or 1, we must use a model for mutually exclusive binary outcomes, such as the Probit or Logit, as these models use a function that effectively transforms the regression model so that fitted values are restricted within the (0,1) interval (Brooks, 2014).

For our analysis, we opted to use the logit model, in which the log odds of the outcome are modelled as a linear combination of the explanatory variables.⁷

As such, our post-campaign regression model has a binary dependent variable (*survival (SV)*), which can only take the value of 0 or 1, and we use the independent variables equity retention (*ER*), human capital (*HC*), social capital (*SC*), financial forecasts (*FF*), tax benefits (*TB*) and Honeymoon (*HON*).

$$SV_i = \alpha_0 + \alpha_1 ER_i + \alpha_2 HC_i + \alpha_3 SC_i + \alpha_4 FF_i + \alpha_5 TB_i + \alpha_6 HON_i + \mu_i$$

⁷ <https://stats.idre.ucla.edu/stata/dae/logistic-regression/>

Note: All the regressions and mean difference tests were conducted using Stata.

4.3 Descriptive Statistics

In this section, we present the descriptive statistics of our sample.

Table 1 - Descriptive Statistics

	Number of Observations	Mean	Std. Dev.	Min	Max
Funding Ratio	135	1.36	0.45	0.90	3.03
Number of Investors	135	126.89	95.07	8.00	640.00
Survival	135	0.81	0.39	0.00	1.00
Equity Offering	135	0.14	0.07	0.00	0.40
Largest Investment/Target	135	0.32	0.21	0.06	1.00
Director Experience	135	5.98	5.52	0.00	22.00
Female Board Participation	135	0.14	0.27	0.00	1.00
Team Size	135	2.39	1.46	1.00	7.00
Partnerships	135	0.36	0.48	0.00	1.00
Financial Forecasts	135	0.67	0.47	0.00	1.00
EIS	135	0.58	0.50	0.00	1.00
SEIS	135	0.37	0.48	0.00	1.00
ln_Target	135	11.87	0.88	9.90	15.42
Year1	135	0.32	0.47	0.00	1.00
Honeymoon	135	0.55	0.49	0.00	1.00

As illustrated in Table 1, the average funding ratio of our sample was of 136%, with a maximum of 303% and a minimum of 90%.⁸ Due to the nature of our dataset, which only includes successful campaigns, these results are very different from those offered by Vismara (2016), who presented a study on the dynamics of equity crowdfunding in the UK using data from Seeders and Crowdcube (2016).

Approximately half of our sample is composed by companies from the following industries: Food and Drink (24%), Professional and Business Services (16%) and Manufacturing (12%).⁹

Most of these companies are based in London (68 companies, which represents 50% of our sample), while Merseyside and Devon are the second most prominent locations (with five projects each).

⁸ As Crowdcube only allows access to information about funded companies, the sample statistics may differ greatly for the general population of the equity crowdfunding setting.

⁹ For more information on industry statistics see Appendix Figure A.2.

Looking at investors, we can see that on average the crowdfunding pitches attracted 127 investors, with some projects attracting more than 600 individuals, demonstrating crowdfunding's ability to reach many potential investors.

In terms of survival, our sample is in line with AltFi Data's (2015) report, with a short-term survival rate of 81%.

Average equity offering in our sample was of 14% for an average target size of £243.40 thousands, leading to an average estimated company value of £1,742,854.

The number of directors ranges between one single entrepreneur and seven, with an average female board participation of 14%. Although there are some unexperienced directors, the average director experience is of approximately 6 years.

The statistics for the *Honeymoon* variable indicate that 55% of these companies are younger than 2 years, and the average company's age of our sample is of 2.5 years, while the mode for age is of 1 year.

An analysis of the remaining statistics shows that 36% of the companies mentioned the existence of interfirm alliances in their pitch, while two thirds of the companies have provided financial forecasts, which is in line with the value reported by Ahlers et al. (2015) for ASSOB.¹⁰

Finally, if we look at tax relief statistics of our sample we can see that only 37% of the companies have qualified for SEIS, while 58% qualified for EIS.

