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# **Entrepreneurial borrowing: Do entrepreneurs seek and receive enough credit?**

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## **Abstract**

The paper reviews the literature on entrepreneurial borrowing. The dynamic concept of the “entrepreneurial credit journey” is developed to frame the discussion of supply and demand side issues affecting entrepreneurial borrowing. The entrepreneurial credit journey follows the entrepreneur from the development of credit needs, through application and lending decisions and, beyond, to the consequences of these earlier decisions for firm performance. The literature has traditionally focussed on the lending decision stage, including: problems of credit rationing which may arise due to asymmetric information; and lending technologies to reduce information issues. However, on the demand side, discouraged borrowers, who decide not to apply for fear of rejection, have received increasing attention. There is also greater attention to issues of entrepreneurial cognition (e.g., over-optimism, illusion of control) which may adversely affect borrowing decisions.

In terms of the firm performance effects of credit access, the paper highlights the widely used internal finance approach to testing financial constraints is unidentified because it is unable to disentangle financial from cognitive constraints. An alternative, more direct, external funding gaps test of underinvestment is therefore proposed. The policy literature is also reviewed which suggests that assistance in the form of loan guarantees has been both finance and economic additional (i.e., providing entrepreneurs with credit they cannot get elsewhere and helping to create jobs that would not otherwise have been created) especially following the Great Financial Crisis.

A discussion of the literature relating to underrepresented groups in the entrepreneurial credit market highlights that female and ethnic minority entrepreneurs may receive less credit, and/or pay a higher rate on the credit they receive, than their male or white counterparts. This speaks to ongoing issues of gender stereotypes and ethnic discrimination in the credit market. The increasing role of peer-to-peer lending following the Great Financial Crisis, and its potential for ‘democratizing entrepreneurial finance’, is discussed. This literature highlights that, while peer-to-peer lending is helping to fill credit gaps following the Great Financial Crisis, there are issues relating to the performance of small business peer-to-peer loans and possible issues of ethnic discrimination.

The paper concludes with proposals for future research on entrepreneurial borrowing, including: collecting more data relating to entrepreneurial credit journeys; developing tests for the presence of information asymmetries and the nature of selection in entrepreneurial credit markets; testing relationships between stages of the entrepreneurial credit journey (e.g., to shed light on the causes of discouragement); developing tests which disentangle financial from cognitive constraints; and researching entrepreneurial and bank learning over recurrent entrepreneurial credit journeys.

**Keywords:** Entrepreneurial borrowing; credit rationing; discouraged borrowers; financial constraints; firm performance; enterprise policy

**JEL classification:** L25 (Firm performance), L26 (Entrepreneurship), L53 (Enterprise policy)

## 1. Introduction

Bank credit is the main source of external finance for entrepreneurs who want to start-up or grow their businesses. For example, while currently around 8% of small businesses in the UK use term loans from banks to fund fixed assets, and over 17% use overdraft facilities for working capital, only around 2% use external equity obtained from venture capitalists (VC) or business angels (British Business Bank, 2019)<sup>1</sup>. Similarly, in the US, whereas more than 60% of small businesses report using any type of credit, and between 10% and 25% use loans to fund different types of fixed assets (Mach and Wolken, 2006), only around 5% of the total funding on small business balance sheets is accounted for by VC or angel finance (Berger and Udell, 1998)<sup>2</sup>. Indeed, whilst firms backed by external equity providers may contribute disproportionately to job creation and growth, only a very small minority of entrepreneurs have the high growth potential and ambition to attract external investors (e.g., Manigart and Wright, 2013). In addition crowdfunding, in its various forms, remains the preserve of a select, if rapidly growing, minority (e.g., Wallmeroth et al 2018).

However, despite this reliance on bank credit, there are structural issues stemming from imperfect information in credit markets, which may result in entrepreneurs not receiving enough credit to meet their funding requirements. In short, the problem is that banks may not know entrepreneurs' ability, willingness, or motivation to repay loans. These information issues, arising both before and after credit is granted, may in certain circumstances leave entrepreneurs with unmet credit needs in equilibrium, in which case they are credit rationed (Jaffee and Russell, 1976; Stiglitz and Weiss, 1981). Accordingly, the availability of personal wealth to fill funding gaps left unmet by the credit market may be an important determinant of new venture creation and performance (Evans and Jovanovic, 1989).

Yet, in many classical writings on entrepreneurship, the role of the capitalist and entrepreneur are distinct. It is the role of the entrepreneur to co-ordinate economic activity (Say, 1803), innovate (Schumpeter, 1911), or move markets toward equilibrium through arbitrage (Kirzner, 1973, 1997), with profit the reward for carrying out these functions. The role of the capitalist/banker, on the other hand, is to fund entrepreneurial activities and receive interest as their reward for risk bearing:

"The entrepreneur is never the risk bearer...The one who gives the credit comes to grief if the undertaking fails" (Schumpeter, 1911, p. 137)

However, other writers have positioned risk-bearing, and by implication self-financing, as an intrinsic part of the entrepreneurial function. In Cantillon's (1755) view, the entrepreneur commits to buying products and hiring labour unsure of what consumers will be willing to pay for the final product. Profit is the entrepreneur's reward for bearing the downside of price fluctuations.

In more recent times, Knight (1921) made an important distinction between risk and uncertainty. In Knight's view: "The conception of an objectively measurable probability or chance [i.e., risk] is simply inapplicable [to entrepreneurial contexts]." (Knight, 1921, p.231). Instead, entrepreneurial decision making is made in a world of uncertainty in which, in contrast to risk, the probabilities of random

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<sup>1</sup> Before the financial crisis of 2007-2008, 20% of small businesses used term loans and over 40% used overdraft facilities, while around 3% used external equity (Fraser, 2009a).

<sup>2</sup> Unfortunately, there are no comparable data in the US post 2007-2008. This and other data issues are discussed later in the paper.

events such as price fluctuations are unknown. Entrepreneurs must therefore make decisions based on their subjective beliefs about the likelihood of price changes and other relevant factors for their decision making. However, while profit is the entrepreneur's reward for bearing uncertainty, there is no capitalist with whom to share the downside. In other words, the entrepreneur must act as their own capitalist.

This literature provides rigorous theoretical foundations for the situation of imperfect information (i.e., uncertainty) in credit markets claimed at the start of the discussion. Indeed, the question of whether entrepreneurs receive enough credit may be framed (more eruditely) in terms of whether Schumpeter or Knight was right about the nature of the entrepreneurial and capitalist roles in the economy (e.g., Evans and Jovanovic, 1989).

However, it is clear that uncertainty affects not only lenders' decisions to provide credit but also entrepreneurs' decisions to seek credit (and how much). Accordingly, how entrepreneurs make decisions in the presence of too little (or too much) information has received increasing attention in the entrepreneurship literature (e.g., Mitchell et al, 2007).

In this context, the central question of this paper is therefore: do entrepreneurs seek and receive enough credit (in a situation of uncertainty)?

### 1.1 Great Financial Crisis

The seminal event affecting entrepreneurial borrowing in recent years was the Great Financial Crisis (GFC) of 2007-2008. Empirical macroeconomic studies highlight the positive and causal relationship between financial development (private sector credit/GDP) and economic growth (King and Levine, 1993; Rajan and Zingales, 1998). That is, credit flows to the real economy, and to businesses in particular, are important for economic development (Beck et al, 2012). In this regard, the GFC caused major disruption in entrepreneurial credit markets worldwide, leading to significant declines in credit flows, and causing a global recession that affected all but a few countries (e.g., Ball, 2014).

The signal event of the GFC was when Lehman Brothers filed for Chapter 11 Bankruptcy protection on September 15<sup>th</sup> 2008 having announced \$3.9bn in losses for the second quarter of that year. Following Lehman's collapse money market interest rates rose sharply and inter-bank lending froze as the market feared that other banks would be allowed to fail<sup>3</sup>. Consequently, an important source of funding for small business loans dried up. In addition, banks' capital was reduced by the writing down of bad loans, which threatened the solvency of some banks and further stemmed the flow of credit to entrepreneurs (Jimenez et al, 2012). The level of government intervention worldwide to increase credit flows to the real economy and stop further bank collapses was unprecedented (in relation to the US policy response to the GFC see: Berger et al, 2014; and DeYoung, 2014; regarding the policy response in EU countries, see Goddard et al, 2014)<sup>4</sup>.

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<sup>3</sup> 3 month LIBOR rates peaked at 6.3075% on 1<sup>st</sup> October 2008, which was over 130 basis points above the Bank of England base rate (source: [www.bba.org.uk](http://www.bba.org.uk)).

<sup>4</sup> A key difference between the UK and US policy response to the financial crisis was that the UK government re-capitalized the banks whereas the US government established a Troubled Asset Relief Program (TARP) to purchase toxic assets from the banks (Berger et al, 2014). As a result of its re-capitalization policy, the UK Government became the main shareholder in the Royal Bank of Scotland Group (RBSG) after taking an initial

Small businesses were particularly vulnerable during the GFC in view of their reliance on bank credit for external financial support. In this respect, evidence in the immediate aftermath of Lehman's collapse indicated small businesses were finding it much harder to obtain credit, were experiencing the withdrawal of previously made offers of credit, and were experiencing large increases in the cost of borrowing. Even firms with good credit histories were affected by these issues (see FSB, 2008). Survey evidence from the UK Survey of Small and Medium Sized Enterprise Finance (UKSMEF) 2008 confirmed anecdotal suspicions and indicated that rates of loan denial and loan margins had both increased (Fraser, 2009a). In addition, more small businesses were having their loans denied due to a lack of collateral suggesting banks had become more risk averse. An important study of Spanish loans by Jimenez et al (2012) identified a reduction in lending to small firms due to bank balance sheet impairment following the GFC. Evidence from other countries in North America, Europe, and Asia suggests that businesses worldwide were facing similar very difficult financing conditions following the GFC (Campello et al, 2010).

The GFC has also had an impact on academic researchers in the field of banking, raising new questions about: the relationship between financial development and growth, and the role of the state in the financial system; the role and importance of financial innovation and securitisation in bank performance; the costs and benefits derived from the increased size of banks; and the links between banking competition and risk (Berger et al, 2014). Some of these issues directly bearing on entrepreneurial borrowing are considered later in this paper.

## 1.2 Purpose and scope of paper

The purpose of the paper, broadly, is to review the extant literature on entrepreneurial borrowing and to provide insights into some of the key concepts and findings in the literature. The term 'entrepreneurial borrowing' is used as shorthand for 'borrowing by Small and Medium Sized Enterprises (SME's)'. The 'entrepreneur' in this context is therefore synonymous with the owner-manager of the SME. Accordingly, 'entrepreneur' encompasses both 'lifestyle entrepreneurs', who form the vast majority of SME's, as well as the high growth aspiring innovator in the tradition of Schumpeter and Baumol (1990, 1993). Speaking directly to this point, de Bettignies (2008) provides comparisons between the financing of lifestyle and high growth ventures and highlights that lifestyle ventures use predominantly debt to fund their ventures whereas high growth ventures mainly use equity type instruments.

The emphasis on the term 'borrowing' (as opposed to 'lending') indicates there is a particular interest in this paper in exploring issues related to the demand for credit. In this respect, issues of entrepreneurial cognition and cognitive biases (e.g., Baron, 1998; Mitchell et al, 2007), along with related insights from the behavioral finance literature (e.g., Barberis and Thaler, 2002; Baker and Wurgler, 2013), receive due attention insofar as they may affect entrepreneurs' borrowing decisions. Of course, examining the other (supply) side of the equation (i.e., 'banks' and 'lending' to SME's) is unavoidable in view of its prominence and coverage in the literature (e.g., Udell, 2015). However, taking an 'entrepreneurial borrowing' perspective on the topic seems apt for the journal *Foundations and Trends in Entrepreneurship*.

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58% stake in the bank in November 2008. The government equity was required to re-capitalise RBSG due to write-downs on risky loans and a loss-making takeover of ABN Amro carried out in 2007.

A discussion of entrepreneurial finance more generally relating to venture capital, angel finance, or equity crowdfunding is out-with the scope of this paper. The reader is referred to articles by Manigart and Wright (2013), Edelman et al (2017), and Wallmeroth et al (2018) for comprehensive coverage of the literature relating to non-debt sources of entrepreneurial finance.

### 1.2.1 Previous reviews of the entrepreneurial credit literature

What value added can this paper provide compared to previous reviews of the literature relating to the availability of SME credit (e.g., Parker, 2002; Udell, 2015)? A first general point of difference with Parker (2002) is that there is more coverage in the current paper of the business and management literature on entrepreneurial borrowing, an area of the literature that has grown rapidly since Parker's article. Relatedly, issues of ethnic and gender discrimination in entrepreneurial credit markets and the role of peer-to-peer lending following the GFC, have received increased attention in recent years especially in the business/management literature, and are therefore covered in this review. Equally, the evidence regarding the impact of the GFC on entrepreneurial credit conditions is another new and important area of discussion.

Another issue, which has received much more attention in both the economics/finance and business/management literatures since Parker (2002), relates to discouraged borrowers. This literature recognises that credit market imperfections may lead some entrepreneurs with credit needs to self-ration (Kon and Storey, 2003; Han et al, 2009a). That is, despite having credit needs, the entrepreneur refrains from applying for credit for fear of rejection by an imperfectly informed lender. Increasingly, it has become recognised that self-rationing is potentially a greater constraint on entrepreneurship than traditional credit rationing (Fraser, 2014a). The issue of discouraged borrowers therefore receives much more attention in this paper.

More recently, Udell (2015) provides a thorough assessment of what we know from the academic literature about SME access to intermediated credit, through the prisms of SME lending technologies and lending channels. In particular, the idea of SME lending technologies builds on earlier work by Berger and Udell (2002, 2006), which emphasizes that banks lend to SME's using a variety of different relational and transactional lending technologies, involving both soft and hard information, to overcome information asymmetries (see also Stein, 2002; Liberti and Petersen, 2018).

An SME lending channel "is a two dimensional concept that pairs a lending technology with a type of financial institution that offers the technology" (Udell, 2015, p 21). The concept of SME lending channels was introduced by Taketa and Udell (2007) to analyze the impact of the Japanese banking crisis on SME credit. More generally, a key benefit of the SME lending channels paradigm is that it can be used to frame the effects of financial shocks on SME access to credit. Applying this paradigm to the GFC, and looking at a number of studies which identify credit supply effects using European data sources (e.g., Jimenez et al, 2012; Carbo-Valverde et al, 2016), Udell (2015) concludes:

"Overall these studies have found, among other things, evidence of a significant credit crunch with a bigger effect associated with banks under more stress and in countries under more stress." (Udell, 2015, p24)

In terms of points of difference with Udell's (2015) paper, the emphasis in the current paper on 'entrepreneurial borrowing' (rather than 'bank lending') leads to more discussion of issues such as

discouraged borrowers, and ethnic/gender discrimination in the credit market. In addition, in contrast to Udell (2015), the current paper reviews the financial constraints literature that has traditionally looked at the relationship between the firm's internal finances and investment for evidence of financial constraints. (In a perfect capital market there should be no relationship between the firm's financing and investment decisions, as suggested in the seminal paper on capital structure by Modigliani and Miller, 1958). However, a key issue highlighted in this paper is that internal finance tests are unable to distinguish supply side financial constraints from demand side cognitive constraints. That is, internal finance tests are unidentified. An alternative, better identified, test of underinvestment based on external funding gaps (due to non-borrowing, discouragement, or rejection by a lender) is therefore proposed. However, inevitably, there is some overlap between Udell's (2015) review and the current paper, including the topics of lending technologies and the impact of the GFC on SME lending.

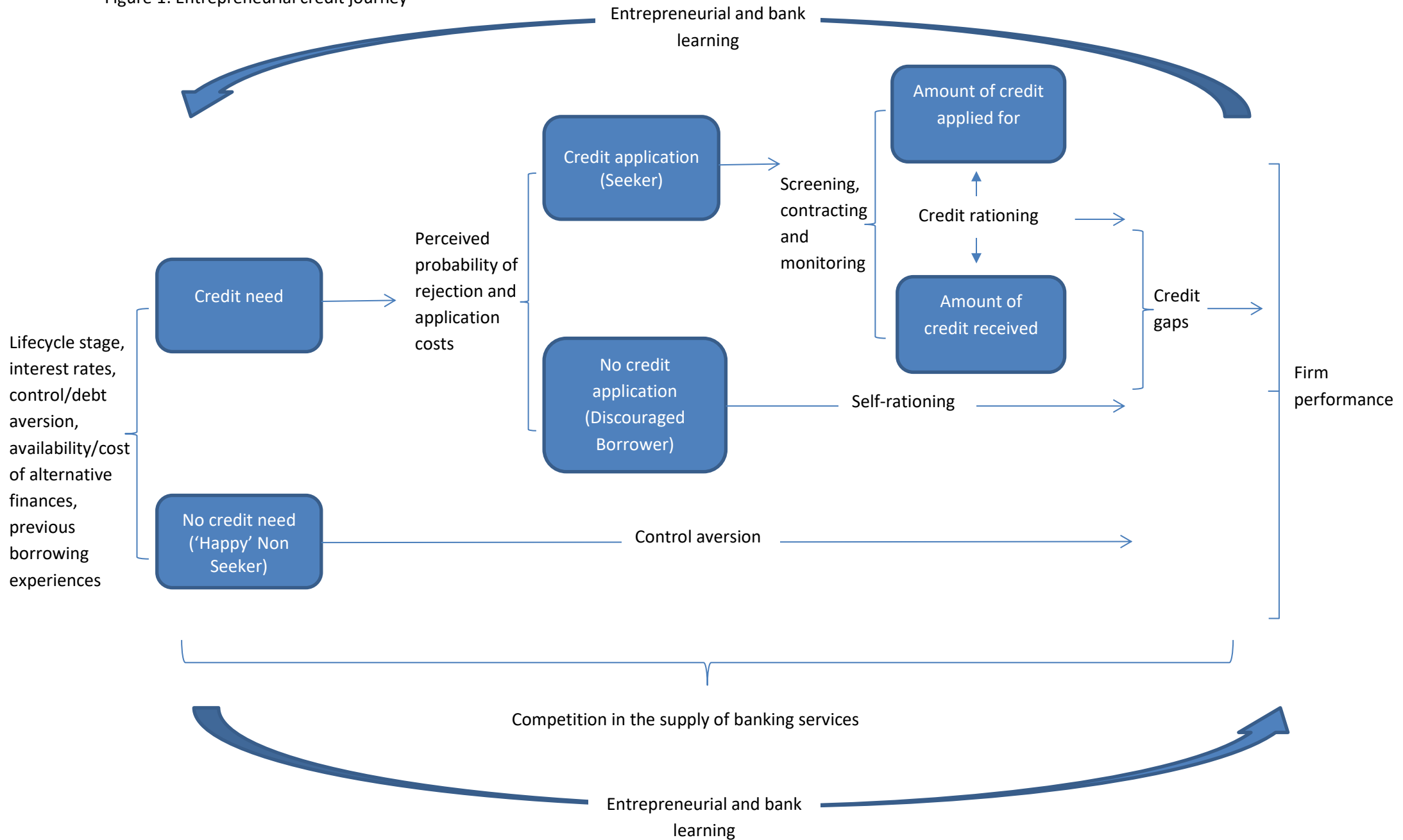
### 1.3 Entrepreneurial credit journeys

To help structure the paper, and frame its core themes and concepts, the overarching concept of the 'entrepreneurial credit journey' is developed. The entrepreneurial credit journey follows the entrepreneur from the development of credit needs, through application and lending decisions and, beyond, to the consequences of these earlier decisions for firm performance. The entrepreneurial credit journey is therefore: dynamic by its very nature; relates to issues affecting both the demand and supply of credit; places the entrepreneur at the heart of the discussion; but, at the same time, highlights the external credit market issues that may inhibit the entrepreneur's access to credit and constrain firm performance.