Mean difference Test

In line with Ahlers et al. (2015) we conduct a mean difference test between fully funded and partly funded projects to understand whether and how fully funded pitches differ from partly funded companies in terms of quality signals, target amount and tax relief settings.

Out of the total sample of 135 projects, 113 were fully funded while 22 did not reach their target, which represents 16% of our dataset.

¹⁰ ASSOB is the Australian Small Scale Offerings Board: <https://assob.com.au/>

As illustrated in Table 2, our results show no statistical difference between fully funded and partly funded projects from our sample. For the financial forecasts variable, the test indicates statistical significance at a 10% level, which supports our hypothesis 5a¹¹, that providing financial forecasts increases the likelihood of obtaining a higher funding ratio.

This may be because all projects from our sample were considered successful and the average funding ratio for partially funded companies is of 96%, and as such is very close to 100%.

Table 2 - Mean difference test between fully funded and partly funded ventures¹²

	No. of observations	Fully Funded (mean)	Partly Funded (mean)	t-value
Equity Offering	135	0.14	0.13	-0.29
Largest Investment/Target	135	0.32	0.33	0.15
Director Experience	135	5.89	6.43	0.42
Female Board Participation	135	0.14	0.12	-0.39
Team Size	135	2.39	2.36	-0.08
Partnerships	135	0.38	0.27	-0.96
Financial Forecasts	135	0.71	0.50	-1.92*
EIS	135	0.57	0.59	0.14
SEIS	135	0.35	0.45	0.89
Target	135	£230,621.20	£309,071.40	0.69

Additionally, we use also a mean difference test to explore whether and how companies who have run into financial distress (*survival* = 0) differ from successful companies in terms of the described venture quality signals, uncertainty, age and tax relief.

¹¹ Hypotheses labelled as “a” refer to the impact of that variable in financing and hypotheses labelled “b” refer to its impact on firm survival.

¹² Note: Table 2 presents the mean comparison test (t-test) for fully funded (113) and partly funded (22) companies. ***, **, * indicate statistical significance at 1%, 5% and 10% respectively.

Table 3 shows that ventures with higher equity offerings and younger ventures (companies in the “honeymoon period” are less than two years old) are associated with short-term failure, while partnerships are associated with success, which supports our hypothesis 1b and 4b.

As we expected most of the companies who have run into financial distress are from the first year of our sample (2013), as 14 out of the 43 companies that raised funding in 2013 have either filed for liquidation, dissolution or are under administration.

Table 3 - Mean difference test between short-term success and failure¹³

	No. of observations	Success (mean)	Failure (mean)	t-value
Equity Offering	135	0.13	0.18	2.84***
Director Experience	135	6.25	4.86	-1.15
Female Board Participation	135	0.12	0.19	1.14
Team Size	135	2.41	2.27	-0.45
Partnerships	135	0.4	0.19	-2.03**
Financial Forecasts	135	0.69	0.57	-1.17
EIS	135	0.57	0.62	0.42
SEIS	135	0.39	0.31	-0.73
Year1	135	0.27	0.54	2.73***
Honeymoon	135	0.50	0.73	2.10**

The failure rate for 2013 was of 33%, one third of the sample, while 2014 only presents a failure rate of 13% so far.

Through this analysis, we find no initial support for our hypothesis 3b, 5b and 6b, as our results show no significant difference between successful and unsuccessful companies in terms of human capital, financial forecasts and tax relief.

¹³ Table 3 presents the mean comparison test for successful (109) and unsuccessful companies (26). ***, **, * indicate statistical significance at 1%, 5% and 10% respectively.

Correlation Matrix

Table 4 shows the correlations between the explanatory variables of our study.

The variable Director experience has the highest amount of significant correlations, if we consider a significance level of 1%. There is evidence of positive correlation between Director Experience and the variables Team Size and EIS (0.23 and 0.25, respectively) and of a negative correlation between the latter variable and the variables Equity Offering and Honeymoon (-0.25 and -0.26, respectively). Additionally, if we consider a significance level of 10%, there is evidence that the variable Honeymoon is positively correlated with 2 variables: Equity Offering and SEIS and negatively correlated with 4: Director Experience, Team Size, Partnerships and EIS.

Table 4 - Spearman rank correlations

	1	2	3	4	5	6	7	8	9	10
1 Equity Offering	1.00									
2 Largest Investment/Target	-0.10	1.00								
3 Director Experience	-0.25***	-0.02	1.00							
4 Female Board Participation	0.22**	-0.08	-0.08	1.00						
5 Team Size	-0.07	0.19**	0.23***	0.11	1.00					
6 Partnerships	-0.09	0.02	0.08	-0.10	0.09	1.00				
7 Financial Forecasts	-0.11	0.04	0.00	-0.01	0.09	0.00	1.00			
8 EIS	-0.04	-0.08	0.25***	0.03	0.17	-0.01	0.01	1.00		
9 SEIS	0.15*	-0.11	-0.09	-0.04	-0.06	-0.16*	-0.02	-0.24*	1.00	
10 Honeymoon	0.18**	-0.06	-0.26***	0.11	-0.17*	-0.18**	-0.09	-0.26*	0.32*	1.00

*, ** and *** indicate that the correlations are statistically significant at the significance levels of 10%, 5% and 1% respectively

5. Results

The results of our regression analysis are presented in Table 4 and Table 5. Respectively for the dependent variables measuring financing success and post-campaign survival.

Table 5 -Determinants of financing success in the equity crowdfunding setting

This table presents the marginal effects and robust standard errors (in parentheses) from our financing regressions. Model 1 and 2 are truncated regressions, with truncation at 0.89 and 7, respectively, which were set at this level to ensure that no observations were left out. The dependent variable for Model 1 is the pitch *Funding Ratio*, which measures the percentage of target capital raised in each operation, and for Model 2 we use *Number of Investors*, which counts the number of individual investors that invested in a crowdfunding pitch, as reported in the respective campaign page. The explanatory variables for these models include: percentage of equity offered in the pitch (*Equity Offering*), the largest individual investment over target amount, average director experience (*Director Experience*), percentage of female board participation (*Female Board Participation*), number of active directors at the time of the pitch (*Team Size*) and binary variables for the provision of financial forecasts (*Financial Forecast*) and tax benefits (*EIS and SEIS*). Additionally, we control for industry fixed effects and target amount (using *logs of target amount*) in both regressions.

	Funding Ratio	No. of investors
Equity Offering	-6.011*** (2.197)	-318.500** (154.300)
Largest Investment/Target	0.903* (0.525)	-255.900*** (93.300)
Director Experience	-0.027 (0.029)	-0.683 (1.932)
Female Board Participation	-0.459 (0.358)	-24.780 (31.950)
Team Size	0.246*** (0.094)	4.688 (9.987)
Partnerships	-0.019 (0.246)	9.014 (26.060)
Financial Forecasts	0.669** (0.329)	84.060*** (28.320)
EIS	0.209 (0.255)	0.122 (23.530)
SEIS	-0.567* (0.318)	-34.480 (27.580)
Ln_Target	-0.317** (0.154)	88.320*** (23.030)
Industry Fixed Effects	Yes	Yes
Constant	3.709** (1.737)	-887.700*** (281.000)
Observations	135	135
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1	

In general, the results for our financing regressions are consistent with the view that signalling venture quality and reducing uncertainty leads to higher levels of financing ratio and a to a more dispersed group of shareholders.

As predicted, equity retention is positively associated with financing success, as higher levels of equity retention by the entrepreneur are associated with higher funding volumes and more investors per pitch. The marginal effect for an increase in equity offering (which equates to a decrease in equity retention in the same level) is of -6.011 at a significance of 1% for funding ratio and of -318.5 at a significance level of 5% for number of investors. These results are in line with previous studies on the matter (Ahlers et al., 2015; Vismara, 2016) and demonstrate that, as Leland and Pyle (1977) suggest, retaining equity acts as a quality signal.