Specifically, the entrepreneurial credit journey encompasses:

- Firm level contextual factors determining whether the firm develops credit needs in the first place. This relates to the stage of the firm in its life cycle, or financial growth cycle (Berger and Udell, 1998), which affects credit needs (and availability). In addition, control aversion (Shaver and Scott, 1991) may lead entrepreneurs to prefer self-finance even if this results in lower firm performance (Cressy, 1995). Control aversion seems to be a particular issue for family owned firms (Mishra and McConaughy, 1999; Romano et al, 2001).
- The factors affecting whether or not credit needs are translated into a credit application (Kon and Storey, 2003). If the entrepreneur is discouraged, this may lead to a demand-side 'self-rationing' credit gap even if the origins of discouragement lie in (supply side) information asymmetries (Kon and Storey, 2003).
- If the entrepreneur applies for credit, the potential issue of a supply-side credit gap due to classical credit rationing caused by information asymmetries between the firm and bank (e.g., Stiglitz and Weiss, 1981).
- The role of screening, contracting and monitoring activities ('lending technologies') conducted by the bank to reduce information asymmetries and improve credit supply (e.g., Berger and Udell, 2002, 2006; Udell 2015).
- The real effects of credit gaps/unmet credit needs, due to self-rationing and credit-rationing, on new venture creation and firm performance (e.g., Evans and Jovanovic, 1989; Hvide and Møen, 2010).

Figure 1: Entrepreneurial credit journey





The literature shows that market conditions play an important role in SME financing conditions (e.g., Beck and Demirguc-Kunt, 2006; Heffernan 2006). In this regard, Figure 1 indicates that the entrepreneurial credit journey is also affected by market level factors relating to competition in the credit market (Berger et al, 2004). Competition affects not only on the cost and availability of credit (Petersen and Rajan, 1995) but also on the likelihood of discouragement (Han et al, 2009a). In particular, higher bank concentration may encourage banks to invest more in their relationships with small firms. This may improve information flows and lower the likelihood of discouragement among creditworthy firms (Han et al, 2009a).

A fundamental issue highlighted by Figure 1 is that the entrepreneurial credit journey is a dynamic recurrent process<sup>5</sup>. In particular, the entrepreneur may require several infusions of credit at different stages in the firm's lifecycle necessitating multiple credit journeys over time. By implication, learning by both entrepreneurs (Jovanovic, 1982) and banks (Petersen and Rajan, 1994) will take place with the experiences obtained over repeated credit journeys. In this respect, previous borrowing experiences which are good (e.g., a successful application), bad (e.g., an unsuccessful application), and ugly (e.g., an unsuccessful application aggravated by poor handling of the denial by the bank), and indeed the absence of previous borrowing experiences, may affect both entrepreneurial financing decisions and banks' lending decisions in subsequent credit journeys (see directions for future research below).

#### 1.4 Structure of the paper

In this context, the core of the paper involves reviewing the literature relating to (information) issues affecting the supply and demand for entrepreneurial credit and the policy responses aimed at addressing these issues. Specifically, the paper contains the following sections:

- Section 2 reviews key data sources and empirical findings relating to the demand and supply of entrepreneurial credit. The literature on recent trends in entrepreneurial credit and the impact of the GFC on entrepreneurial credit conditions is also reviewed. This section is largely about stating facts and commenting on issues relating to entrepreneurial credit journeys without going into rigorous theoretical explanations, which are explored in more detail in subsequent sections.
- Section 3 reviews the literature relating to supply-side credit-rationing and market mechanisms designed to overcome information asymmetries (i.e., the lending technologies used by finance providers in the entrepreneurial credit market).
- Section 4 reviews the literature relating to demand-side self-rationing (discouragement) and issues of control/debt aversion that inhibit the development of credit needs.
- Section 5 reviews the issue of financial constraints on firm performance caused by credit-rationing and discouragement. Existing internal finance tests of underinvestment are critiqued and an alternative external funding gap test is proposed.

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<sup>5</sup> This relates to the more general idea of a 'financial growth cycle' (Berger and Udell, 1998). Start-ups traditionally tend to rely on insider finance, trade credit and, to a lesser degree, angel finance. Since the GFC, start-ups may also use crowdfunding and accelerators as sources of funding. As the firm grows and gains a track record, it is more likely to become 'investor ready' allowing it to access external finance in the form of bank debt, and venture capital. For the most informationally transparent firms, public debt and equity may also become available.

- Section 6 reviews policy issues, in particular the role of loan guarantee schemes and small firm banking competition policy in improving credit supply to entrepreneurs.
- Section 7 reviews the literature on gender and racial/ethnic discrimination in entrepreneurial credit markets. There is also a discussion of other underrepresented groups of entrepreneurs in the credit market (the young, religious minorities, and those geographically located at a distance from lenders).
- Section 8 reviews the literature relating to peer-to-peer (P2P) lending facilitated by online platforms, a key development in entrepreneurial borrowing since the GFC, and the factors affecting the chances of entrepreneurs successfully receiving credit on online platforms.
- Section 9 concludes with a recap of the main findings from each previous section and provides directions for future research.

Each section concludes with its own comprehensive summary to help the reader keep track of the issues as they progress through the paper. In addition, italicised text in the summaries highlights areas where there are substantial gaps in our understanding and therefore scope for further research. These gaps feed in to the main directions for future research proposed in section 9.

## **2. Trends in entrepreneurial credit markets and the Great Financial Crisis**

In this section, the context for entrepreneurial credit journeys is developed by looking at some important trends in the demand and supply of entrepreneurial credit. Principally this involves examining empirical evidence, where the data are available, relating to entrepreneurial credit needs, application rates, discouragement rates, and denial rates. In addition, relevant to the discussion here, we take a preliminary empirical look at issues of credit market structure and competition.

However first, in section 2.1, we begin with a traditional supply side perspective by looking at the seminal studies from the finance literature relating to the effects of financial crisis on bank lending to SME's. This includes recent studies relating specifically to the effects of GFC on the supply of credit to the real economy. Then, in section 2.2, before broadening the discussion to encompass the wider issues of the entrepreneurial credit journey, we look at some key data sources from around the world which have been used to understand trends and developments in the demand and/or supply of entrepreneurial credit (before, during, and after the GFC). Thereafter, in the remainder of section 2, we look at empirical studies that have used these data sources to examine the factors affecting entrepreneurial credit journeys in different countries and, where possible, to test the effects of the GFC on different parts of the journey.

### **2.1 The effects of financial crisis on bank lending to SME's**

As discussed in the introduction, the seminal event in recent years affecting entrepreneurial credit markets was the GFC. How does a financial crisis impact on the supply of entrepreneurial credit? Bernanke's (1983) seminal analysis considered non-monetary effects of financial collapse in the US during the early 1930s on GDP. Bernanke argued that the contraction in bank lending and output during the Great Depression was partly due to increases in the real costs of credit intermediation caused by a variety of factors. Principally, the withdrawal of deposits and increased lender risk aversion reduced the role and efficiency of banks in performing credit intermediation (in short, it impaired bank-firm relationships). In addition, falling collateral values raised default costs. Informationally opaque small businesses, which rely on bank credit derived from relationship

lending, were therefore among those borrowers most affected by rising credit intermediation costs. Following a crisis, small businesses therefore have to look to trade creditors for an alternative source of funding.

Building on Bernanke's analysis of the Great Depression, studies relating to the credit crunch in the US during the early 1990s have identified a range of factors that contributed to the reduction in the supply of entrepreneurial credit. These factors include: stricter bank portfolio supervision (Peek and Rosengren, 1995a; Berger et al 2001); increased regulatory capital standards based on leverage ratios (Berger and Udell, 1994; Wagster, 1999); impaired ability to lend due to reductions in bank capital caused by loan defaults (Peek and Rosengren, 1995b; Hancock and Wilcox, 1998); and increased lender risk aversion (Berger and Udell, 1994; Peek and Rosengren, 1995b; Hancock and Wilcox, 1998). However, there was no evidence that implementation of the Basle Accord contributed to the reduction in credit to businesses (Berger and Udell, 1994; Wagster, 1999). Hancock and Wilcox (1998) also found that the marginal effect of capital depletions on business lending at small banks was greater than the corresponding effect on lending by large banks. This suggests that the 1990s credit crunch led to a bigger reduction in small business lending since, in the US at least, small businesses tend to borrow from small banks (see below).

Relating to the GFC, using Italian Credit Register data on outstanding loans, Albertazzi and Marchetti (2010) find evidence of a contraction of credit supply, due to reduced bank capitalization and scarce liquidity, in the six month period after Lehman Brothers went into bankruptcy. Similarly, Jimenez et al (2012) identified a bank balance sheet channel linking tighter monetary conditions with reduced bank lending. In particular, using individual loan application records from the Credit Register of Spain (CIR) for the period 2002:02-2008:12, they find that, within applications made in the same month or for the same loan by the same firm to different banks, banks with weaker balance sheets (i.e., those with lower capital or liquidity ratios) grant fewer loan applications when short-term interest rate are higher or when GDP growth is lower. Using loan level data from the Bank of Portugal's Central Credit Register (CRC), Iyer et al (2013) find that firms which borrowed more from banks with a higher interbank borrowing ratio in 2007:Q2 experienced a greater reduction in credit during the GFC (between 2007:Q2 and 2009:Q2). Further, they find that this credit supply contraction due to bank liquidity affects only entrepreneurial (smaller and younger) firms.

Behn et al (2014) uses loan level data from the German credit register compiled by Deutsche Bundesbank to identify how the introduction in 2007 of model based capital regulation under Basel II affected the quantity and the composition of bank lending. They find that credit supplied by banks that introduced the model based (internal ratings based: IRB) approach exhibits a higher sensitivity to model-based PDs as compared with credit supplied by banks that remained under the standard (Basel I) approach (SA). However, risk estimates for IRB loans underestimate actual default rates, while there is no such bias for SA loans. The findings have important implications for the post GFC regulatory environment under Basel III, which crucially depends on estimates from banks' internal risk models to calculate capital requirements based on risk weighted assets.

However, in terms of understanding entrepreneurial credit journeys, the above studies have not looked at the impact of the GFC on entrepreneurs' credit demands. In particular, an increased number of creditworthy firms may decide not to apply for fear of rejection if the perceived probability of rejection increases during periods of crisis/recession. In this context, we review later in

this section the available evidence regarding the impact of the GFC and the ensuing sovereign debt crisis<sup>6</sup>, on entrepreneurial credit journeys (encompassing both credit demands and supply). Before that, we look at some important data sources, from around the world, which have been used in empirical studies of the demand and/or supply of entrepreneurial credit.

## 2.2 Data sources on entrepreneurial credit

### *Survey of Small Business Finances (SSBF) (US)*

SSBF represented a pioneering survey of small business finances. SSBF was, for many years, the only reliable data resource on small business finances and for that reason it established a reputation as the 'go to' data resource for small business finance researchers (e.g., Berger and Udell, 1998; Mach and Wolken, 2006). Indeed, the data have been used in many seminal studies of small business finances (e.g., Petersen and Rajan, 1994, 1995; Cavalluzzo and Cavalluzzo, 1998). SSBF, which was conducted in 1987, 1993, 1998, and 2003, collected information on a large representative sample of small businesses (fewer than 500 employees) in the United States. This information included owner characteristics, firm size, use of financial services, and the income and balance sheets of the firm. However, with unfortunate timing, a planned SSBF 2008 was cancelled by the Federal Reserve just before the GFC due to its cost. In this context, US Senate Committee (2014) notes that:

"Accurate and current data is critical for documenting problems, targeting our resources, and validating trends. The most recent government data available is outdated and comes from the 2003 Survey of Small Business Finances and the 2007 U.S. Census Survey of Business Owners, before the financial crisis." (US Senate Committee, 2014, p. 3)

Had SSBF not been cancelled, it would undoubtedly have been an invaluable resource for understanding the impact of the GFC on small business finances in the US (US Senate Committee, 2014). It is also somewhat ironic that, whilst the US was cancelling SSBF, other countries were increasing their investment in SME finance data inspired not least by the example set by SSBF of the benefits of these data. Indeed, SSBF remains the 'gold standard' for survey design in SME finance research due to the detailed information about small businesses and their finances collected by the surveys, and the rigorous methodology used to obtain the data (Potok et al, 2005).

### *UK Survey of SME Finances (UKSMEF) (UK)*

The motivation for UKSMEF was to provide a data resource similar to SSBF for the UK (e.g., Fraser, 2014b). UKSMEF was conducted in 2004, 2008, and 2009. It collected information, from a large representative sample of small and medium sized enterprises (SME's) (fewer than 250 employees), relating to owner characteristics, firm size, use of financial services, and the income and balance sheets of the firm. However, UKSMEF was more streamlined than SSBF (in particular, involving a much shorter questionnaire) and therefore was considerably cheaper to conduct. Nonetheless, UKSMEF has facilitated a better understanding for policy makers on several specific issues including access to finance among female entrepreneurs, ethnic minority businesses, social enterprises and

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<sup>6</sup> The sovereign debt crisis began in Dubai in late 2009 and spread to Euro Area countries in 2010, and continued to 2012.

creative industry businesses in addition to the impact of the GFC on SME's (Fraser, 2005, 2009b, 2014b).

#### *SME Finance Monitor (SMEFM) (UK)*

SMEFM is a quarterly survey conducted among large representative samples of SME's (fewer than 250 employees) since 2011 Q2. The survey, which is funded by the big UK banks, collects information on SME 'customer journeys' relating to their applications for external finance, what their experience was in relation to applications, and what if anything stopped those who did not apply from doing so. The survey also collects background information on business and owner characteristics. The data have been used to understand how the demand and supply of finance (principally bank credit) has changed following the GFC (Cowling et al, 2016a)

#### *Survey on the Access to Finance of Enterprises (EU countries)*

SAFE is a collaborative project between the European Central Bank (ECB) and the European Commission (EC) to provide information on access to finance among enterprises in the European Union (EU). The survey covers both SME's (fewer than 250 employees) and large firms. The first wave of SAFE was conducted in June-July 2009. The ECB runs a limited part of the survey every six months to look at the latest developments in financing conditions experienced by firms in the euro area. The more comprehensive part of SAFE was run by the EC among all EU countries biennially (2009 and 2011) but since 2013 has been conducted annually. In addition to financing conditions, SAFE also collects background information on business and owner characteristics. The data have been used to understand issues including how the sovereign debt crisis affected access to finance among SME's in EU countries (Ferrando et al 2017).

#### *Surveys conducted by the Research Institute of Economy, Trade and Industry in Japan*

The Research Institute of Economy, Trade and Industry (RIETI), a government affiliated research institution, has conducted several surveys, both before and during the GFC, which have looked at issues relating to SME finances. These include the *Management Survey of Corporate Finance Issues in the Kansai Area*, which was conducted in June 2005 (Uchida et al, 2012). The survey asked SME's<sup>7</sup> questions about firm characteristics, management strategy, bank relationships, the loan screening process, and access to credit. RIETI also conducted the *Kigyo Kinyukikan to no Torihiki Jittai Chosa* (Survey on Inter-Firm and Firm-Bank Transactions) in February 2008 and *Kinyukikika ni okeru Kigyo Kinyukikan to no Torihiki Jittai Chosa* (Survey on Inter-Firm and Firm-Bank Transactions during the Financial Crisis) in February 2009 (Ono and Uesugi, 2014). In addition to firm characteristics and financial information about the firm, the 2008 and 2009 surveys asked SME's about a variety of issues regarding their transaction partners i.e., their customers, suppliers, and banks. The 2009 RIETI survey, in particular, asked firms how their relationships with transaction partners were affected by the GFC following Lehman Brothers' collapse. The 2008/2009 RIETI surveys also asked firms to identify the two banks with which they had the largest and second-largest amount of loans

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<sup>7</sup> The Small and Medium Enterprise Basic Law in Japan, defines SME's as enterprises with 300 or fewer regular employees (100 or fewer in Wholesale and Services, 50 or fewer in Retail and Food) or a capital stock of 300 million yen or less (100 million yen or less in Wholesale, 50 million yen or less in Retail, Food and Services).

outstanding. The number of respondents in the 2008 RIETI survey is 6,079. The 2009 survey achieved 4,103 respondents.

#### *Public Credit Register Data (several countries)*

A public credit register is a database:

“created by public authorities and managed by central banks. Their data are compulsorily reported by lenders, who then obtain a return flow of data for use in their lending decisions. The distinctive feature of public credit registers, beside the compulsory nature of participation by lenders, is their universal coverage of banking institutions. Where such a register exists, all the financial intermediaries under the regulatory authority of the central bank are required to file information with it.” (Jappelli and Pagano, 2000, pp.8-9)

Jappelli and Pagano (2002) provides information on public credit registers around the world. They report that while public credit registers are common in continental Europe and Latin America, there are none in Anglo-Saxon countries (such as the US and UK). Most public credit registers were established after 1980, except for Germany (1934), Italy (1964) and Mexico (1964). The newest public credit registers are mostly in Latin America countries. There is considerable variation across countries in the data reported to the public credit register. For example: in Argentina lenders are required to report data on defaults, arrears, loan exposure, interest rates and guarantees; in Germany, only loan exposure and guarantees are reported; and in Belgium, only defaults and arrears. In terms of the loan size reporting threshold, in most of Europe, due to a high reporting threshold, public credit registers tend to collect information only on relatively large business loans. However, due to lower reporting thresholds, public credit register information in Belgium and France also covers consumer loans. The highest European public credit register threshold is in Germany (almost \$1.7m) and the lowest is in Belgium (just below \$28,000 for firms).

Specific studies using public credit register data relating to the GFC include: Albertazzi and Marchetti (2010) (Italy); Jimenez et al (2012) (Spain); Iyer et al (2013) (Portugal); and Behn et al (2014) (Germany). In particular, Albertazzi and Marchetti (2010) use data on outstanding loans from the Bank of Italy's Italian National Credit Register. For all loans above a threshold (which was reduced to €30,000 from €75,000 in December 2008) lenders are required to report monthly the amount of each loan which was granted to and used by borrowers. Jimenez et al (2012) use loan data from the Credit Register of the Banco de España (CIR) which contains confidential information on almost all business loans granted by all banks operating in Spain (the loan reporting threshold is €6,000). Iyer et al (2013) use data from the Central Credit Register (CRC) maintained by the Bank of Portugal. CRC contains confidential and very detailed information at the loan level on all commercial and industrial loans granted to all non-financial publicly limited and limited liability companies by all banks operating in Portugal. The reporting threshold is only €50 leading to a very comprehensive coverage of commercial loans. Behn et al (2014) use data from the German credit register compiled by Deutsche Bundesbank in its supervisory role. Lenders are required to provide quarterly information on all outstanding loans of at least €1.5 million. The register records information on the identity of the lender and the borrower, the amount of the loan outstanding and several other loan characteristics. Following the Basel II reforms, since 2008 German lenders are also required to report exposure-level information on the regulatory approach (SA or IRB) and the estimated probability of default (PD). The reported PD is the one used to determine regulatory capital charges

for IRB loans. For SA loans, lenders also have to report PDs if they are estimated internally<sup>8</sup>. A discussion of the substantive findings reported in the above papers is provided at the start of this section.