The effect of large investments is not as consistent across both models, as although it does have a positive impact on the company's funding ratio (partly supporting hypothesis 2), it has a large negative impact on the number of investors, with a marginal effect of -255.9 at a significance level of 1%. This effect is probably due to the fact that by purchasing a large block of shares, large investors decrease the number of available shares for the remaining potential investors. Therefore, results are not supportive of herding behaviour. In this context, it would be interesting to study the effect of large investments under a different scope, as it would be interesting to look at the number of other investors prior and post large investments and also the impact of this variable on the time it takes to complete a round of funding.

The results for team size are similar to those of Ahlers et al. (2015), as a larger number of directors is associated with higher levels of funding, but in contrast with our predictions, we find no relationship between signals of qualified human capital and number of investors. These results are especially interesting as director experience, which is regularly associated with financing success (Zacharakis and Meyer, 2000; Baum and Silverman, 2004), appears to have no impact on the financing operation success.

In line with Ahlers et al. (2015) findings on social capital, we find no relationship between partnerships and financing success. This may be because this information is not

highlighted in the campaign pitch, unlike the remaining variables of our study, as it is generally presented as a side note in the market information section of the campaign.

Additionally, it is interesting to notice, that Vismara (2016) who uses LinkedIn connections as a proxy for social capital, found this signal to have a positive impact in the financing stage, highlighting the impact of social networks on this type of financing.

As we hypothesised, providing financial forecasts is associated with a higher funding ratio and number of investors (Epstein and Schneider, 2008), with a marginal effect of 0.669 at a significance level of 1% in our funding ratio model and a marginal effect of 84.06 at a significance level of 5% in our number of investors model.

In terms of tax relief, the results for EIS do not indicate any relationship between this type of tax benefit and financing success, while the results for SEIS contradict our hypothesis that the provision of this tax benefit has a positive impact on funding, as the marginal effect of this variable on funding ratio is of -0.567 at a significance level of 10%.

As for our control variables, an increase in target size is associated with a lower funding ratio and a higher number of investors, which was to be expected, as a larger target may be harder to reach but allows for a larger number of investors to pitch in (assuming average investment value is preserved).

Table 5 presents the results for the survival regression. Equity offering, partnerships, SEIS and honeymoon period are the only variables with a statistically significant predictive value for the odds of avoiding short-term financial distress. Information such as team size and financial forecasts, which had positive impact on the financing stage, have no significance in what concerns the prediction of short-term survival.

In line with our hypothesis, equity retention is positively associated with higher odds of survival, as an increase in equity offered as a negative marginal effect of -0.723 at a significance level of 5%. This may result from the fact that by retaining higher levels of equity, entrepreneurs can incur an increased loss of wealth should the company fail, which in turn may act as an extra financial motivation to make the venture succeed (Wilson and Altanlar, 2014). Furthermore, equity retention is associated with higher levels of venture

quality (Leland and Pyle, 1977), which is generally associated with a lower probability of financial distress.

Table 6 - Determinants of short-term survival in the equity crowdfunding setting¹

This table presents the marginal effects and robust standard errors (in parentheses) from our post-campaign regression. The dependent variable survival is a binary variable, which takes the value of 1 if the venture managed to avoid short-term financing distress and the value of 0 otherwise, and the specification for this regression is a logit model. The explanatory variables for this model include: percentage of equity offered in the pitch (*Equity Offering*), average director experience (*Director Experience*), percentage of female board participation (*Female Board Participation*), number of active directors at the time of the pitch (*Team Size*) and binary variables for the provision of financial forecasts (*Financial Forecasts*), tax benefits (*EIS and SEIS*) and for early-stage companies – under two years (*Honeymoon*). Additionally, we control for industry fixed effects and campaign year (*Year1*), which indicates if the campaign took place in the first year of our sample.

	Survivability
Equity Offering	-0.723** (-0.396)
Director Experience	0.006 (0.006)
Female Board Participation	-0.036 (0.103)
Team Size	-0.004 (0.020)
Partnerships	0.104* (0.055)
Financial Forecasts	-0.028 (0.072)
EIS	-0.026 (0.064)
SEIS	0.104* (0.058)
Industry Fixed Effects	Yes
Year1	-0.145 (0.097)
Honeymoon	-0.133* (0.067)
Constant	3.873*** (1.306)
Observations	135
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1

¹ Regression coefficients are presented in Appendix Table A.2.

The results for human capital (Director Experience, Female Board Participation and Team Size) show no relationship between any of the three variables used to measure this feature and the probability of survival, an interesting result as most authors agree that experience and board diversity have a positive impact on the company's ability to thrive (Singh et al., 2001; Wilson and Altanlar, 2014).

We also find no evidence of a relationship between increased levels of preparedness (obtained through the preparation of financial forecasts) and a lower probability of short-term failure.

Social capital, which is measured through partnerships, is positively associated with short-term survival, with a marginal effect of 0.104 at a significance level of 10%. This result is in line with our hypothesis 4b and with previous studies on venture capital who provide evidence that alliances offer numerous advantages which increase the odds of survival for early-stage companies (Baum and Silverman, 2004; Chua et al., 2010; Wilson and Altanlar, 2014).

In terms of tax relief, while EIS appears to have no effect on survival, we find evidence that companies which qualify for SEIS are less likely to face financial distress, which contrasts with our hypothesis for this variable.

Lastly, the results for year 1 companies (those who sought funding in 2013) contrast with our preliminary analysis, as we find no relationship between short-term failure and this variable, while companies which were in their honeymoon phase at the moment of financing (companies which were younger than two years old when they applied for financing through crowdfunding) are associated with higher odds of short-term failure.²

² As illustrated in Table 3 (pp. 31) and Appendix Figure A.3, 73% (19/26) of the ventures who have run into short-term financial distress were classified as "Honeymoon" (companies with less than 2 years).

6. Conclusions

Crowdfunding is qualitatively different from existing forms of financing, as it allows for a closer relationship between lenders and borrowers, by removing regular financial intermediaries and introducing social features, such as comments or questions, in the funding process.

This alternative finance method can be classified as both financial innovation and source of innovation, as it creates an environment through which entrepreneurs can share their ideas, no matter how wild these may seem, and get feedback from potential customers or investors. This process leads to an improved research and development cycle and, if used correctly, may greatly decrease project sunk costs.

These features make crowdfunding an appealing concept, but there are also some problems to consider when assessing the value of crowdfunding as a new method of financing.

Crowdfunding shares, or even aggravates, some common financial markets issues, such as information asymmetries, moral hazard, adverse selection and principal-agent problem, which crowdfunders are expected to be less equipped to deal with. This could have a negative impact on the viability of the model, but similarly to what happens in conventional financial markets, crowdfunders may find ways to circumvent those issues through signalling.

Our study focuses on the impact of these signals on the funding operation and post-campaign survival, investigating how these are influenced by quality signals, actions to reduce uncertainty, investor behaviour and tax benefits.

In similarity to previous studies, we find that equity retention is positively associated with higher levels of funding ratio and a larger number of investors, as it allows signalling venture quality to investors. It is interesting to note that higher levels of equity retention are also associated with lower probability of short-term failure, which emphasizes the relevance of this signal.

Our research also indicates, that providing financial forecasts is associated with higher levels of funding and a larger number of investors, demonstrating the importance of uncertainty reduction in this financing method.

Neither experience nor gender have any impact on both financing success and post-campaign survival, which contrasts with the literature on venture capital financing and venture survival.

In general, our results show that venture quality signals and uncertainty levels have an impact on the funding operation success, but only equity retention and partnerships seem to provide useful insights on the probability of short-term venture survival.