However, a key problem with this type of data for use generally by researchers is that access to the public credit register is granted only to authorized central bank staff (for supervisory reasons primarily and under tight confidentiality rules) and to the reporting financial institutions (Jappelli and Pagano, 2002). Research contacts with central bank staff would therefore be an advantage for accessing these data. Another issue, in terms of understanding entrepreneurial credit journeys, is that the data relate only to firms that have applied for loans (e.g., there is no information about discouraged borrowers or non-borrowers).

## 2.3 US trends

### 2.3.1 Demand and supply of credit

Cole and Sokolyk (2016) use data from SSBF 1993, 1998, and 2003 to look at changing credit demand and supply in the US. This is an important study as it reports evidence on small business credit demand and supply in the US using all but one of SSBF. Regarding demand, Cole and Sokolyk (2016) report that 55% of small firms had credit needs in 1993 following the recession in 1990-1991. This fell to 41% during a period of high economic growth in 1998. Credit demand rose again following the 2001-2002 recession and 9/11 to 49% of small firms in 2003.

Yet, in 1993, 28% of small firms had credit needs but did not apply for fear of rejection i.e., they were discouraged borrowers. This corresponds to 15% of the entire small business population who were discouraged borrowers in 1993. In 1998, 37% of US small businesses with credit needs were discouraged borrowers (which again is around 15% of the entire small business population). By 2003 only 18% of US small businesses with credit needs, or 9% of the entire small business population, were discouraged borrowers. Clearly, the economic cycle does not explain this declining trend in discouragement. Instead, it may reflect changes in lending technologies, which have reduced information asymmetries and screening errors, making small businesses more confident in making applications (see below).

Regarding credit supply, Cole and Sokolyk's analysis shows that 18% of applicants (7% of the entire population of small businesses) had their credit applications denied by lenders in 1993. In 1998, 22% of small business applicants (6% of the whole population) had their credit applications denied. And, in 2003, only 11% of applicants (4% of the whole population) were denied credit they applied for. This falling trend in credit denial rates is consistent with the falling trend in discouraged borrowers. As denial rates fall (due to improved lending technologies) small businesses' confidence that their applications will be successful seems to rise.

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<sup>8</sup> Relatedly, although not an ongoing public credit register in the sense defined above, Irish financial institutions were required to submit their full loan books to the Central Bank of Ireland under the Financial Measures Programme 2011 which were then used to stress-test the Irish banking system (McCann and McIndoe-Calder, 2012). McCann and McIndoe-Calder (2012) use a sample of these data to estimate the probability of SME default at different points in the exposure size distribution.

In terms of the determinants of credit needs Cole and Sokolyk (2016) find that firms with greater assets are more likely to have credit needs while older and more profitable and more liquid firms (holding more cash) firms are less likely to have credit needs. This is consistent with the pecking order theory of capital structure (Myers and Majluf, 1984). In addition, more highly levered firms and lower credit quality firms (with more delinquencies and bankruptcies) are more likely to have credit needs. Regarding owner characteristics, firms with credit needs tend to be younger, less educated, more likely to be black, and to have less personal wealth than those without credit needs. Overall, Cole and Sokolyk (2016) interpret these findings as suggesting that firms without credit needs are good high quality firms that could obtain more credit if they wanted it but have no need for it suggesting they are at their optimal capital structure.

Looking at the determinants of discouragement Cole and Sokolyk (2016) show that, relative to firms with credit needs that applied for credit, discouraged borrowers are smaller (hold fewer assets), younger, have lower credit quality, and are more likely to be located in an urban area. The owners of discouraged firms are also older, have poorer personal credit histories, and are less wealthy than those owners that applied. Interestingly, there is little evidence of ethnic and gender differences in discouragement. Discouraged borrowers also use fewer sources of bank and non-bank financial services. Overall, this suggests that discouraged borrowers are less creditworthy and have less developed financial relationships than applicants.

Regarding the determinants of credit approval, Cole and Sokolyk's analysis indicates that, relative to firms whose applications were denied, approved firms are larger, more profitable, and have higher credit quality. Black small business owners are less likely to have their applications approved as are small business owners with poor personal credit histories. There is some evidence that small business loan applications are more likely to be approved if the owner is female (relating to estimates for SSBF 2003). The specific issue of ethnic and gender differences in access to credit are discussed separately later in this paper (see section 7). Credit applications are more likely to be approved where the application involved a loan for a fixed asset (which, implicitly, could be used as collateral). Overall, this suggests that approved firms are more creditworthy and have more collateral than denied firms.

Whilst there are no SSBF data after 2003, a 2012 survey by the National Federation of Independent Businesses of SME's (with fewer than 250 employees) found that approximately one-third of applicants for new loans had their applications denied (reported in BIS, 2016). Whilst comparisons with SSBF are problematic, not least due to the different definitions of 'small business' used in the respective surveys, the finding suggests that credit denial rates rose again in the US following the GFC.

US loan interest rates show a declining trend between 2007 and 2014. In particular, rates on business loans up to \$1 million (which is the definition of a small business loan used by the Small Business Administration (SBA)) fell from around 8% in 2007 to 4-5% in 2009, stabilizing between 3-4% thereafter reflecting the dramatic loosening of monetary policy following the GFC (based on Board of Governors of the Federal Reserve System, Survey of Terms of Business Lending reported in BIS, 2016).

### 2.3.2 Credit market structure and competition



The US banking industry has gone through significant change over the last quarter century with the dismantling of the regulatory framework set up in the Great Depression (DeYoung, 2014)<sup>9</sup>. This led to a wave of mergers and acquisitions which reduced the number of commercial banks by one-half and increased the size of the largest banks tenfold (DeYoung, 2014). Specifically, through bank failures and mergers, the number of commercial banks and savings institutions fell from 14,495 to 6,532 in the period 1984-2010 (Wheelock, 2011). The number of banks fell by 12% between 2006 and 2010 alone (Wheelock, 2011). In addition, based on data for 2010, the four largest banks accounted for 45% of total US banking assets with 6,524 community banks accounting for only 15% of banking assets (FDIC, 2012 study reported in BIS, 2016). In terms of concentration, evidence reported in BIS (2016) indicates that, in metropolitan areas, the US banking market is less concentrated than the UK but the reverse is true in rural areas

Regulatory reform (and banking innovation) have led to the emergence of two main banking strategies in the US (DeYoung, 2014). One strategy involves small 'community banks' which use the traditional 'originate and hold' banking model and which specialize in relationship lending. This relationship-based approach to banking gives small banks a comparative advantage in lending to small firms that are informationally opaque and are unable to access public capital markets (Berger and Udell, 2002; Berger et al. 2005b). This may lead to higher approval rates on small business loans made by community banks compared to large banks (BIS, 2016). The other main strategy involves a large bank model, which is based on high volumes of transactions rather than developing close relationships with customers. This strategy exploits the scale economies of the 'originate to sell' banking model and relies on transactions based lending technologies and loan securitization.

DeYoung (2014) reports that in 2006 there were 434 small banks with between \$500 million and \$2 billion in assets. In contrast, there are only 56 large banks that have at least \$10 billion in assets. Consistent with the strategic model, small banks invested 8.55% of their assets in small business loans while the corresponding figure for large banks was only 4.46%

## 2.4 UK trends

### 2.4.1 Demand and supply of credit

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<sup>9</sup> The McFadden Act of 1927 prohibited interstate branch banking and most states placed restrictions on intrastate branching. The Glass–Steagall Act of 1933 prevented competition between commercial banks and non-depository institutions (insurance companies, investment banks, brokerage firms) by prohibiting commercial banks from engaging in insurance, underwriting and brokerage activities. Also, competition for deposit accounts was restricted by the Federal Reserve's Regulation Q which imposed interest-rate ceilings on most deposit accounts (DeYoung 2014). These restrictive regulations were removed in three stages relating to the relaxing of price regulations, geographic restrictions on banking, and bank product powers (DeYoung, 2014). In the first stage, the Depository Institutions Deregulation and Monetary Control Act of 1980, began the process of removing the interest rate ceilings in the Federal Reserve's Regulation Q. In the second stage, the Riegle–Neal Interstate Banking and Branching Efficiency Act of 1994, effectively repealed the McFadden Act and harmonized the different state-by-state banking and branching rules. And, in the third stage of reform, the Graham–Leach–Bliley Financial Services Modernization Act of 1999, allowed commercial banks to engage in activities previously limited to insurance companies and investment banks, effectively repealing the Glass–Steagall Act. Following the \$1 trillion taxpayer bail-out of banks after the GFC, there has been a partial re-regulation of banks with the passing of the Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010.

BIS (2013)<sup>10</sup> provides a comprehensive analysis of changes in bank lending to SME's in the UK between 2001 and 2012. The analysis in this report uses data from UKSMEF 2004, 2008, and 2009 and SMEFM for 2011Q1-2012Q2. The analysis is able to extend back to 2001 because UKSMEF 2004 asks questions about financing conditions in the three year period before the survey. Regarding overdraft facilities (i.e., borrowing to fund working capital), BIS (2013) shows that 23% of SME's applied for an overdraft in 2001-2004, 21% applied in 2005-2008, and 39% applied in 2008-2009 (consistent with increased working capital needs during a recession). However, looking at the trend post GFC, only 20% of SME's applied for an overdraft facility in 2010-2011, falling further to 14% in 2011-2012. Recent SMEFM data indicate that, in the year ending 2017 Q4, overdraft application rates have fallen yet further to 5% (SME Finance Monitor, 2018).

Looking at term loan application rates (i.e., borrowing to fund mainly fixed capital), application rates among SME's fell from 14% in 2001-2004, to 11% in 2005-2008, and remained at 11% in 2008-2009. Again, the SMEFM data analyzed in BIS (2013) indicate that credit demands fell further post GFC, with term loan application rates of 10% in 2010-2011 and 7% in 2011-2012. In the year ending 2017 Q4, term loan application rates fell yet further to 3% (SME Finance Monitor, 2018).

On the supply side, BIS (2013) shows that 11% of SME's that applied for an overdraft in 2001-2004 had their applications denied. This figure rose to 15% in 2007-2008 and 16% in 2008-2009. Following the GFC, in 2010-2011 the overdraft denial rate was 14% but rose again to 19% in 2011-2012. The BIS (2013) report also shows that term loan rejection rates were 5% in 2001-2004, 9% in 2007-2008 and 14% in 2008-2009. This rising trend continued post GFC with term loan rejection rates of 18% in 2010-2011 and 23% in 2011-2012 (BIS, 2013). In the year ending 2017 Q4, 15% of overdraft applicants and 33% of term loan applicants were denied credit (SME Finance Monitor, 2018).

BIS (2013) does not look at discouragement rates. However, Fraser (2014a) performs an analogous study of trends in discouragement over the period 2001-2013 using UKSMEF and SMEFM data. This report shows that, in 2001-2004, 1.8% of all SME's did not apply for credit for fear of rejection, which figure rose to 2.3% in 2005-2008 and 4% in 2008-2009. Post GFC, rates of discouragement fell from 4.3% of all SME's in 2011 Q2, to 3.1% in 2013 Q2, and 2.0% in 2013 Q2.

Cowling et al (2016a) use the first six waves of SMEFM data, covering the period July 2011 to March 2013, to conduct an econometric analysis of the determinants of credit demand and supply in the wake of the GFC. Firms applying for credit are larger (in terms of sales) and older than those not applying for credit. Firms applying for credit are also less profitable and are higher growth firms than non-applicants. Similar to the US findings, credit applicants tend to be lower quality firms as measured by financial delinquencies (unauthorized overdraft borrowing and late tax payments) and credit ratings. In addition, firms with business plans and those funded with the entrepreneur's own equity are more likely to seek credit. In terms of owner characteristics, women-led firms are less likely to seek credit. However, SME's with more experienced owners are more likely to apply for credit.

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<sup>10</sup> This report was conducted by the National Institute of Economic and Social Research on behalf of the Department for Business Innovation and Skills.

In terms of the determinants of credit approval, Cowling et al (2016a) shows that older firms are more likely to have their applications approved whereas high growth firms are less likely to gain approval. Lower quality firms, with poorer credit ratings or financial delinquencies (relating to late loan repayments, unauthorized overdraft borrowing, unpaid cheques, county court judgements, and trade credit restrictions) are less likely to have their credit applications approved. Similar to findings for the US, women led firms in the UK are more likely to gain approval for their credit applications.

In another paper, using seven waves of the Business Barometer<sup>11</sup> (covering December 2008 to February 2010 with 2-3 month intervals), Cowling et al (2016b) analyze the determinants of credit needs, discouragement, and credit denial using multivariate methods similar to Cole and Sokolyk (2016). Larger firms (in terms of employment), family owned firms, and those with growth ambitions are more likely to have credit needs. Firms with poor banking relationships and those that have missed loan repayments are also more likely to have credit needs (consistent with lower quality among firms with credit needs). In contrast, older firms (aged more than 20 years old) and firms that previously sought finance are less likely to have credit needs.

Conditional on credit needs, discouraged borrowers are smaller, younger, less profitable, and less likely to be incorporated than applicants (Cowling et al, 2016b). The owners of discouraged firms are more experienced and more likely to have a university degree. Cowling et al (2016b) interpret the experience effect as reflecting entrepreneurial learning about the adverse impact of a recession on credit supply so that more experienced entrepreneurs are less likely to consider applying worthwhile. In terms of banking relationships, discouraged borrowers tend to have poorer relationships and have missed loan repayments. Firms were more likely to be discouraged in the immediate aftermath of the GFC (December 2008) compared to later periods. Conditional on applying, firms receiving credit tend to be older than denied firms, are more likely to use internet banking, and have better quality banking relationships.

Again, these findings for the UK echo the findings in Cole and Sokolyk (2016) for the US i.e., that small businesses completing successful credit journeys are higher quality firms. Yet, despite the implication of lower quality among discouraged borrowers, Cowling et al (2016b) still estimate that over one-half of these firms (55.6%) would have received credit had they applied.

Fraser (2014a) provides further evidence of the characteristics of discouraged borrowers using UKSMEF and SMEFM data covering the period 2004 Q4 to 2013 Q2. Compared to non-discouraged firms, discouraged borrowers tend to be smaller, younger and more risky businesses. In addition, the owners of discouraged firms are: less wealthy; have lower levels of education; and have less business experience (the latter finding in contrast to Cowling et al, 2016b). Overall, a typical discouraged borrower in the UK: has sales below £250,000, business assets of £10,000; fewer than 10 employees; is less than 7.5 years old; has an average/above average risk rating; belongs to either the real estate/business services or construction sectors; is located in London, the West Midlands or East of England; and has an owner aged 31-50 with 15 or fewer years of experience and a personal wealth of around £100,000.

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<sup>11</sup> This is series of surveys carried out by BIS to gain information on small businesses during the recession following the GFC.

However, despite the apparent lower credit quality of discouraged borrowers, and very similar to the finding in Cowling et al (2016b), Fraser (2014a) estimates that 63% of discouraged borrowers would make successful applications if they applied. The econometric analysis in Fraser (2014a) also indicates that entrepreneurs tend to over-estimate their perceived likelihood of rejection which situation is made worse if the firm-bank relationship is poor. In addition, the gap between perceived and actual rejection probabilities increased at the height of the GFC (2008-2009) as businesses' confidence in the success of credit applications fell. This may help explain why discouragement increased during the GFC (as also observed in Cowling et al, 2016b)

Using UKSMEF data for 2004, 2008, and 2009, Fraser (2014b) conducts an econometric analysis of the impact of the GFC on bank lending to small firms. Controlling for a wide range of business/owner characteristics (e.g., firm assets, risk ratings, financial delinquency, and gender/ethnicity), banking relationships, and loan characteristics (amount, cost, and purpose), small firms which applied for term loans in 2007-2008 were 4.5% points more likely to have their application denied than in 2001-2004. This effect increased among applicants in 2008-2009 to 8.8% points. Similarly, the likelihood of overdraft denial is respectively 2.8% points higher, for applicants in 2007-2008, and 5.5% points higher, for applicants in 2008-2009, relative to applicants in 2001-2004. These findings support the view that the negative impact of the GFC on access to credit among small firms was greater in phase 2 of the GFC, the insolvency crisis phase following the collapse of Lehman Brothers in September 2008, than in phase 1 of the GFC, corresponding to the initial liquidity crisis beginning in August 2007 when banks such as BNP Paribas encountered problems accessing funds from capital markets. The underlying (supply-side) mechanisms whereby financial crisis leads to a contraction in credit were discussed in the introduction to this section.

Fraser (2014b) also looks at the impact of the GFC on loan margins and collateral requirements. Summary analysis indicates that margins on overdraft borrowing were 1.9% points over the Bank of England base rate in 2001-2004, 0.7% points over base in 2007-2008, and 3.6% points over base in 2008-2009. Margins over the Bank of England base rate for term loans were 2.3% points in 2001-2004, 2% points in 2007-2008, and 4% points in 2008-2009. This suggests that during the GFC the cost of small business loans only increased in phase 2 of the crisis. This is supported by the econometric analysis which shows that, controlling for a wide range of factors affecting the cost of credit, small firms paid lower margins on bank debt in 2007-2008 (GFC, phase 1) relative to 2001-2004. In particular, other things equal, overdraft margins for small businesses were 1.2% points lower and term loan margins were 0.8% points lower in 2007-2008 than in 2001-2004. However, other things equal, overdraft margins were 1.9% points higher and term loan margins were 1% point higher in 2008-2009 than in 2001-2004. This suggests that banks may have been reducing risk on their small firm loan portfolios during phase 1 (leading to lower average margins). However, the cost of capital increased significantly following the collapse of Lehman Brothers which led to increased loan margins in Phase 2 of the GFC.

Looking at the impact of the GFC on the amount of collateral posted per pound borrowed on a term loan (collateral ratio), other things equal collateral ratios were 87% points higher on loans obtained by small firms in 2007-2008 compared to 2001-2004. Viewed alongside the evidence of higher loan rejection rates and lower loan margins in phase 1 of the GFC, this supports the view that during this phase banks were reducing risk on their small firm loan portfolios and lending to those businesses able to signal lower risk by posting collateral (see discussion in section 3). However, other things

equal, collateral ratios were lower in 2008-2009 compared to 2001-2004. This is consistent with falling asset values during phase 2 of the GFC.