We should also note that 73% of the companies that have run into financial distress were in their “honeymoon period” when they resorted to crowdfunding, demonstrating that this group of companies presents higher levels of risk (25% of the “honeymoon” companies have run into financial risk, while only 11% of older companies have faced any issues).

The results of our study provide a better understanding of the equity crowdfunding phenomena, as we look into both financing success and post-campaign survival and provide evidence on the importance of reducing information asymmetries in the financing process and the importance of the equity retention, social capital and honeymoon signals as predictors for post-campaign survival. However, limitations such as only being able to access information about successful pitches and restricted access to company financials prior to the campaign date limit the interpretation of our findings.

It would be interesting to conduct a similar study using a full database, with all the financing operations in the UK equity crowdfunding arena and compare the results with the results obtained so far. Additionally, an analysis of the company’s financials and their development would give us additional insight on the main reasons behind short-term failure, information which could be useful for both investors and entrepreneurs.

There are still a lot of issues to be tackled in the equity crowdfunding setting, and as such we expect literature regarding this matter to increase exponentially in the next few years.

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7. Appendix

7.1 Additional Tables

Table A.1 - Methodological aspects of previous studies

Authors	Platform	Sample Size	Financing
Agrawal et al. (2011)	Sellaband	4,712	Successful
Moutinho and Leite (2012)	Kickstarter	18430	Successful
Ethan Mollick (2014)	Kickstarter	48,526	Successful and unsuccessful
Ahlers et al. (2015)	ASSOB	104	Successful and unsuccessful
Sousa and Oliveira (2015)	PPL	613	Successful and unsuccessful
Vismara (2016)	Crowdcube and Seedrs	271	Successful and unsuccessful

Table A.2 - Logit Regression results

This table presents the coefficients and robust standard errors from our survival regression. The dependent variable survival is a binary variable, which indicates whether the company managed to avoid short-term financing distress since the end of the campaign, and is modelled using is a logit model. The explanatory variables for this model include: percentage of equity offered in the pitch (*Equity Offering*), average director experience (*Director Experience*), percentage of female board participation (*Female Board Participation*), number of active directors at the time of the pitch (*Team Size*) and binary variables for the provision of financial forecasts (*Financial Forecast*), tax benefits (*EIS and SEIS*) and for early-stage companies – under two years (*Honeymoon*). Additionally, we control for industry fixed effects and campaign year (*Year1*), which indicates if the campaign took place in the first year of our sample.

	Coef.	Std. Error	z	P> z
Equity Offering	-6.004	3.020	-1.990	0.047
Director Experience	0.048	0.054	0.890	0.370
Female Board Participation	-0.295	0.857	-0.340	0.731
Team Size	-0.036	0.168	-0.210	0.832
Partnerships	0.941	0.561	1.680	0.090
Financial Forecasts	-0.237	0.637	-0.370	0.710
EIS	-0.219	0.541	-0.400	0.686
SEIS	0.929	0.531	1.750	0.080
Industry Fixed Effects	-0.919	0.567	-1.620	0.105
Year1	-1.049	0.655	-1.600	0.109
Honeymoon	-1.135	0.598	-1.900	0.058
Constant	3.873	1.097	3.530	0.000
Observations	135			
Wald $\chi^2(11)$	19.900			
Log likelihood	-54.470			
Pseudo R2	0.177			