#### 2.4.2 Credit market structure and competition

At the end of November 2015, there were approximately 362 credit institutions in the UK (BIS, 2016). However, most of these institutions have very small market shares and only a minority (30-35) lend to SME's (BIS, 2016). Indeed, policy makers have ongoing concerns about a lack of competition in the supply of banking services to SME's the UK (see Ashton and Keasey, 2005, and the discussion in section 6.5 below). In particular, the SME lending market in the UK is dominated by the four largest banking groups: Royal Bank of Scotland Group (RBSG); Lloyds Banking Group; Barclays; and HSBC. These banks account for 80% of the value of SME loans in the UK (BIS, 2016). Two key developments affected competition in the supply of SME banking services following the GFC: Lloyds TSBs takeover of HBOS to form Lloyds Banking Group and the part-nationalisation of Royal Bank of Scotland Group and Lloyds Banking Group. Before the GFC, banking concentration among the largest five banks had actually been declining between 2004 and 2009 (BIS, 2016). Other issues affecting competition/concentration include: high barriers to entry relating to the costs of setting up and maintaining a branch network; the fact that the majority of SME's use only a single bank for all their financial services and do little 'shopping around'; and switching rates are low typically around 2% per annum (BIS, 2016). In addition, there is limited awareness of alternative finance providers (British Business Bank, 2017). The extent to which this lack of competition is detrimental to SME financing conditions is considered later in the paper (see section 6.5).

### 2.5 Euro Area trends

#### 2.5.1 Demand and supply of credit

Holton et al (2013) provides a comprehensive overview of SME financing conditions in the Euro Area using five waves of biannual SAFE data (the ECB component) between September 2010 and March 2013 (waves 4-8). In particular, they look at Euro Area heterogeneity in firm level incidences of credit denial, perceptions of credit availability, and whether they experienced an interest rate increase on extended credit. Their analysis relates specifically to eleven Euro Area countries: Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Netherlands, and Portugal.

Across all 11 of the Euro Area countries denial rates increased from around 20% in 2011 H1 to over 23% in 2013 H1, peaking at over 25% in 2012 H2. However, this masks significant variation across countries. In particular, denial rates are relatively low in Austria, Germany, and Finland. In Austria denial rates increased from 5.4% in 2011 H1 to 12.7% in 2013 H1. In Germany, denial rates actually decreased from 12.9% in 2011 H1 to 7.9% in 2013 H1. And, in Finland, denial rates increased from 6.2% in 2011 H1 to 14.8% in 2013 H1.

In contrast, denial rates during this period are above the Euro Area average in the sovereign debt crisis affect countries of Spain, Greece, Ireland, and Portugal as well as the Netherlands. Specifically denial rates for Spanish SME's increased from 26.2% in 2011 H1 to 34.6% in 2013 H1. In Greece, this increase over the same period was from 36.9% to 42.3% (peaking at 54.4% in 2012 H1). In contrast Irish SME's experienced a decrease in denial rates from 38.2% in 2011 H1 to 32.4% in 2013 H1 (peaking at 44.4% in 2011 H2). Denial rates for SME's in Portugal went from 21.3% in 2011 H1 to

37.7% in 2013 H1. And, in the Netherlands SME denial rates increased from 29% to 37.7% over the same period (peaking at 58.1% in 2012 H2). This speaks to an overall general deterioration in the availability of credit to SME's in the Euro Area in the period studied but with significant variation across countries.

Regarding perceptions of credit availability (in a question asked to all firms regardless of whether they applied), again there is an overall worsening in these perceptions from 18.9% reporting a deterioration in credit availability in 2011 H1 to 22.2% in 2013 H1. Notably, among Greek SME's whereas 36% thought the availability of credit had deteriorated in 2011 H1 by 2012 H2 this figure had risen to 63.6% before falling back to 47.1% in 2013 H1. In contrast, in Germany rates of perceptions of a deterioration in credit availability among SME's are relatively constant at around 11-12% between 2011 H1 and 2012 H2, falling to 7.5% in 2013 H1.

Regarding SME's reporting interest rate increases, across the Euro Area countries in the sample there is an overall fall from 58.7% reporting an increase in 2011 H1 to 44.3% in 2013 H1. However, among Italian SME's the cost of credit appears to have increased with 60.9% reporting an increase in interest rates in 2011 H1 rising to 71% in 2013 H1. Also, the vast majority of SME's (typically 70-80%) in Spain, Greece, Italy, and Portugal, and to a lesser extent Ireland (typically 60-70%), consistently report interest rate increases between 2011 and 2013.

Holton et al (2013) also conduct an econometric analysis of financing conditions. Here they find that micro firms and firms with lower turnover are more likely to have their credit applications denied. In contrast, improved or unchanged internal funds, credit histories, or capital reduce the likelihood of denial relative to firms experiencing a deterioration in these factors. This suggests that banks in the eleven Euro Area countries in the sample tend to allocate credit to higher quality firms which is consistent with the findings for the US and UK. Improved or unchanged internal funds, credit histories, or capital also, respectively, reduce the likelihood of perceiving a deterioration in credit availability and reporting an interest rate increase. Again, this is consistent with lower quality firms being more likely to experience discouragement or, if they apply successfully, being charged a higher cost of credit.

In terms of the inter-country differences in financing conditions, Holton et al (2013) find that even after controlling for firm characteristics SME's in the Netherlands, Portugal, Spain, Greece, Ireland, and Italy are more likely to have their credit applications denied than SME's in Germany. In contrast, SME's in Finland and Austria are less likely to have credit applications denied than German SME's. Similarly, other things equal, SME's in the Netherlands, Portugal, Spain, Greece, and Ireland are more likely to report a deterioration in credit availability than SME's in Germany. And, regarding the cost of credit, SME's in Spain, Greece, Ireland, and Italy are more likely to report interest rate increases than German SME's holding firm characteristics constant.

Further analysis in Holton et al (2013) indicates that the transmission of the effects of the GFC/sovereign debt crisis on SME financing conditions on Euro Area countries operates through the effect of higher sovereign bond yields on bank funding costs. Indeed, controlling for firm quality, bank funding costs explain most of the variation in financing conditions across the Euro Area countries in the sample. To this extent, SME credit denial rates in Greece, Italy, Portugal, and to a lesser degree Spain are not significantly different from Germany after controlling for firm quality and bank funding costs. Similarly, only Irish SME's have poorer perceptions of credit availability than

German SME's after controlling for firm quality and bank funding costs. And, regarding the cost of credit only Spanish, Italian, and to a lesser degree Irish SME's are more likely to experience interest rate increases than German SME's after controlling for firm quality and bank funding costs. In other words, there is limited evidence of a 'credit crunch' (i.e., a significant downward shift in the supply of credit holding firm quality and bank funding costs constant) relative to Germany among Euro Area SME's.

Ferrando et al (2017) also analyze the effect of the sovereign debt crisis of 2010-2012 on SME's access to finance in the Euro Area using waves 1-6 of the ECB SAFE survey (covering January 1<sup>st</sup> 2009 – 31<sup>st</sup> March 2012). They define Greece, Ireland, Italy, Portugal, and Spain as stressed countries, which experienced a significant deterioration in their sovereign creditworthiness following the beginning of the sovereign debt crisis in October 2010. The main dependent variable in their analysis is a credit constrained dummy equal to one if, in the past 6 months, the firm was denied a loan, received less than 75% of the amount requested, refused a loan offer because the rate was too high, or felt discouraged from applying for a loans, and equal to zero if the firm's credit application was approved. Ferrando et al (2017) report that 39% of Euro Area SME's were overall credit constrained during the sample period. Breaking credit constraints down into its constituent components, 12% had their application denied outright, 10% received less than 75% of the amount requested, 3% refused a loan offer due to its high cost, and 20% felt discouraged from applying.

Summary comparisons of stressed and non-stressed countries indicate that 48% of SME's in stressed countries experienced credit constraints versus 33% of SME's in non-stressed countries. In particular, echoing the findings in Holton et al (2013), 62% and 66% of Greek and Irish SME's respectively reported credit constraints during the sovereign debt crisis. However, among non-stressed countries during the same period only 31% of German SME's and 14% of Finnish SME's encountered credit constraints (although a very high 61% of SME's in the Netherlands had credit constraint issues). The econometric analysis in Ferrando et al (2017) estimates that, holding firm characteristics constant, an SME in a stressed country following the onset of the sovereign debt crisis had a 20.3% point higher probability of credit constraints than an otherwise similar SME in a non-stressed country.

Looking at the impact of the sovereign debt crisis on the components of credit constraints, other things equal, SME's in stressed countries are: 30.6% points more likely to be denied credit outright; 17.9% points more likely to receive less than 75% of the amount requested; 4.9% points more likely to refuse a loan offer on cost grounds; and 4.9% points more likely to be discouraged from applying. Overall, this points to credit (i.e., quantity) rationing rather than price rationing as the main mechanism leading to credit constraints among SME's in stressed countries following the sovereign debt crisis. Further analysis of firm financing patterns reported in Ferrando et al (2017) reveals that SME's in stressed countries relied more on internal funds and government subsidies to make up for a lack of bank credit after the onset of the sovereign debt crisis. They conclude that the crisis affected both the availability and cost of finance in stressed countries in the Euro Area, with potentially adverse consequences for the real investment decisions of SME's in these countries.

The findings in Holton et al (2013) and Ferrando et al (2017) are mutually consistent. The difference between the studies is that the former study explicitly controls for differences in bank funding costs and identifies this as the main channel leading to poorer credit supply in stressed countries (so

overall, with exceptions including Ireland, Spain and Italy, there was no 'credit crunch' as such after controlling for firm quality and bank funding costs).

These studies provide interesting and complementary findings to the country specific studies of the impact of the GFC on credit supply in Italy (Albertazzi and Marchetti, 2010), Spain (Jimenez et al, 2012), and Portugal (Iyer et al, 2013) discussed at the start of section 2.

### 2.5.2 Credit market structure and competition

In this context, we will look at credit market structure and competition issues for two Euro Area countries with different market structures i.e., Germany and Italy.

#### 2.5.2.1 Germany

In Germany, the banking system is organized around three separate pillars/types of bank:

- Commercial banks: organized as companies owned by private investors with their main business focus on institutional and international banking
- Public banks: organized on a regional basis predominantly as publicly (state) owned savings banks with a focus on lending to SME's and households in the region. Public savings banks consist of Landesbanken, which are large regional banks, and smaller local Sparkassen (savings banks). The focus of the Landesbanken is on wholesale banking in contrast to the retail banking focus of the Sparkassen. Landesbanken act as the central bank for the Sparkassen in the region.
- Co-operative banks: these banks are owned by their depositors and, like Sparkassen, focus on lending to SME's and households in their region.

In 2014, there were 1,807 credit institutions in Germany: 58% are co-operative banks; 23% are Sparkassen/Landesbanken; 15% are commercial banks; with 4% other credit institutions (BIS, 2016). The number of credit institutions in Germany has fallen by more than 50% since 1993 driven by waves of mergers of banks within each of the 3 banking pillars. However, at least at the national level, market concentration is low relative to other countries such as the UK in view of the relatively high total number of credit institutions. In contrast, concentration is much higher at the regional level which is the more appropriate focus given banks in Germany compete for SME customers at the regional level (BIS, 2016). Also, similar to the UK, switching rates are low with German SME's favouring a stable long-term 'Hausbank' relationship with a single bank for all its banking needs.

#### 2.5.2.2 Italy

Similar to Germany, banks in Italy are organized around three separate pillars: limited liability banks; co-operative banks; and mutual banks. Limited liability banks and co-operative banks, despite their different ownership structures, are larger profit-orientated organizations. Mutual banks are smaller, regionally based institutions, which pursue mutual objectives and typically lend to small firms and households (BIS, 2016).

The number of credit institutions in Italy fell from 1,100 to 841 between 1990 and 2000 due to a wave of mergers following the EU's Second Banking Directive in 1989. By the end of 2012, there were 706 credit institutions in Italy with total assets 220% of GDP (BIS, 2016). 56% of these credit



institutions are mutual banks, 28% are limited liability banks, 5% are co-operative banks, and 11% are branches of foreign owned banks (BIS, 2016). However, due to their small size, mutual banks account for only 6% of total banking assets, with limited liability banks holding 71% of total assets, and co-operative banks 14% of total assets (BIS, 2016). Based on measures of credit market concentration at the national level, the market in Italy is more concentrated/less competitive than Germany but less concentrated than the UK (BIS, 2016).

In contrast to the UK and Germany, SME's in Italy, including even very small firms, have relationships with multiple banks. For example, around 15% of Italian SME's with revenues of €5m or less have more than seven banking relationships while almost 70% of those with revenues between €15m and €25m use more than seven banks (reported in BIS, 2016). It would seem that higher screening/monitoring costs in the SME credit market in Italy, due to greater informational asymmetries, increase the benefits (to both firms and banks) of diversifying banking relationships (Carletti et al, 2007).

## 2.6 Japan trends

### 2.6.1 Demand and supply of credit

Data on the demand and supply of credit to SME'S in Japan are not available in the same format as for the other countries reported in this section. However, Ono and Uesugi (2014) provide a detailed analysis of the impact of the GFC on the availability of credit to SME's in Japan and much of the information in this section is drawn from this study. Ono and Uesugi (2014) note that:

“Although the economic impact of the global financial crisis on the Japanese economy was substantial, there was no abrupt decline in loans to SME's after 2008.” (Ono and Uesugi, 2014, p 195)

There are two main reasons why SME lending in Japan did not decline during the GFC. First, the financial health of Japanese banks was much less affected by the GFC than US and European banks. For example, aggregate losses on securitized products at the end of September 2008 was 3.3 trillion yen for Japanese banks which was a relatively small proportion of their aggregate tier 1 capital (50.0 trillion yen) and their annual profits (6.1 trillion yen). In contrast, Western banks experienced losses on securitized products that were ten times larger than in Japanese banks. Further, because domestic banks dominate Japanese banking, capital-impaired Western banks did not propagate the crisis in Japan (Uchida and Udell, 2014) to the extent they had done in Europe (Popov and Udell, 2012).

Second, the effects of the financial crisis were mitigated by large scale policy interventions made by the Bank of Japan and the government (see Yamori et al., 2013). In particular, regarding direct assistance for SME's, the Emergency Credit Guarantees (ECG) program was introduced in autumn 2008 by the Japanese government. Total guarantees under the scheme amounted to 27.1 trillion yen (about \$300 billion) by the end of the program in April 2011, making it one of the largest credit guarantee schemes ever implemented anywhere in the world.

The first main finding in Ono and Uesugi (2014) is that the main impact on SME's of the GFC was in the form of reduced customer demand rather than a reduced supply of finance. Indeed, SME's relied on bank loans, especially from their main bank, to cope with the demand shock. Accordingly, unlike

in other countries (e.g., Carbó-Valverde et al, 2016), trade credit provided by main suppliers played a limited role in filling funding gaps due to the crisis.

A second finding is that, while many SME's obtained loans from their main bank to deal with the crisis, some firms did experience difficulties obtaining loans from their main bank. Ono and Uesugi (2014) interpret these difficulties as arising in cases where firms had obtained transactional loans from other banks before the crisis which undermined their main banking relationship thus making it harder to obtain relational loans from their main bank when needed subsequently.

A third finding in Ono and Uesugi (2014), is that while the ECG helped increase credit availability for SME's during the GFC, this increase in credit availability was partially offset by a decrease in non-ECG loans in cases where the main bank provided the ECG loan. This finding suggests that main banks were substituting ECG for non-ECG loans implying close firm-bank relationships with the main bank may undermine the efficacy of credit guarantee schemes.

A fourth main finding is that subsequent employment in SME's that obtained main bank loans or ECG loans decreased more than in SME'S that did not obtain these loans which may be due to lenders 'urging' borrowing firms to implement cost cutting strategies (Ono and Uesugi, 2014). However, the profitability of these borrowing firms showed no signs of significant improvement. In addition, trade credit provided from main suppliers had no significant impact on firms' subsequent performance.

## 2.6.2 Credit market structure and competition

Japanese financial institutions hold 47% of the 6,200 trillion yen of Japanese financial assets. Depository financial institutions (in general banks) hold 26% of Japanese financial assets. Domestically licensed banks comprise 58% of banking assets with foreign banks (2%), banking institutions for agriculture, forestry and fisheries (14%), and banking institutions for small businesses (26%) comprising the remainder (Uchida and Udell, 2014). The proportion of financial assets held in banks has declined during the 1990s and 2000s corresponding to the period of Japan's banking crisis<sup>12</sup> (Uchida and Udell, 2014).

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<sup>12</sup> Japan's banking crisis began with the failures of two credit cooperatives in 1994. Between 1994 and 2003 there were 171 bank failures in Japan comprising one city bank, two long-term credit banks, one regional bank, 12 second regional banks, 23 Shinkin banks, and 132 credit cooperatives (data from Nikkin, 2005, reported in Uchida and Udell, 2014). The crisis was caused by a combination of factors including: an inflexible financial regime; the failure of the Bank of Japan's monetary policy; a regulatory response that was slow and indecisive; a lack of public support and political will to bail out crisis hit financial institutions with public funds; and the refusal of financial institutions' managers to accept criticism of their policies (Cargill, 2000). Reduced bank lending due to Japan's banking crisis had real effects on Japanese firm investment and performance (Gibson, 1997; Fukuda, Kasuya, and Nakajima, 2005; Hosono and Masuda, 2005; Miyajima and Yafeh, 2007). Also, evergreening - the practice of keeping "zombie" (unviable) firms alive by renewing their lending facilities (in order to hide non performing loans) - contributed to lower total factor productivity (Caballero, Hoshi and Kashyap, 2008). However, as discussed above, compared to Western economies, the effect of the GFC on Japan's economy was fairly limited (Ono and Uesugi, 2014).

Japanese banking operates under a complex system of regulatory segmentation governed by the 1981 Banking Law (Uchida and Udell, 2014). In particular, Japanese banks comprise:

**City banks** – These are very large (“mega”) universal banks (of which there are four: Mitsui-Sumitomo, Mitsubishi-Tokyo-UFJ, Mizuho, and Resona) offering nationwide branch banking.

**Regional banks and second regional banks** – These are banks focussed on local and retail banking. Regional banks are medium-sized while second regional banks are smaller in size. Historically these banks were formed as mutual (*Sogo*) banks with the purpose of lending to SME’s and this function remains a core part of their business.

**Trust banks** – These banks provide money trusts (*kinsen shintaku*) to their customers, a type of medium- to long-term time deposit, which the bank uses to make long-term commercial loans and investments. Trust banks have been a key source of long term funding for corporate borrowers in Japan.

**Long term credit banks** – Another source of long term corporate funding in the post-war Japanese financial system, these banks no longer exist in their original form following Japan’s banking crisis. The three remaining long term credit banks in the mid 1990s either merged with city banks (the Industrial Bank of Japan merged with Mizuho Bank and the Mizuho Corporate Bank) or became bankrupt (the Long-Term Credit Bank of Japan and the Nippon Credit Bank went into bankruptcy in 1998 and, after a temporary period of nationalisation, were renamed respectively the Shinsei Bank and the Aozora Bank). Increased access to corporate bond markets, both domestically and abroad, contributed to the decline of the long term credit banks.

**Foreign banks** – Although a large number of foreign owned banks have branches in Japan, and are regulated along with domestic banks under the 1981 Banking Law, their role as financial intermediaries in Japan is very minor.

**Shinkin Banks and Credit Cooperatives** – Shinkin banks (*Shin-you Kinko*) and credit cooperatives (*Shin-you Kumiai*) are types of cooperative bank that provide commercial banking services to their members (SME’s and individuals). Legally they are not banks and operate under a different set of rules from the 1981 Banking Law although they offer similar lending/deposit services as other banks. However, a key difference with other banks is that, both Shinkin banks and credit cooperatives are only permitted to lend to their member firms. In addition, while Shinkin banks are permitted to offer deposits to non-members, credit cooperatives can only offer deposits to members. Firm members of Shinkin bank must have fewer than 300 employees or a capitalization less than 900 million yen, while members of credit cooperatives must have fewer than 300 employees or a capitalization less than 300 million yen. Shinkin banks and credit cooperatives are limited to operating in an area no larger than a single prefecture.

**Other financial institutions providing commercial banking services** – This group includes a variety of other banks regulated by the 1981 Banking Law. It includes labour banks, agricultural cooperatives, fishery cooperatives, and forestry cooperatives. It also includes the two former long-term credit banks, Internet banks, and a resolution bank to manage the assets of failed financial institutions. In addition, Japan Post Bank (previously Japan Post) was formerly a state held postal savings bank

before it was floated on the Tokyo Stock Exchange in 2015. Japan Post Bank is primarily a savings bank with limited loan products.

Findings in Kano and Tsutsui (2003) suggest the lending market for Shinkin banks is segmented by prefecture, although this segmentation is weaker for regional banks (see also Ishikawa and Tsutsui, 2013). However, bank-type segmentation has not been tested in the literature.

There is also little research relating to the competitiveness of the banking market in Japan. Molyneux et al (1996) pooled city and regional banks and found these banks were uncompetitive in 1986 and 1988. Uchida and Tsutsui (2005), analysing a sample of city and regional banks from 1974 to 2000, find that competition improved in the sample period, especially following financial deregulation in the early 1980s. In addition, Uchida and Tsutsui (2005) found that competition was greater for city banks than regional banks.

A system of corporate financing and governance, based on industrial groups known as *keiretsu*, were arguably a driver of Japanese economic growth following the Second World War (Uchida and Udell, 2014). These groups are based on close ties between businesses, financial institutions and regulatory authorities. Specifically, the financial keiretsu relates to the horizontal links between financial institutions while the corporate keiretsu relates to the vertical ties between different firms in the supply chain. However, the relationship between the firm and its main bank lies at the centre of keiretsu. Whilst there are parallels with relationship lending in Western countries, the firm-main bank relationship has an additional corporate governance component (Uchida and Udell, 2014). Research suggests that the benefits of the main bank system to borrowing firms (e.g., the provision of liquidity) may come at the cost of the main bank extracting excessive rents from borrowers (Uchida and Udell, 2014). Other evidence of inefficiency due to the main bank relationship are implicit in the findings reported in Ono and Uesugi (2014) (discussed above).

## 2.7 Summary

This section has provided a broad sweep of trends in the demand and supply of entrepreneurial credit and different factors affecting demand and supply in recent years. In this respect, we began the section with a traditional supply side focus by looking at some key findings from the finance literature identifying significant reductions in bank lending in European countries following the GFC (Albertazzi and Marchetti, 2010, Jimenez et al, 2012, and Iyer et al, 2013). After looking at different data sources from across the world providing information, to varying extents, about different stages in the entrepreneurial credit journey, we turned to the empirical evidence in studies which have used these data to examine the factors, including the GFC, affecting these journeys.

In this respect, Cole and Sokolyk's (2016) findings for the US, Cowling et al's (2016a, 2016b) findings for the UK, and Holton et al's (2013) findings for Euro Area countries are supportive of the view that in, developed economies at least, banks are well informed about the risk of applicants and accordingly allocate credit efficiently. On the other hand there would seem to be over-optimism among entrepreneurs to the extent that (in the US and UK) riskier, lower credit quality firms apply for credit in the first place (consistent with de Meza and Southey, 1996 – see section 5). However, a contrary view is that the firms' underlying quality is good but they are simply experiencing short term financial difficulties due to the recession that makes it necessary for them to seek external

financial support. Therefore denying these firms' credit applications may simply make matters worse for them and, ultimately, may be detrimental to the economy (Cowling et al, 2016a).

Yet, even if entrepreneurial credit markets in developed economies are generally efficient this does not mean that all creditworthy entrepreneurs actually receive credit. In particular, some entrepreneurs may develop credit needs but cut short their entrepreneurial credit journey before applying for credit for fear of rejection. Indeed it is concerning that analysis of these 'discouraged borrowers' in the US and UK suggest that between one-third and two-thirds of them might be successful if they were to apply for credit. It is also clear from the literature that SME financing conditions, on both the demand and supply side, are susceptible to shocks such as the GFC and ensuing sovereign debt crisis that swept through credit markets between 2007 and 2012. In this respect, the review of the literature has highlighted the importance of discouragement as a demand side mechanism which may in general lead to financial constraints, but which seems to have been a heightened issue following the GFC. Until recently discouragement as a mechanism for transmitting market failure and shocks in the credit market to the real economy has been neglected. More on this issue later in the paper.

*What suggestions for further research flow from the discussion in this section? Unsurprisingly they are data related. In particular, there is a need for more countries, not least the world's largest economy, to systematically collect data relating to all stages of the entrepreneurial credit journey and to make these data publicly available. In this regard, the US's own SSBF, which was discontinued in 2008, remains the high standard researchers in the US and elsewhere should attempt to follow. More data on entrepreneurial credit journeys for the world's second largest economy (i.e., China) would also be particularly valuable for researchers. These appeals for more data are complementary to those made by Udell (2015) who calls for more loan level and firm level data to be collected in the US, comparable to the rich data used in European studies to identify the supply side impact of the GFC on bank lending to SME's (e.g., Jimenez et al, 2012).*

Udell (2015) also calls for the collection of more data, not only in the US but in other countries as well, on the lending technologies used by different financial institutions to understand how lending channels are affected by shocks such as the GFC. This leads us to the next section where we will look at the underlying theoretical arguments for why the market may fail to allocate credit efficiently and how lenders, through the development of different lending technologies, have addressed market failure.

### **3. Asymmetric information and market failure**

Creditors require information about entrepreneurs' repayment ability, based on the expected cash-flows generated by the business, to reach a decision about whether or not to lend to the firm and, if they decide to lend, on what terms. However, information in the small firms' credit market is imperfect and asymmetric with the usual assumption being that entrepreneurs are better informed about their ability to repay loans than banks (see e.g., Berger and Udell, 1998)<sup>13</sup>.

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<sup>13</sup> In contrast, de Meza and Southey (1996) characterize entrepreneurs as being over-optimistic about their chances of success (see also Fraser and Greene, 2006). Bankers, on the other hand, can draw on their experience of lending to new ventures to make better informed judgments about whether the business will be successful (enough, at least, to repay the loan). See further discussion on this issue in section 5.

This information gap arises because small firms are recognised as being more informationally opaque than large firms. This is because small firms tend to be younger and therefore have shorter track records i.e., there is less information available compared to large firms. Also small firms are required to keep less detailed accounts than large firms so, specifically, there is less financial data available. This leads to a situation of uncertainty, rather than risk, as per Knight's (1921) classical distinction between risk and uncertainty (see introduction). In particular, when the expected cash flow generated by the venture is uncertain and is not directly observable by the lender, it can only be verified through costly due diligence and audit (Townsend, 1979; Gale and Hellwig, 1985). However, the fixed costs of collecting private information relating to small firms are high relative to the typically smaller amounts of credit sought by these firms, which may make lending unviable (Ang, 1991).

### 3.1 Credit rationing

In this context, equilibrium credit rationing may arise where it is too costly for the bank to verify:

- The ex-ante (pre-lending) repayment ability of the firm leading to an adverse selection problem (Stiglitz and Weiss, 1981);
- Whether the entrepreneur will sustain an optimal level of effort or switch to a riskier project after receiving credit ('ex-post'), leading to a problem of moral hazard with hidden action (Jensen and Meckling, 1976; Watson, 1984); or
- Whether the entrepreneur is lying about their ability to repay the loan ex post, leading to an issue of moral hazard with hidden information (Williamson, 1987).

The explanation of credit rationing can be developed as follows. To begin with, suppose the credit market is perfect i.e., information costs are negligible, then, from a position of excess demand  $Q_d - Q_s$ , the interest rate will increase from  $r_{CR}$  to  $r_M$  to clear the market:

INSERT FIGURE 2 HERE

However, under asymmetric information, raising the interest rate to clear the market may no longer be the bank's optimal policy. In that case there may be an excess demand for loans ( $Q_d > Q_s$ ) in *equilibrium*. In particular, two types of credit rationing are identified in the literature (Keeton, 1979)

- *Type I credit rationing* (where  $Q \equiv \text{size of loan}$ ): some businesses are offered a *smaller* loan than desired at the going interest rate
- *Type II credit rationing* (where  $Q \equiv \text{number of loans}$ ): some businesses are denied a loan *altogether* at the going interest rate.

Importantly, the businesses offered a smaller loan than desired/denied outright: i) would be willing to pay more than the going interest rate to obtain the loan they need; and ii) are observationally equivalent (i.e., have the same observed risk) to businesses which received all the finance they needed (Stiglitz and Weiss, 1981). In addition, in both instances, rationing credit is the bank's optimal policy i.e., rationing does not arise because of an exogenously determined interest rate ceiling e.g., due to a usury law (Jaffee and Russell, 1976).

#### 3.1.1 Adverse selection

Under adverse selection, banks are unable to distinguish high risk from low risk entrepreneurs although the bank may know the proportions of high risk and low risk entrepreneurs in the population (corresponding to the risk distribution). In that case, the bank will pool high risk and low risk entrepreneurs and offer them a single interest based on a weighted average of the rates it would offer to high risk and low risk types respectively if it could distinguish them. But, this pooled rate may be too high for the low risk entrepreneurs causing them to drop out of the credit market leaving behind a pool of mainly high risk entrepreneurs. It may therefore be optimal (i.e., profit maximising) for the bank to set a lower interest rate to avoid this problem. However, this may lead to an under-supply of credit in equilibrium (i.e., credit-rationing).

The following 'model' illustrates adverse selection a la Stiglitz and Weiss (1981). To be clear, this is a paraphrasing of the Stiglitz and Weiss framework, not a literal exposition, and bears a greater similarity to an adverse selection model developed in Parker (2002, 2003). Individuals differ in ability  $x$  which both increases the expected cash flow from an entrepreneurial venture  $y$  and the return in waged employment (which is normalized to  $x$ ). The problem is that  $x$  is private information known only to the entrepreneur. Banks are therefore in a pooling equilibrium situation where lending decisions are based on the expected cash flow of the venture  $\bar{y}$  (which the bank is able to derive given knowledge of the distribution of  $x$ )<sup>14</sup>.

INSERT FIGURE 3 HERE

In the above diagram,  $x(r)$  denotes the location of the marginal entrepreneur.  $x(r)$  depends on the interest rate  $r$  because an increase in the interest rate will shift the expected cash-flow curve downwards from  $y(x)$  to  $y'(x)$  since, with higher borrowing costs, the venture yields a lower cash flow for any given level of ability. Under adverse selection this causes the location of the marginal entrepreneur to shift downwards to  $x'(r)$ . Assuming rational choice, individuals will select into entrepreneurship if the return in entrepreneurship exceeds the wage rate:  $y(x) > x$ . As shown in Figure 3, this occurs if  $x < x(r)$  since under adverse selection the marginal entrepreneur is the most able in the pool of entrepreneurs and is the first to drop out of the pool if the interest rate rises.

The implication for bank lending is that increasing the interest rate has two opposing effects on expected bank returns. First, an increase in the interest rate will increase the repayment to the bank conditional on the entrepreneur generating sufficient cash-flows to meet the repayment. This effect therefore has a positive effect on expected bank returns. However, second, increasing the interest rate also reduces average ability in the pool of entrepreneurs, lowering the average cash-flow  $\bar{y}$  and hence the average repayment ability of entrepreneurs. This effect therefore has a negative effect on expected bank returns. If the net effect on bank returns is positive for some levels of the interest

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<sup>14</sup> In particular individuals differ only in their venture success probability  $p(x)$ . All ventures yield the same gross return  $R^s$  in the event of success (and the common return in the event of failure is  $R^f = 0$ ). Accordingly, for the entrepreneur, the expected cash flow from the venture is  $y = p(x)[R^s - (1 + r)B]$  where  $r$  is the interest rate and  $B$  is the (given) required loan amount. However, from the bank's perspective  $p(x)$  is unobservable since  $x$  is private information. As a result, entrepreneurs/borrowers are pooled with an expected cash flow  $\bar{y} = \bar{p}[R^s - (1 + r)B]$  where  $\bar{p}$  is the success probability of the average entrepreneur/borrower. This formulation is consistent with de Meza and Webb (1987) and Parker (2002, 2003) in which ventures display heterogeneous expected returns and are therefore ranked in terms of first order stochastic dominance. In contrast, in Stiglitz and Weiss (1981), ventures differ in terms of their risk profile and are therefore ranked in terms of second order stochastic dominance.

rate (otherwise no lending would take place) then the bank expected return function is concave in the interest rate with an interior bank optimal interest rate where the two effects cancel out. This is shown in the following diagram:

INSERT FIGURE 4 HERE

Accordingly, in the presence of adverse selection, a credit rationing equilibrium may occur if the interest rate required to clear the market lies above the bank optimal rate  $r_{CR}$  (corresponding to a 'high demand' situation with  $r_M > r_{CR}$  in Figure 4). In that case, credit rationing is the optimal policy for the bank leaving entrepreneurs with unmet credit demands given by  $Q_1 - Q_{CR}$ . Intuitively, the high interest rate causes too many high ability entrepreneurs to drop out of the credit market leading to a fall in bank returns. Conversely, if the interest rate required to clear the market lies below  $r_{CR}$  then the market will clear as if the market was perfect. Accordingly, adverse selection is neither necessary nor sufficient for credit rationing to occur.

### 3.1.2 Moral hazard

Another situation in which the bank profit function may be a concave function of the interest rate is in the presence of moral hazard. The basic problem in this instance is that: i) the entrepreneur (the 'agent') may change their behaviour after receiving the loan to the detriment of the creditor (the 'principal'); and ii) observing the entrepreneur's behaviour, to ensure they do not act in a manner detrimental to the creditor, is costly i.e., there exist agency costs (Jensen and Meckling, 1976).

The relationship between moral hazard and credit rationing may be illustrated in the following model by Williamson (1987). In this model entrepreneurs hold no information advantage over banks ex ante. However, ex post, while the entrepreneur observes the realised cash-flow the bank only knows the probability distribution of  $y$ . Therefore, it is in the (economic) interests of the entrepreneur to lie about their ability to repay the loan and strategically default on the loan. This corresponds to a situation of moral hazard with hidden information.

To counter this possibility banks will monitor (audit the accounts) of all entrepreneurs who say they cannot repay. If the entrepreneur defaults and is monitored they must hand over the entire project cash-flow. One might also envisage a situation that if the entrepreneur were found to have lied about their ability to repay they would be taken to court and sued for fraud resulting in a loss of their business and reputation (restricting their ability to borrow in future). Accordingly, a credible threat of monitoring will induce entrepreneurs to behave truthfully: they will declare default if and only if  $y < D$  where  $D$  is the loan repayment. However, monitoring is costly and incurs a cost  $c$  per default.

How does increasing the interest rate affect the bank's expected returns in this case? While it increases the repayments that the bank collects when the firm repays in part or in full, it also increases the probability of default:  $Prob(y < D)$ . It can be shown that, at some point, the positive effect of increasing  $D$  will be outweighed by the higher expected monitoring costs due to the higher probability of default (and noting that, for the monitoring threat to be credible, the bank has to monitor every time an entrepreneur defaults). Accordingly, the bank profit and credit market supply functions are concave in the interest rate leading once again to the possibility of credit rationing as shown in Figure 4.



### 3.1.3 Redlining

In the previous examples, we have assumed that the bank can earn a non-negative return from lending to entrepreneurs at some if not all levels of the interest rate. That is, at least part of the bank return function in Figure 4 lies on or above the x-axis. However if the bank's expected returns from lending to a particular group of borrowers are negative for all levels of the interest rate then that group is 'redlined' (Jaffee and Stiglitz, 1990). In that case, no member of the group will receive a loan at any interest rate. This may be a particular issue for minority and disadvantaged groups and in other circumstances where information asymmetries are very high (Holmes and Horvitz, 1994).

### 3.2. Lending technologies: overcoming market failure

Economic theory suggests that problems arising from asymmetric information can be overcome in certain circumstances. An entrepreneur can signal (for example, by offering collateral) that they undertake good ventures (with a high likelihood of repayment) thereby overcoming adverse selection. Similarly, the problem of moral hazard can be overcome if an entrepreneur makes a credible commitment to allow creditors to monitor their activities closely after credit is provided (as in the Williamson, 1987, model discussed previously).

Financial intermediaries have developed several mechanisms to overcome the problems of adverse selection and moral hazard (see e.g., Amit et al, 1998; Manigart and Wright, 2013 in the context of venture capital). In the specific context of debt finance, lenders use various lending technologies to cope with these issues (Berger and Udell, 2002; 2006). These technologies can be divided broadly into two groups: transactions lending and relationship lending (Berger and Udell, 2002). Transactions lending relies on the gathering and processing of 'hard' data about the firm/entrepreneur (e.g., credit/behavioral scoring: Frame et al, 2001) or the availability of collateral (asset based lending: Han et al, 2009b). Relationship lending, on the other hand, relies mainly on 'soft' information, such as the character and trustworthiness of the entrepreneur, which is gathered over time through a relationship between the entrepreneur and a loan officer at the bank (Petersen and Rajan, 1994). In addition, trade creditors may have an informational advantage over banks regarding firm and sector risk (Carbó-Valverde et al, 2016). In this manner, working capital may be made available to firms unable to obtain it from other sources especially in periods of financial crisis.

However before turning to specific lending technologies we firstly discuss in more detail the types of information which underlie these technologies

#### 3.2.1 Hard and soft information

A pithy definition of hard information is "information that is easily reduced to numbers" (Liberti and Petersen, 2018, p1). The collection of hard information may be delegated to low skilled workers and/or automated with the use of computers, which reduces transactions costs (Frame et al, 2001). In addition, hard information may be stored and processed in a standard format which introduces economies of scale into its production (Liberti and Petersen, 2018). Due to these scale economies, large banks have an advantage over small banks in using lending technologies based on hard information (e.g., credit scoring) (Stein, 2002).

Conversely, soft information is information which: "is difficult to completely summarize in a numeric score, that requires a knowledge of its context to fully understand, and that becomes less useful

when separated from the environment in which it was collected” (Liberti and Petersen, 2018, p1). In particular, soft information is often communicated in the form of text, the translation of which into a numeric score (i.e., the ‘hardening of soft information’) involves a loss of information (Liberti and Petersen, 2018). The nature of soft information means that it is more easily communicated (i.e., entails less information loss) within the flatter organisational structures of small banks. This provides small banks with an advantage over larger banks, which have more hierarchical organisational structures, in delivering relationship lending (Stein, 2002).