7.2 Additional Figures

Figure A.1 - The evolution of United Kingdom net lending volume¹

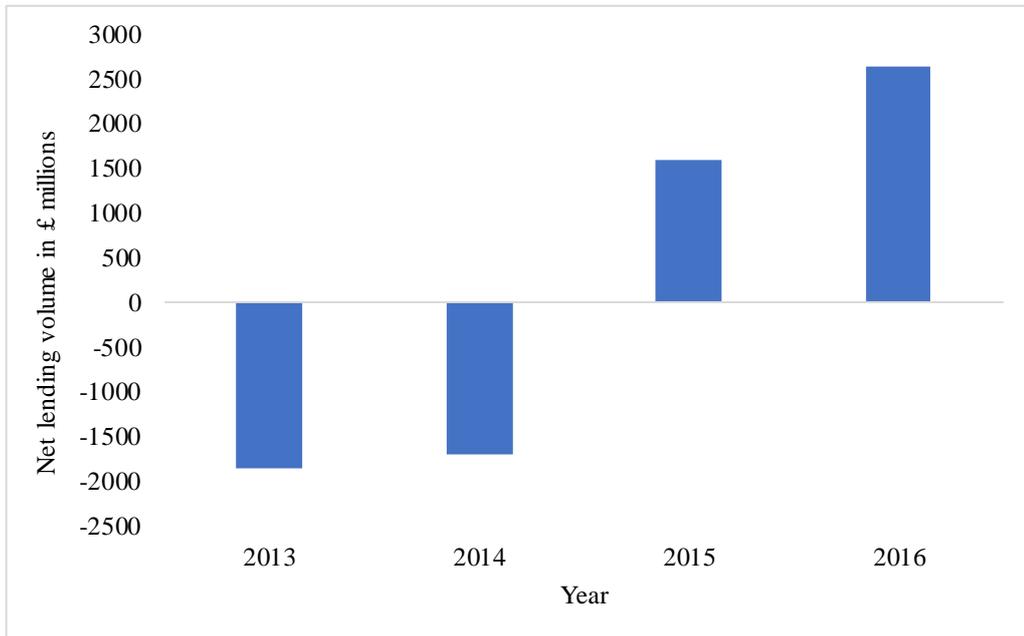
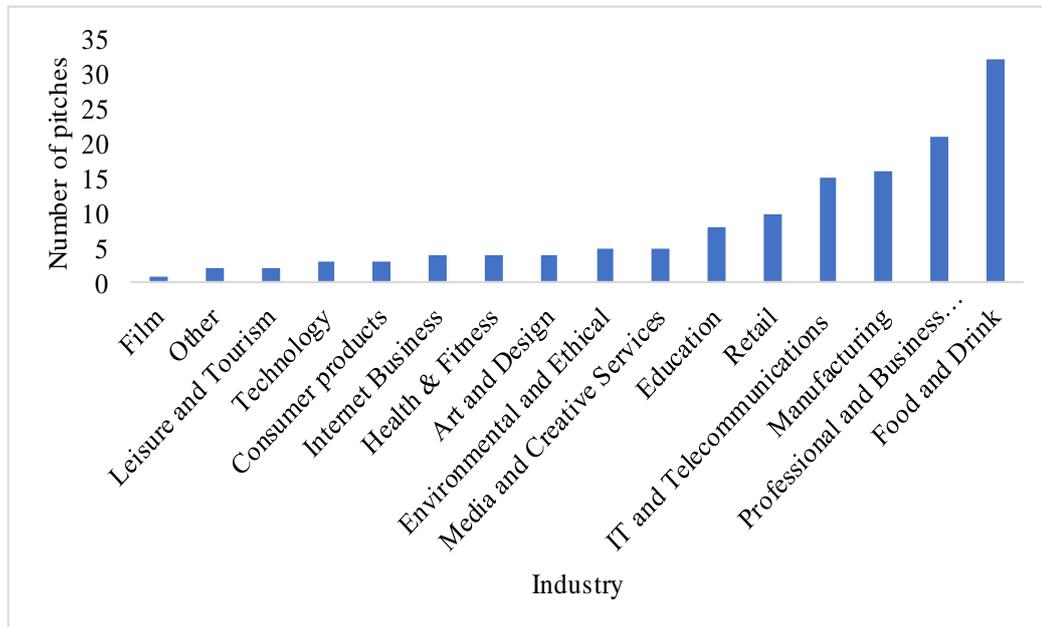


Figure A.2 - Number of crowdfunding campaigns per industry



¹ Source: <http://www.bankofengland.co.uk/statistics/Pages/bankstats/default.aspx>

Figure A.3 - Number of companies in financial distress per age