Empirically, Liberti and Mian (2008) find that greater hierarchical distance between loan officers and their superiors leads to less reliance on soft information and more on hard information. In addition, personal interaction between loan officers and the superiors approving the loans reduces the loss of soft information and mitigates the effects of hierarchical distance on information use. An ongoing area of research relates to the geographical and hierarchical boundaries on the communication of soft information and the impact of technology on these boundaries (Udell, 2015).

The idea of a financial growth cycle suggests the type of information available about the firm will harden as the firm matures facilitating a wider range of lending technologies (Berger and Udell, 1998). However, the tipping point in the firm cycle, where the firm is able to switch from relationship to transactions based lending, is untested in the literature (Udell, 2015). An example of the hardening of soft information due to technological change is the introduction of small business credit scoring (Udell, 2015) which is discussed in more detail below. More recently, an interesting development at the interface between hard and soft information is the growth in peer-to-peer lending which has increased rapidly since the GFC. Peer-to-peer lending decisions involve both traditional hard metrics and expanded soft measures such as the borrower’s physical appearance and the pitch narrative (e.g., Duarte et al, 2012). In addition, online social networks appear to increase the chances of funding, lower the cost of funding, and reduce default rates (Lin et al, 2013). The value of the extended information used in peer-to-peer lending decisions is an ongoing area of research (Liberti and Petersen, 2018; see also further discussion in section 8)

### 3.2.2 Collateral based lending

Collateral based lending involves lending against the value of tangible assets. It therefore relies on hard information obtained from the firm’s balance sheet. We begin this section by looking at theoretical issues underlying the role of collateral in SME lending before concluding the section with recent developments in specific forms of collateral based lending, in particular: asset based lending, factoring, and leasing and hire purchase agreements.

In the presence of information asymmetries, lenders are unable to separate high risk from low risk borrowers using a single term (i.e., the interest rate) in a loan contract. If banks offered separate contracts for high and low risk ventures respectively, based solely on an interest rate term, it would be optimal for high risk ventures to masquerade as low risk ventures to take advantage of the lower interest rate offered to low risk ventures (and the bank would lose money). Because of this, with a single term, the bank has to pool high and low risk types (it is unable to separate the ‘wheat from the chaff’) which leads to the possibility of credit rationing as discussed previously.

However, by writing more complex contracts with additional terms, lenders may be able to separate risk types (and overcome credit rationing). An important example of an additional loan term is

collateral e.g., Bester (1985). Other examples of additional loan terms include equity investment by the entrepreneur (Myers and Majluf, 1984) and the proportion of the loan subject to unlimited liability (Chamley, 1983). Lenders can write contracts involving an interest rate and collateral term which are incentive compatible (i.e., separate risk types) and maximize bank profits. In particular, the incentive compatible contract for low risk borrowers involves pledging collateral in return for a lower interest rate whereas high risk borrowers prefer a contract with no collateral and a higher interest. In this manner, the willingness to offer collateral by low risk borrowers becomes a reliable signal of borrower quality to an imperfectly informed lender (Bester, 1985, 1987).

This situation with collateral can be explained in more detail as follows. In Bester's (1985) model the bank is unable to observe directly whether the entrepreneur is a high risk ( $b$ ) or low risk type ( $g$ ). Instead the bank offers different loan contracts involving different interest rate ( $r$ ) and collateral terms ( $C$ ) to the high risk and low risk types respectively. If the contracts on offer are incentive compatible, then the high risk and low risk types self-select into the contract intended for their risk type. This results in a separating equilibrium (i.e., no credit rationing) in which entrepreneurs signal their risk type through their choice of contract. This is shown in the following diagram:

INSERT FIGURE 5 HERE

In the above diagram  $\pi_b$  and  $\pi_g$  are iso profit lines. They represent different combinations of  $r$  and  $C$  which yield the same level of (optimal) expected bank profit from lending to high risk and low risk entrepreneurs respectively. If the entrepreneur repays the loan, the bank will receive the interest payment  $r$  (and capital); if the entrepreneur does not repay the bank will receive  $C$ . The iso-profit lines slope downwards because the bank can earn the same level of expected profit by charging a higher  $r$  and lower  $C$  or vice versa i.e., there is a trade-off between  $r$  and  $C$ . The bank charges the high risk entrepreneur a higher interest rate due to their lower probability of repayment ( $\pi_b$  lies above  $\pi_g$ ). However, as  $C$  increases, the bank's return in the event of default also increases. Since default is more likely for the high risk entrepreneur the bank can reduce the interest rate by more along  $\pi_b$  relative to  $\pi_g$  (and, therefore,  $\pi_b$  is steeper than  $\pi_g$ ).

The indifference curves  $I_b$  and  $I_g$  represent combinations of  $r$  and  $C$  that yield the same level of utility to the entrepreneur. An indifference curve closer to the origin implies higher utility (the "bliss" point is at the origin). The slope of the indifference curves shows how willing entrepreneurs are prepared to trade a lower  $r$  for offering more  $C$ . The high risk entrepreneur is less willing to accept a lower  $r$  in return for offering more  $C$  (because they are more likely to fail and have to give up their collateral). Therefore  $I_b$  is steeper than  $I_g$ .

Now suppose the bank offers contracts  $\Gamma_b$  and  $\Gamma_g$  as depicted in Figure 5. Entrepreneurs will self-select into the contract that maximizes their utility. Therefore, the b-type will select  $\Gamma_b$  and the g-type will select  $\Gamma_g$ . If, instead, a b-type took a contract just (i.e., infinitesimally) to the right of  $\Gamma_g$  then their utility would fall. Equally, if a g-type took  $\Gamma_b$  then their utility would fall. Therefore,  $\Gamma_b$  and  $\Gamma_g$  are incentive compatible loan contracts. In other words, contracts  $\Gamma_b$  and  $\Gamma_g$  separate types and result in an equilibrium with no credit rationing.

In contrast, contracts  $\Gamma_b$  and  $\Gamma_{g^*}$  do not separate types. In this case, the b-type's utility would rise if they masqueraded as a g-type. From this we can infer that the key requirement for incentive

compatible contracts is that  $I_b$  and  $I_g$  cross once on or between  $\pi_b$  and  $\pi_g$ . This is known as the single crossing property. Also, in a competitive market,  $\Gamma_b$  and  $\Gamma_g$  are unique: any other contracts satisfying the crossing property involve lower borrower utility. Therefore, these contracts must be offered if credit markets are competitive.

The situation in the Bester framework is sometimes referred to as Sorting by Private Information (SBPI): the idea is that low risk entrepreneurs offer collateral to signal their type to lenders (and benefit from a lower interest rate). High risk entrepreneurs may get credit but they offer less/no collateral and pay a higher interest rate. Collateral therefore helps to overcome the adverse selection problem.

An alternative view is that collateral is required by (well informed) lenders from (observably) riskier entrepreneurs to provide insurance against losses in the event of default (see Berger and Udell, 1990). This corresponds to a situation of Sorting by Observed Risk (SBOR). Whereas SBPI predicts a negative relationship between collateral and risk, SBOR predicts a positive relationship.

Han et al (2009b) develop a model in which collateral has both SBPI and SBOR roles (which they call Sorting by Signalling and Self-Selection: SBSS). Stage 1 in the model corresponds to a SBOR stage: the entrepreneur applies for loan and the bank observes risk characteristics ('signals'). However this information is imperfect – the true quality of the entrepreneur is private information known only to the entrepreneur. Therefore, at Stage 2 the bank writes a menu of incentive compatible contracts based on the observed signals. Stage 2 corresponds to SBPI. At this stage, the entrepreneur chooses the contract that maximises their utility. Good entrepreneurs will prefer a contract with a higher collateral requirement ( $C$ ) but a lower interest rate ( $r$ ) (and vice-versa for low quality entrepreneurs) as in Bester's model.

The key predictions of Han et al (2009b) are:

1. Entrepreneurs which convey good signals at Stage 1 will be offered more favorable loan contracts (i.e., contracts with both lower  $r$  and  $C$ ). This is because better information/lower information asymmetries at Stage 1 will improve the terms for good entrepreneurs (but worsen them for low quality entrepreneurs). Indeed, if 'signals' convey perfect information about the quality of the entrepreneur, there is no need for Stage 2.
2. At Stage 2, good entrepreneurs will choose a contract with higher  $C$  and lower  $r$  and vice-versa for lower quality entrepreneurs.

Han et al (2009b) test their model using US SSBF data for 1998. They find evidence to support SBSS (i.e., the dual role of collateral) over SBOR and SBPI individually. In particular, they find that:

1. Entrepreneurs with good credit histories are less likely to post collateral and pay a lower interest rate than those with bad credit histories (which supports SBOR).
2. Higher quality entrepreneurs (more profitable) are more likely to post collateral and pay a lower interest rate (which supports SBPI).

In other words, neither SBOR nor SBPI are individually able to explain loan contract terms: instead, SBSS offers a more complete explanation. The implications are that collateral is both required by banks in some circumstances (where the entrepreneur is observably riskier) and offered by entrepreneurs in other circumstances (where information asymmetries are high and the

entrepreneur wishes to benefit from a lower interest rate). In addition, for good entrepreneurs it pays to develop a stable/long term relationship with their bank (in order to reduce information asymmetries) so that they receive loans on more favorable terms (i.e., both lower  $r$  and  $C$ ).

However, regardless of whether the role of collateral conforms to SBPI, SBOR, or SBSS, the problem with collateralized lending is that businesses with insufficient assets to offer as collateral will be unable to access credit. This provides an important part of the rationale for government intervention in the form of loan guarantees (see below). A further issue specifically with SBPI/SBSS is that wealthy entrepreneurs may be the least risk averse and therefore inclined to take on risky projects. This situation of declining absolute risk aversion obscures the signal because ventures offering collateral now include a mix of low risk and high risk types (Cressy, 2000).

Developments in 'non-bank' debt products<sup>15</sup> have reduced entrepreneurs' reliance on traditional (collateralized) bank debt. In particular, asset based lending typically provides funding for working capital which is secured against debtors/unpaid invoices/accounts receivable (frequently, a plentiful asset for high growth businesses). In addition, leasing and hire purchase agreements (or 'asset finance' in the UK) provides funding for fixed assets which is secured on the asset being funded (i.e., there is usually no need for additional collateral). Indeed, leasing and hire-purchase agreements are now more widely used by SME's than term loans in the UK (British Business Bank, 2019).

In the US, asset based lending ('discounting') involves funding secured against accounts receivable and/or inventory which is typically used for working capital purposes (Udell, 2015). Asset based lenders, using their own rather than external audit teams, calculate loan-to-value (LTV) ratios on a daily basis based on changes in the levels of the accounts receivable and inventory. Asset based lending is accordingly an expensive lending technology due to the continuous monitoring of current assets (Udell, 2015).

In the UK, asset based lending covers a broader range of assets including, in addition to accounts receivable and inventory, plant and machinery, real property and even intellectual property and brands (British Business Bank, 2019). Also, whilst factoring, which involves the sale of accounts receivable to a lender, is considered separate from invoice discounting in the US, both factoring and invoice discounting (along with equipment and real estate loans) fall under the general heading of asset based finance in the UK (British Business Bank, 2019).

Subject to these definitional differences, Udell (2015) highlights that there is relatively little research on asset based lending. What research there is, suggests that asset based loans (using the narrower US definition) are riskier (Klapper, 1998; Carey et al, 1998) consistent with the view that firms pledging their accounts receivable/inventory are already highly leveraged (with, presumably, fewer fixed assets left to offer as collateral). In terms of real estate lending, Kleiner (2014) found that the fall in this type of lending in the UK during the GFC led to a reduction of between 9-16% in national employment with a bigger reduction of 20-27% in the regions worst hit by the slump in property prices. Regarding factoring, the research suggests there are synergies between the factor's financing activities (i.e., credit assessment and provision), risk assumption, and debt collection activities

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<sup>15</sup> Asset based lending and leasing and hire purchase agreements are often provided by commercial finance companies e.g., GE Capital, which is why the term 'non-bank products' is sometimes used in connection with them. However, banks are also active in providing these products.

(Bakker et al, 2004). These synergies may give factors an advantage over other potential providers of working capital (e.g., banks and trade creditors) and benefit their customers (e.g., helping improve the firm's cash flow management). In addition, because factoring involves the sale of accounts receivable, it may be particularly beneficial in countries where weak laws would make lenders reluctant to accept accounts receivable as collateral (Bakker et al, 2004).

Berger and Udell (2006) highlight the importance of a country's 'lending infrastructure', relating to its informational, accounting, legal, judicial, tax, regulatory, and social environments, in determining the feasibility and importance of particular lending technologies in a country. In particular, Udell (2015) highlights that for asset based lending to work several key components of the lending infrastructure need to be in place. These include: laws that allow for the bulk assignment of accounts receivable and inventory; a nationwide system of collateral registration; strong judicial and bankruptcy systems that uphold security holders' rights; and information sharing mechanisms that allow asset-based lenders to efficiently evaluate the quality of accounts receivable. Only a handful of common law countries including Australia, Canada, New Zealand, the UK and the US currently have the necessary lending infrastructure for asset based lending in its strict sense (which involves the lender continuously monitoring current assets). However, a number of countries, including China, Japan, and Vietnam, have changed their lending infrastructures (including introducing laws to protect security holders' rights) which is facilitating increased asset based lending (Udell, 2015)

There is an important distinction between 'inside' and 'outside' collateral (Berger and Udell, 1998; Udell, 2015). Inside collateral refers to business assets that are used as collateral to obtain a loan for the business. Outside collateral relates to non-business assets, typically the entrepreneur's personal assets, which are pledged as collateral to obtain a loan for the business. Udell (2015) argues that confusion exists because the literature has focused on outside collateral whilst assuming the same implications apply for inside collateral. For example, the incentive and signalling effects discussed above which are associated with collateral (e.g., Bester, 1985) relate specifically to outside collateral ('entrepreneurial wealth') and it is not clear whether the same implications would hold with inside collateral.

Also inside collateral only matters where there is more than one lender in which case a security interest will make a difference as to which lender has the senior claim on an asset in the event of bankruptcy. If there is only one lender then inside collateral only has a role in preventing the entrepreneur from selling fixed assets in the event of bankruptcy which cannot explain the prevalence of lending secured against current assets. In short: "there needs to be more theoretical literature on inside collateral to better understand why it is so common in SME lending; and, there needs to be more empirical research that specifically tests theories of outside collateral with data on outside collateral – and that specifically tests theories of inside collateral with data on inside collateral." (Udell, 2015, p. 35)

### 3.2.3 Relationship lending

Relationship lending is a traditionally important lending technology for informationally opaque small firms (e.g., Petersen and Rajan, 1994; Berger and Udell, 1995). Indeed, relationship lending may be the only lending technology available where the firm has insufficient collateral or lacks audited financial statements (Udell, 2015). In the case of relationship lending, loan decisions are based on proprietary information about the firm, which is gathered over time through the firm's various

dealings with the lender. In contrast to transactions lending, relationships may produce not only hard information but also soft information e.g., about the character and reliability of the business owner (see discussion of hard and soft information above).

The strength of lending relationships is measured in four key dimensions (Kysucky and Norden, 2015):

- Time
- Distance
- Exclusivity
- Cross-product synergies

Time facilitates the production of both hard and soft information which may be either publicly available (proxied by firm age) or private information exclusive to the firm and relationship lender (proxied by the relationship length) (Petersen and Rajan, 1994). Traditionally, less distance between the lender and borrower strengthens the relationship and facilitates the production of more soft information (Agarwal and Hauswald, 2010). However, the effect of distance depends on a number of factors including technological change, which has facilitated relationships over a greater distance (DeYoung et al, 2008)<sup>16</sup>. Exclusivity relates to the extent to which the borrower concentrates their borrowing and other bank products with a single lender. Exclusivity promotes the production of soft/hard private information, which may lead to better lending outcomes than would be available from outside lenders. With cross product synergies, the parties to the relationship may benefit from the increased information production and shared costs over multiple services provided by the lender. In short, the information the lender is able to obtain from the borrower's use of multiple bank products over time improves the lender's ability to predict the borrower's credit quality (e.g., Agarwal et al. 2018).

The strength of lending relationships impact on four key lending outcomes (Kysucky and Norden, 2015):

- Credit availability
- Price of credit
- Collateral
- Maturity

Early empirical evidence relating to these predictions for US small firms, using SSBF 1987 data, suggests that more concentrated relationships reduce loan rates and longer/more concentrated relationships increase the availability of credit for small firms (Petersen and Rajan, 1994). Also using SSBF 1987, Berger and Udell (1995) find that longer relationships reduce loan rates and incidences of collateral being pledged on loans by small firms. A later study, based on a wide review of the findings in the literature, Elyasiani and Goldberg (2004) find evidence that relationships increase the availability of credit and reduce loan rates. However, the evidence on the direction and magnitude

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<sup>16</sup> Agarwal and Hauswald (2010) show that proximity between the borrower and lender, in informationally opaque credit markets, facilitates the collection of soft information which is incorporated into the lender's credit assessment. DeYoung et al (2008) discuss the positive association between lender-borrower distance and the use of credit scoring.

of the effect of relationship length on lending outcomes is mixed and multiple relationships reduce the value of any single borrower lender relationship. In addition, despite technological change favoring transactions based lending, small banks still have an advantage over larger banks in providing relationship lending. More recently, Kysucky and Norden (2015) conducted a meta analysis of the impact of relationship lending on lending outcomes based on 101 studies in the US, Europe, Asia, and Latin America from 1970 to 2010. The overall evidence from these studies indicates that relationships, which are longer, exclusive, and provide cross-product synergies, are associated with lower loan rates and higher credit volume. However, borrowers with exclusive relationships post more collateral and those located close to their lenders pay higher loan rates.

Both the review findings in Elyasiani and Goldberg (2004) and Kysucky and Norden's meta analysis supports the view that relationship lending may have both good and dark sides (see also Boot, 2000). In particular, whilst relationship lending may deliver beneficial outcomes for borrowers, it may also create a hold-up problem, where the borrower becomes informationally captured by the bank (leading to higher loan rates). In addition, a potential negative outcome from the lender's perspective, is that relationship lending may create a soft budget constraint problem, where the lender is unable to credibly deny additional credit if the borrower gets into financial difficulties (Boot, 2000).

Looking at findings from individual studies, credit file data relating to loans to medium sized firms extended by five leading German banks, indicates that lending by housebanks is consistent with the idea of a long term commitment between the bank and firm (Elsas and Krahnen, 1998). In particular, liquidity insurance is provided to firms in case of an unexpected (small if not large) deterioration in the firm's credit rating. (Elsas and Krahnen, 1998). However, housebank relationships do not seem to influence loan spreads.

As indicated by the findings in Ono and Uesugi (2014), relationship lending with the firm's main bank plays a very important role in SME lending in Japan (see section 2.6.1). In this regard, in a study using RIETI data from before the crisis, Uchida et al (2012) find that loan officers produce more soft information when there is no loan officer turnover and less soft information is produced when there is no specific loan officer. In addition, more soft information is produced by more frequent contact between the loan officer and entrepreneur. These findings are consistent with the hypothesis that loan officers are important in accumulating soft information. However while smaller banks tend to produce more soft information than larger banks (consistent with the hypothesis that smaller banks have a comparative advantage in relationship lending – Stein, 2002), Uchida et al (2012) also find that loan officer capacity to produce soft information is equally important (in terms of soft information production) in both large and small banks.

The impact of a banking relationship on the availability of bank finance may be weakened if a firm has multiple banking relationships. Theoretical models by Sharpe (1990), Diamond (1991) and Rajan (1992) demonstrate that a single banking relationship is beneficial because the information about firm risk/quality collected by the bank is not shared with other finance providers. Proprietary information alleviates the problem of free-riding and thus provides the motivation for lenders to invest more in monitoring (Bris and Welch, 2005). In contrast, multiple borrowing relationships may create a free-rider problem among creditors weakening the incentives of creditors to monitor



borrower's behaviour (Holmstrom, 1982; Márquez, 2002). In addition, transaction costs may be higher when there are multiple creditors.

In this respect, Cole (1998), using SSBF 1993 data, finds that firms with multiple sources of financial services are less likely to receive credit and that the length of relationship is unimportant in explaining credit access. However, while monogamous relationships with banks may be advantageous in the early stages of a firm's life, some of these advantages may be offset if loan rates rise with the duration of the relationship (consistent with the overall evidence from the literature reported in Elyasiani and Goldberg, 2004). Unsurprisingly in this respect, while most firms borrow from a single bank initially, over time many start borrowing from additional banks. The likelihood of multiple banking relationships is higher for firms with more growth opportunities and those with poor performance (Farinha and Santos, 2002).

The model in Bris and Welch (2005) also suggests that creditor concentration is positively related to the amount creditors spend on debt collection. But, debt collection activities are purely redistributive with social waste greatest when creditors are concentrated. Additionally, when firm quality is not known, Bris and Welch's model predicts that higher quality entrepreneurs signal their quality by concentrating their creditors. Equally, empowering creditors in financial distress (i.e., by increasing creditor concentration) may motivate entrepreneurs to increase their efforts to avoid bankruptcy.

Bris and Welch's analysis implies there is a trade-off underlying the optimal number of creditors. Minimizing ex ante signalling and agency costs on the one hand, which favours higher concentration. And, on the other hand, minimizing ex post deadweight bankruptcy collection costs which favours lower concentration. Overall, this situation would seem to point to concentrated small firms' banking relationships as being the optimal outcome in view of the high information asymmetries and agency costs associated with entrepreneurial credit. Indeed, supportive of this view, the empirical evidence reported previously suggests that small firms tend to concentrate their borrowing relationships in a single bank to improve access to finance (e.g., Cole, 1998).

Yet despite the theory and empirical evidence multiple bank-firm relationships are still frequently observed in practice e.g., among Italian SME's (see section 2.5.2.2). For example, more than half of US small businesses have multiple sources of financial services and nearly 90% of Italian manufacturing firms have more than one creditor (Detragiache et al, 2000). Although, relating to a sample of large firms with average sales of \$750 million across 20 European countries, Ongena and Smith (2000) find the average number of bank relationships is 5.6, with a median of 3 and a maximum of 70. Theoretical models in the literature suggest there are three principal reasons for the existence of multiple creditor relationships.

First, multiple relationships can induce interim creditor competition to overcome the problem of rent extraction through the creditor's acquisition of private information from a unique relationship (von Thadden, 1992). For example, Repetto et al, (2004) looking at the cost of borrowing for Chilean manufacturing firms, find that lower creditor concentration has a significantly negative effect on the cost of borrowing. This is because a single creditor may be able to charge a higher rate on small business loans through a "lock-in" mechanism (Degryse and Cayseele, 2000). This mechanism creates rents for banks, which gain a proprietary hold over private information about the firm so that other potential creditors are informationally disadvantaged. This hold-up problem can be

mitigated through multiple relationships with banking competition further mitigating the information monopolies associated with single banking. (Although, as discussed below, higher credit market concentration may potentially create greater incentives for lenders to invest in relationships which improves firms' access to credit: Petersen and Rajan, 1995).

Second, entrepreneurs commit themselves to more costly renegotiation if they have multiple creditor relationships which acts as a deterrent to strategic default (as discussed above in the context of Williamson, 1987). Therefore, low-default risk/high quality firms tend to borrow from more creditors (Bolton and Scharfstein, 1996). Third, higher screening/monitoring costs in the credit market (as in e.g., Italy), in contrast to the implications of Bris and Welch (2005), may increase the benefits (to both firms and banks) of diversifying banking relationships (Carletti et al, 2007). And fourth, multiple creditor relationships, may help to insure firms against liquidity shocks that may affect banks (Detragiache et al, 2000).

Creditor concentration is also associated with characteristics of the firm and entrepreneur, e.g. business size measured by value of assets (Petersen and Rajan, 1994) and sales (Ongena and Smith, 2000). Institutional factors are also linked to creditor concentration. In this respect, Ongena and Smith (2000) find that multiple bank relationships are associated with inefficient judicial systems and poor enforcement of creditor rights (based on an analysis of 1079 firms across 20 European countries).

Firms also maintain less concentrated banking relationships in countries with less concentrated but stable banking systems and active public bond markets (such as the US). Berger et al (2005b) find that small banks are more likely to develop concentrated relationships with small business customer reflecting the advantage of small banks over large banks in collecting soft information about the firm (see also Berger and Udell, 2002; Liberti and Petersen, 2018). In an analysis of Portuguese firms, Farinha and Santos (2002) find that the likelihood of a firm increasing its creditor relationships from one to multiple banks increases over the duration of that relationship. In addition, firms with more growth opportunities and those with poor performance are more likely to disperse their borrowing. In Germany, viewing creditor concentration from the bank's perspective, Elsas (2005) finds that a concentrated relationship improves the bank's access to information and its influence on the management of the firm. However, the duration of the bank-borrower relationship is not related to creditor concentration (Elsas, 2005).

Looking at these issues in the round, Han et al (2008) perform an empirical analysis of the determinants of creditor concentration using SSBF 1998 data. They use a Heckman procedure to control for sample selection bias due to non-random selection from the small firms' population into the group of businesses with creditor relationships. In particular, firms with creditor relationships (i.e., those firms whose credit applications have been approved) would be expected to be more creditworthy than those without creditor relationships. Accordingly, estimation of the determinants of creditor concentration using just the sub-sample of firms with creditor relationships will lead to biased and inconsistent estimates of the population effects.

Controlling for selection, and consistent with previous findings (e.g., Petersen and Rajan, 1994; Ongena and Smith, 2000), Han et al (2008) find that larger businesses have less concentrated relationships. In addition, entrepreneurs with at least a college degree are more likely to have concentrated creditor relationships. More informationally transparent firms (those with business

credit cards) are less likely to concentrate their credit supply in a single provider. Also longer banking relationships are associated with more dispersed creditor relationships suggesting this strategy mitigates the hold-up problem (see also Farinha and Santos, 2002).

The key finding of Han et al (2008) is that the correlation between the unobservables in the credit supply (selection) and concentration equations (where unobservables relate to unobserved firm quality/creditworthiness) is negative and statistically significant. This implies that higher quality firms have less concentrated creditor relationships. This supports the theoretical prediction of Bolton and Scharfstein (1996) that low-default risk/high quality firms tend to borrow from more creditors rather than the prediction of Bris and Welch (2005) that high quality firms signal their type by concentrating their creditor relationships.

Looking further at the issue of information capture, a theory paper by von Thadden (2004) predicts that relationship lending leads to a limited informational capture of borrowers, with interest rates charged above the full-information market rate and occasional switching of borrowers in equilibrium. (This contradicts an earlier influential paper by Sharpe, 1990, which predicts full informational capture leading to long term bank-firm relationships.)<sup>17</sup>. Indeed, Von Thadden's (2004) analysis is consistent with an earlier empirical paper by Degryse and Van Cayseele (2000) which finds, for a sample of Belgian relationship loans, that: loan rates increase with the length of the bank-firm relationship (although this effect depends on the scope and intensity of the relationship); and some firm's occasionally switch to an outside bank which charges a higher rate (which prices in a winner's curse effect).

Dell'Ariccia and Marquez (2004) develop a model in which negative shocks to banks' funding costs (which force a reduction in lending) cause a reallocation of bank credit toward informationally captured borrowers, and away from borrowers with alternative sources of financing (a 'flight to captivity' effect). One implication for financial liberalization in developing/transition economies is that, following liberalization, foreign banks would be able to attract better quality less informationally opaque borrowers due to their cost advantage, while local banks would retain dominance in lending to opaque borrowers due to their informational advantage. This is consistent with empirical evidence e.g., Berger et al (2001) who find, using micro-data for Argentina, that foreign-owned banks are less likely to lend to informationally opaque small businesses. In addition, Dell'Ariccia and Marquez's model predicts there should be a flight to captivity following a forced reduction in lending due to monetary contraction. This is somewhat contrary to empirical findings following the GFC which identified a supply side reduction in lending (due to impaired bank balance sheets) to informationally opaque small firms (e.g., Jimenez et al, 2012).

There is clearly an intimate relationship between the hold up/informational capture problem and banking competition:

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<sup>17</sup> The issue, which von Thadden (2004) points out, is that Sharpe (1990) failed to consider a winner's curse phenomenon: "if an outside bank wins the bidding contest, it must take into account that its success is due to its bid being attractive, but also to the fact that the inside bank did not want to bid more aggressively. Hence, the very fact of winning contains information that a rational player must take into account. Typically, in such situations pure-strategy equilibria do not exist." (von Thadden, 2004, p 16). This situation leads to a game which only has an equilibrium in mixed strategies, featuring partial informational capture of firms and random termination of lending relationships.

“Competition enters the discussion of the hold-up problem through the market power of the inside bank. An increase in bargaining power for the inside bank means that the bank can profit more from any information advantage it has over outside banks. The focus of the theoretical literature has been the implications of this observation.” (Rosen and Udell, 2017, p. 332)

In a seminal early study on this issue, Petersen and Rajan (1995) develop a model in which the value of lending relationships is determined by concentration in the credit market. When credit markets are concentrated, it is easier for creditors to internalize the benefits of a firm-creditor relationship. In contrast, too much competition may reduce incentives to invest in banking relationships leading to reduced credit availability and possibly worse terms (see e.g., Petersen and Rajan, 1995).

Consistent with their model, Petersen and Rajan (1995) find, using US SSBF 1987 data, that young firms in concentrated markets receive more credit from banks than otherwise similar firms in competitive markets. However, creditors smooth interest rates over the firm life-cycle in concentrated markets, charging lower than competitive rates when the firm is young but higher than competitive rates when the firm is older. Petersen and Rajan’s theoretical explanation for this result is that the young firm rates are subsidized by higher rates for older firms because raising the interest rate too high on loans to young firms would induce problems of adverse selection/moral hazard which would otherwise result in younger firms going without credit. Banks are more willing to subsidize younger firm loans when they know there is less chance of the older firm seeking credit elsewhere (due to high market concentration). This is related to the informational capture or ‘hold-up’ problem discussed previously whereby firms ‘locked in’ to relationships pay higher loan rates.

In a theory paper, Boot and Thakor (2000), explore the impact of bank competition on bank orientation (i.e., the choice between transactions based lending and relationship lending). Interestingly, in contrast to Petersen and Rajan (1995), Boot and Thakor’s model predicts that faced with increased interbank competition banks make more relationship loans (although the marginal rents from these loans is lower). This follows because interbank competition reduces the rents from both relational and transactional loans but information capture means that relational loans are partially shielded from the effects of pure price competition. Providing empirical support for this proposition, Degryse and Ongena (2007) find that banks facing more local competition engage more in relationship lending.

As Rosen and Udell (2017) note:

“Overall, the theoretical literature does not come to a simple conclusion about the effect of competition on SME lending.” (Rosen and Udell, 2017, p. 334)

Accordingly, we give the final word on relationship lending, and the competition/concentration issue in particular, to the broad based empirical evidence provided by the meta analysis in Kysucky and Norden (2015):

“We document a strong and positive monotonic link between bank competition and relationship-lending benefits for borrowers. We further find that the benefits for the borrowers are more likely in the United States compared to the other regions. The prevalence of relationship lending per se, as found in the bank-based financial systems in Europe and Japan with a large fraction of SME

borrowers, does not necessarily come along with benefits for these borrowers” (Kysucky and Norden, 2015, p 103).

Essentially, in the ‘race’ between lender competition (reducing hold-up problems and lowering borrowing costs) and concentration/market power (encouraging lenders to invest more in relationships), higher competition appears to be the ‘winner’ in terms of delivering the benefits of relationship lending to SME’s. (Further discussion of bank competition is provided in the policy section 6.5.)

Yet, as indicated by Kysucky and Norden (2015), more research is required to fully understand the role of supply and demand in determining the outcomes of lending relationships (see suggestions for future research in the conclusion).

### 3.2.4 Small business credit and behavioral scoring

Credit scoring, as a type of transactions based lending, has become increasingly important for small business lending since the mid-1990s (see Allen et al, 2004; Bank of England, 2004). Credit scoring involves the development of statistical models, using large samples of data on previous loans, to predict the probability of default. New applicants’ data can be input into the model at a later time to derive a credit score which then forms the basis for lending decisions. Typically the data used to predict defaults relates to financial ratios (encompassing profitability, leverage, and liquidity) and information on credit histories and financial delinquencies (see Allen et al, 2004, for an international survey of credit scoring models).

Credit scoring has a long history in consumer lending but its application to small business loans is relatively recent<sup>18</sup>. Previously, the relevance of credit scoring for small business lending was questioned due to the heterogeneity of small businesses, suggesting models with poor predictive power, and the limited availability of financial data for these firms (Rutherford, 1994/1995). However, in this regard, the key innovation in small business credit scoring was made by Fair Isaac and Company (FICO) in the 1990s, who discovered that personal information about the small business owner (e.g., income, personal assets, home ownership, outstanding debts and previous loan defaults/delinquencies) is highly predictive of the firm’s repayment likelihood (Mester, 1997). However, the use of data on the applicant’s gender, race or religion to determine credit scores is prohibited by anti-discrimination legislation.

Another scoring technique which is widely used by banks is behavioral scoring. This approach uses information about the performance/management of the entrepreneur’s current (checking) account to predict the likelihood of repayment. Predictors include debit and credit turnover (flows of funds out of and into the account over a monthly period), debit/credit turnover volatility, unauthorized

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<sup>18</sup> In this respect, Udell (2015) questions whether small business credit scoring can be viewed as a technological innovation, as some have argued, since the underlying technology (e.g., discriminant analysis) had been around for decades (see Altman, 1968, in the context of business credit scoring) and was already widely used in consumer lending. Instead, Udell (2015) argues that the innovation inherent in the adoption of small business credit scoring was the introduction of firm and entrepreneur level variables into existing consumer credit scoring models. It therefore makes more sense to consider small business credit scoring as a financial rather than a technological innovation.

overdraft borrowing, returned cheques due to insufficient funds in the account and other financial delinquencies.

Again, the use of information about the performance of the entrepreneur's personal current account may be a useful complement and/or substitute for data on the business account. As with credit scoring, behavioral scoring does not use information on the gender, ethnicity or religion of the applicant: in principle, businesses with the same financial ratios, credit histories and account performance would receive the same score, and hence have the same access to finance and pay the same interest rates, regardless of the owner's gender, ethnicity, or religion. However, statistical discrimination on ethnicity could enter indirectly into scoring systems insofar as postcodes, which may be used in credit/behavioral scoring models, are strongly associated with ethnicity (Holmes and Horvitz, 1994).

Equally, credit/behavioral scoring is often used as a complement to expert systems which involve the judgement of a loan officer about the entrepreneur's ability and willingness to repay the loan based on the five Cs (capacity, character, capital, collateral and conditions – see e.g., Greenbaum and Thakor, 2007). This introduces the possibility for loan officers' views on ethnicity to enter the credit evaluation.

Proponents of credit scoring argue it delivers accurate and cost effective assessments of credit risk. This should lead to:

1. A reduction in the fixed costs of credit screening (with no loss in the accuracy of risk assessments). Consequently, lending to small firms becomes more profitable leading to increased lending to these firms.
2. Loan margins which adjust to individual borrowers' credit risk. Consequently, there is less 'pooling' of borrowers so that riskier borrowers get loans at higher rates (rather than being credit rationed).

In respect of these predictions Berger et al (2005a) conduct an empirical analysis of the impact of credit scoring on small business lending in the US using credit file data for loans below \$100,000 in the period 1995-1997. Their key findings are that small business credit scoring is associated with:

1. An increase in lending to small businesses.
2. An increase in loan prices.
3. An increase in loan risk.

These general findings support the view that small business credit scoring has allowed banks to make loans that differentiate between borrowers of different risk types and reduced the need to pool borrowers. In other words, small business credit scoring in the US has facilitated a credit market which operates closer to the perfect information paradigm depicted in Figure 2, and less like the imperfect market, with the potential for credit rationing, depicted in Figure 4.

However Berger et al (2005a) also find that the impact of small business credit scoring depends on how the bank uses the technology. In particular, 'rules' banks use credit scoring as a cheaper substitute for other lending technologies. These banks purchase scores from external vendors and use the score to allocate/price loans automatically (allowing little or no discretion for loan officers in the lending decision). In this case, reduced screening costs allows rules banks to increase small

business lending leading to an increase in quantities of loans, loan margins and risk in these banks' small firms' loan portfolios.

On the other hand, 'discretion' banks develop in-house credit scoring models and use them as a complement to other lending technologies to increase the accuracy of risk assessments. They do this so they can 'cherry-pick' low risk borrowers. In this case, the higher screening costs result in no increase in small business lending and loan margins that are higher (as the bank passes on higher costs to borrowers). Instead, the more accurate risk assessments provided by credit scoring are used by banks to lower the risk in their small firms' loan portfolios.

Overall, and somewhat ironically, the principal benefits of credit scoring for small firms appear to come from 'rules' banks which use credit scoring as a cheaper alternative to other technologies. In other words, these 'rules' banks are the types of banks small firms tend to complain about as being remote and impersonal and which, due to the 'black box' nature of credit scoring, are able to offer little explanation for why a credit application has been denied.

Udell (2015) raises two important unsettled issues in relation to small business credit scoring. First, has small business credit scoring displaced relationship lending beyond the (micro-lending) threshold of \$100,000? Second, can technological innovation help convert soft information into hard information that can be transmitted effectively through the complex hierarchy of a large bank? In particular, on this last point, Udell (2015) notes:

"In the spirit of Stein (2002) soft information is only "hardened" to the extent that its value is not diluted as it is transmitted through the banking organization. It has not been established in the academic literature whether technological innovation has facilitated this type of hardening. That is, it has not been established in the literature whether this codification of soft information can be successfully transmitted through the hierarchical structure of a bank in a way that does not dilute its content and impact." (Udell, 2015, p 33)

### 3.2.5 Financial statement lending

In financial statement lending, decisions to lend and the monitoring of loans is based on the strength of the firm's financial statements. Financial statement lending is primarily used in underwriting loans to large and mid size firms as it relies on the firm having audited financial statements to underpin the accuracy and reliability of the statements (Berger and Udell, 2006). Loan covenants, relating to specific financial ratios or events, are an important monitoring mechanism used in financial statement lending and they would not be feasible without the firm having audited financial statements (see Udell, 2015, for a discussion of the large firm literature relating to covenants).

As SME's typically do not obtain audited financial statements, implicitly because high auditing costs outweigh the benefits in terms of better credit availability/terms, an interesting question is what type of SME would choose to have audited financial statements. In this respect, Allee and Yohn (2009) examined the decision by SME's to choose among four levels of increasing auditor association. They find that the demand for "sophisticated" financial statements is positively related to firm size and firm growth. Allee and Yohn (2009) also find that having audited financial statements reduces the probability of loan denial and reduces loan rates for SME's with unlimited liability (if not for those with limited liability).

Udell (2015) calls for more research on the decision by SME's to obtain audited financial statements, in particular relating to the cost side of the cost/benefit trade-off of audit, and relating to countries outside of the US (with different accounting standards)<sup>19</sup>.

### 3.2.6 Trade credit

Trade credit obtained from suppliers provides an alternative source of financing for firms rationed out of the credit market. Trade credit suppliers have comparative advantages over banks regarding information about the market in which firms with credit needs operate, and in obtaining information about these firms themselves (Petersen and Rajan, 1997). In addition, it is less profitable and therefore less likely for a firm's management to misuse inputs that are supplied on trade credit than cash provided by banks. Trade credit therefore reduces a significant incentive compatibility problem that can exist between banks and firms that use bank credit (Burkart and Ellingsen, 2004).

The empirical evidence is consistent with the argument that trade credit is a contractual solution to the asymmetric information problems that may reduce the availability of bank credit (Ng et al, 1999). Firms are more likely to make greater use of trade credit if they do not have banking relationships. The use of trade credit also increases during periods of monetary contractions (Biais and Gollier, 1997). Further, trade credit may play a signalling role as well, much like credit rating scores. In this respect, firms using trade credit may gain greater access to bank credit (Cook, 1999). Crowding in of bank credit by trade credit has also been observed in other contexts (Giannetti et al, 2011).

In a recent study, Carbó-Valverde et al (2016) analysed the importance of trade credit using a sample of over 40,000 Spanish SME's in the period 1994-2008. In particular, these data allow an analysis of whether trade credit provided an alternative source of external finance to small firms during the GFC. The study finds that credit constrained firms (whose loan demands exceed loan supply) rely on trade credit in general, and not bank loans, to fund capital expenditures. However, the intensity of these firms' reliance on trade credit increased during the GFC. In contrast, unconstrained firms rely on bank funding not trade credit. The substitution between bank credit and trade credit is therefore conditional on the presence of credit constraints and became more important during the GFC. In other words, trade creditors act as lenders of last resort to small firms and this role increases in importance during a credit crisis.

However, whilst the role of trade credit as a 'safety valve' (i.e., a lending channel that increased) during the GFC is well grounded in the literature (e.g., Carbó-Valverde et al, 2016) there remain unresolved issues relating to the true cost of trade credit (Udell, 2015). In particular, there is an issue reconciling the apparent high cost of trade credit (a figure of 44% per annum is often quoted) with the observation that globally trade credit is nearly as important as bank lending:

"If the cost of trade credit is indeed 44%, then either trade credit is an exorbitantly expensive lending technology to deliver or vendors are enjoying extraordinarily high rents – neither of which seems particularly plausible." (Udell, 2015, p 15)

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<sup>19</sup> "This lack of research is particularly troubling because the audit decision matters the most in the SME sector. In fact this decision may lie squarely on the cusp between a "small" firm and a medium-sized "firm" – i.e., the in the middle of the SME space." (Udell, 2015, p 37)



### 3.3 Is there favorable selection in the credit market?

The literature we have looked at so far suggests that a credit rationing equilibrium may be the outcome of adverse selection and moral hazard problems caused by asymmetric information. However, it has also been shown that asymmetric information may not give rise to credit rationing if the market clearing interest rate lies below the (interior) bank optimal rate. Equally small business lending technologies may help overcome information asymmetries and allow 'good' entrepreneurs to receive credit to fund their ventures. Simply put, credit rationing is not an assured outcome when there are information asymmetries in the credit market.

But going even further than these 'objections' to credit rationing, in a seminal critique of the Stiglitz and Weiss framework, de Meza and Webb (1987), and a series of related papers (de Meza and Webb 1989, 1990; de Meza, 2002), shows that asymmetric information may actually result in *too much lending* rather than credit rationing. In essence, this occurs if there is favorable, rather than adverse, selection into the credit market. Due to the importance of this issue, for both theory and SME finance policy, we will conclude this section with a discussion of the framework developed in de Meza and Webb (1987) and related papers.

In the de Meza and Webb model entrepreneurs differ in their ability/success probability (as in the adverse selection 'model' discussed above) which leads to entrepreneurs having different expected profits/cash-flows<sup>20</sup>. These success probabilities are private information to the entrepreneur and so entrepreneurs are pooled and lending decisions are based on the average success probability/cash-flow in the pool. So far, so similar to the previous adverse selection discussion. However, what distinguishes the de Meza and Webb framework from the adverse selection model is that the marginal entrepreneur/borrower is the least able in the pool of entrepreneurs/borrowers (in contrast to the adverse selection model in which the marginal entrepreneur/borrower is the most able in the pool). This arises in the de Meza and Webb model by assuming that the entrepreneur's outside option is the return on safe investment that, unlike the uncertain return in entrepreneurship, does not vary with ability/success probability. Accordingly the marginal return to ability is higher in entrepreneurship than in the outside option (since ability has no effect on the return on safe investment) resulting in more able entrepreneurs selecting into the loan pool. To put this another way, the separation of types is greater in entrepreneurship than in the outside option

Parker (2003) discusses in detail the formal conditions for favorable versus adverse selection in a model where both the returns in entrepreneurship and the outside option vary with ability. Essentially, to achieve the favorable selection result, we need to assume that the marginal return to ability is greater in entrepreneurship than in the outside option. In particular, Parker (2003) develops a model in which individuals are pooled in wage employment (the outside option) i.e., paid a wage based on average rather than actual ability. In contrast, the expected return in entrepreneurship is based on the individuals (perceived) actual ability so again the separation of

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<sup>20</sup> In fact de Meza and Webb (1987) show that equity rather than debt is the optimal financial contract in the Stiglitz and Weiss (1981) model. This arises essentially because Stiglitz and Weiss assume second order stochastic dominance (ventures generate the same expected return but differ in terms of the variance of returns) and, with equity finance as the optimal contract, under-investment disappears. In contrast, under first order stochastic dominance, as assumed in de Meza and Webb (1987), debt emerges as the optimal financial contract, which leads to the possibility of adverse selection/credit rationing (Parker, 2002, 2003) or favorable selection/over-lending (de Meza and Webb, 1987; de Meza, 2002).

types is greater in entrepreneurship than in wage employment. Accordingly, the marginal return to ability is greater in entrepreneurship than in wage employment, which again leads to favorable selection. Conversely, Parker (2003) also shows that if separation of types is greater in wage employment than entrepreneurship then variations in ability translate into larger changes in wage income relative to expected entrepreneurial income resulting in adverse selection (as previously illustrated in Figure 3).

The situation under favorable selection can be illustrated using the same framework developed to help explain adverse selection.

INSERT FIGURE 6 HERE

Recall from Figure 3 that, under adverse selection, following a downward shift in venture cash-flows  $y(x)$  due to an increase in the interest rate, the location of the marginal entrepreneur  $x(r)$  shifts downwards. However, in the situation depicted in Figure 6, with the marginal returns to ability greater in entrepreneurship than wage employment (reflecting greater separation of types in entrepreneurship), then a downward shift in the  $y(x)$  curve causes an outward shift in the location of the marginal entrepreneur. In other words, following an interest rate rise, the first entrepreneur to exit entrepreneurship is the least able in the loan pool.

Accordingly, if there is an excess demand for credit the bank will always increase the interest rate to clear the market. That is, the bank profit function is not concave in the interest rate (contrary to the situation depicted in Figure 4), consequently there is no interior bank optimal interest rate, and therefore a credit rationing equilibrium cannot occur. Also, assuming that banks breakeven at the average success probability  $p(\bar{x})$  associated with  $y(\bar{x})$  then the bank makes an expected loss on lending to the marginal entrepreneur (and all entrepreneurs with ability below  $\bar{x}$ ). Therefore, not only is credit rationing impossible under favorable selection, there is actually too much lending in equilibrium: socially inefficient ventures receive credit because the least able entrepreneurs (with  $x < \bar{x}$ ) receive loans which are cross-subsidised by the most able entrepreneurs (with  $x > \bar{x}$ ). So instead of introducing policies to increase the amount of credit available to entrepreneurs, as implied by adverse selection/credit rationing (see section 6 below), under favorable selection/over-lending government should place a tax on interest income to achieve the socially efficient outcome (de Meza and Webb, 1987, Proposition 3). In short, entrepreneurship should be discouraged rather than encouraged<sup>21</sup>.

The problem of too much lending is exacerbated if entrepreneurs are prone to over-optimism (de Meza and Southey, 1996 – see section 5 below). In terms of Figure 6, over-optimism is equivalent to an upward shift in the (perceived) cash-flow curve (the entrepreneur misperceives a higher level of cash-flow for any given level of actual ability relative to the cash-flow under realism). Accordingly the marginal entrepreneur has lower ability than in the absence of over-optimism and the extent of socially inefficient lending is increased yet further.

Accordingly, there are very strong theoretical objections to the case that asymmetric information gives rise to credit rationing. This is a fundamental issue because the policy implications are polar

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<sup>21</sup> Over-lending occurs even if entrepreneurs are risk averse rather than risk neutral providing they are not too risk averse (de Meza and Webb, 1990)

opposites depending on whether information asymmetries give rise to adverse or favorable selection. It is therefore of pivotal importance to conduct more empirical research able to speak directly to the issue of the nature of selection in entrepreneurial credit markets (see recommendations for further research in the conclusion).

### 3.4 Are there information asymmetries in the credit market?

An even more fundamental issue than whether there is adverse or favorable selection in the credit market, is the issue of whether information asymmetries actually exist in the credit market (everything we have discussed so far in this section is predicated on an affirmative answer to this question). Yet, despite the importance of this question, there has been little progress identifying information asymmetries in empirical work. One exception is Karlan and Zinman (2009) who implement a field experiment of 58,000 randomised direct mail offers, involving different offer and contract interest rates, to former clients of a major South African lender. Their study finds evidence of private information problems particularly relating to moral hazard induced by the contract terms.

However, while Karlan and Zinman's experiment provides a direct approach to testing information asymmetries, and one which can distinguish between ex ante and ex post information issues, replicating this approach more widely may be difficult due to the cost of collecting a large single-purposed data-set. Cheaper, alternative non-experimental approaches need to be devised for testing the presence of information asymmetries, which could use, for example, the SME finance data-sets discussed in section 2, to provide comprehensive evidence on this issue for different countries (see directions for future research in the conclusion).

### 3.5 Summary

Issues affecting the supply of entrepreneurial credit are the traditional focus of the credit market literature. The seminal papers by Jaffee and Russell (1976) and Stiglitz and Weiss (1981) show how information asymmetries may give rise to problems of adverse selection and moral hazard which, in turn, may result in a credit rationing equilibrium. Information asymmetries may be a particular issue for the supply of entrepreneurial credit inasmuch as entrepreneurship is associated with smaller and younger firms which are more informationally opaque (Ang, 1991) and lack collateral to signal and/or mitigate risk (Bester, 1985; Berger and Udell, 1990; Han et al, 2009b). Relationship lending (Petersen and Rajan, 1994) and, in more recent times, credit and behavioral scoring (Frame et al, 2001) provide alternative means for creditors to assess credit applications where collateral is absent.

Developments in 'non-bank' credit products, principally leasing and hire purchase agreements to fund fixed assets and asset based lending/invoice finance as a source of working capital, have helped diversify the supply of entrepreneurial credit since the recession in the early 1990s (e.g., Bank of England, 2004). In addition, firms with audited accounts (albeit applying to the minority of SME's) may be able to obtain credit through financial statement lending without the need for collateral. In addition, trade credit is an important alternative source of credit for entrepreneurs unable to obtain sufficient bank credit especially in times of a credit crisis (Petersen and Rajan, 1997; Carbó-Valverde et al, 2016). The more recent rise in peer to peer lending as an alternative source of entrepreneurial credit following the GFC is discussed separately later.

*However, while the concepts of lending technologies (Berger and Udell, 2002, 2006; Udell, 2015) and lending channels (Udell, 2015) are now well established in the literature there remain many unresolved issues. These include: the distinction between inside and outside collateral; the boundaries of soft information communication and the role of technology in moving these boundaries; relatedly, the ability of technology to harden soft information without loss of information as it is transmitted through the lender's organizational hierarchy; the cost and benefits of audit for SME's; and the true cost of trade credit (Udell, 2015).*

*In addition, a fundamental issue identified by Udell is that:*

*"in general firm survey data and bank financial statements generally do not categorize SME lending in ways that necessarily allow empiricists to distinguish among the channels that exist in specific countries" (Udell, 2015, p 27)*

*Accordingly, adding to the data gaps identified in section 2, better data-sets are required to test hypotheses about SME lending technologies and channels.*

Whilst lending technologies/channels may help SME's to overcome issues of credit rationing caused by information asymmetries, theoretical studies have shown that information asymmetries may actually give rise to an over-supply of entrepreneurial credit (de Meza and Webb, 1987, 1989, 1990; de Meza, 2002). This situation arises when there is favorable selection into the credit market caused by greater separation of types in entrepreneurship than in the outside option. Under favorable selection, and in complete contrast to adverse selection, the marginal entrepreneur is the least able borrower. As a consequence more able entrepreneurs cross-subsidize the less able leading to over lending in equilibrium.

*The issue of whether there is adverse or favorable selection in the credit market, and therefore the appropriate policy response to encourage or discourage entrepreneurs, is ultimately one that requires empirical evidence (which is not yet available to the author's knowledge). Going yet deeper into this issue, with very few exceptions (Karlan and Zinman, 2009), there has been little progress identifying information asymmetries in empirical work. This is another fundamental gap in our understanding that needs to be addressed in future research.*

*Going further, despite the focus on asymmetric information in the entrepreneurial credit literature, consistent with the view that entrepreneurship is a process of learning and discovery (Kirzner, 1997) conducted under uncertainty (Knight, 1921), it seems more plausible that both banks and entrepreneurs start out uncertain about the firm's prospects and only learn about these prospects over time (Jovanovic, 1982). Yet, there is little formal analysis of credit market outcomes where both parties to a credit agreement are ill-informed about the venture's prospects. However, the literature on relationship lending (Petersen and Rajan, 1994), entrepreneurial learning (Jovanovic, 1982) and the financial growth cycle (Berger and Udell, 1998) suggest that, as uncertainty is resolved, the entrepreneurial credit market may increasingly allocate credit efficiently. Conversely, by implication, obstacles to bank and entrepreneurial learning may impede the achievement of an efficient equilibrium.*

*In short, more research (both theoretical and empirical) is required to develop our understanding of credit market and firm outcomes when uncertainty affects both lenders and entrepreneurs but when*

*both parties also have the capacity to learn (this is further discussed in the directions for future research in the conclusion).*

It is fair to say that the demand for entrepreneurial credit has received less attention in the literature over the years. This is perhaps understandable as the focus on market failure naturally puts the spotlight on lenders. Yet, we now understand that market failure may affect not only lenders' but also borrowers' decisions. In addition, we know more about entrepreneurial psychology (Mitchell et al, 2007) and how this may affect entrepreneurs' borrowing decisions (possibly resulting in 'sub-optimal' decisions). We therefore change the focus to issues affecting the demand for entrepreneurial credit in the next section.

#### **4. The demand for entrepreneurial credit: discouraged borrowers and control aversion**

The focus of most of the theory and policy debates surrounding SME financing conditions has, until relatively recently (roughly up to the early 2000s), been on the supply side and issues of credit rationing. Yet, it has become increasingly recognised that credit market imperfections may have adverse consequences for entrepreneurs' decisions to apply for credit even if they have credit needs. At the same time, insights from behavioral economics suggest that entrepreneurial cognition may affect whether or not the firm develops credit needs in the first place.

In a perfect credit market, economic theory suggests the main determinant of credit demand is the interest rate. However theories of credit rationing predict that interest rates are 'sticky' and may not adjust fully to clear the credit market (see previous section), thereby subordinating the role of price in the allocation of entrepreneurial credit (relative to its role under perfect information). In this respect, some studies suggest that spreads on US commercial loans are indeed 'sticky' i.e., negatively related to changes in the open market safe rate, consistent with credit rationing (Berger and Udell, 1992)<sup>22</sup>. Also, empirical evidence suggests that, compared to the number of firms unable to obtain credit, a relatively small proportion of firms refuse loan offers because the interest rate is too high (e.g., Ferrando et al, 2017, discussed previously in section 2). In this context, entrepreneurs' decisions to seek credit may be more affected by the non-price terms of the loan contract (e.g., collateral requirements), the perceived availability of credit, and other factors relating to entrepreneurial cognition.

Developing the implications of credit rationing for borrower behaviour leads to the prediction that there exists a group known as discouraged borrowers. These are firms with credit needs but which choose not to apply for fear of rejection by the bank. Discouraged borrowers were first studied empirically in the 1990s (Jappelli, 1990; Raturi and Swamy, 1999)<sup>23</sup> while Kon and Storey (2003) provides the seminal theoretical analysis of discouraged borrowers. In essence, in the presence of information asymmetries, some entrepreneurs with otherwise viable ventures may become self-rationed from the credit market if they perceive that applying for credit is not worth the time, money, and effort involved in making the application relative to the chances of obtaining credit.

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<sup>22</sup> Although Berger and Udell (1992) note that the stickiness varies with loan contract terms in a manner different from that predicted by the theory of credit rationing.

<sup>23</sup> Jappelli (1990) identifies discouraged borrowers in a study of consumer credit. Raturi and Swamy (1999) looked at discouraged borrowers in the context of ethnic differentials in credit market outcomes affecting manufacturing firms in Zimbabwe.

Whilst discouragement may reflect 'optimal' behaviour by the entrepreneur, the outcome is socially inefficient if otherwise viable ventures go unfunded.

Indeed, discouraged borrowers are at least as prevalent as 'credit rationed' firms (in the sense of firms which have had their credit applications denied). It is therefore important that academics and policy makers have a good understanding of who discouraged borrowers are (in terms of firm and entrepreneur characteristics) and why discouraged borrowers arise (relating to underlying theoretical mechanisms causing discouragement) (see Fraser, 2014a).

Relating to the question of why discouraged borrowers arise, insights from behavioral economics suggest that entrepreneurial cognition may have an important impact on credit market outcomes and firm performance. In this context, whilst the 'classical' theoretical formulation of discouraged borrowers in Kon and Storey (2003) is based on rational behaviour by entrepreneurs, it is possible that some discouragement may be irrational in the sense that entrepreneurs may misperceive the likelihood that their credit applications will be denied (Fraser, 2014a).

In particular, behavioral economics highlights limitations in individual's ability to process information, especially in situations of uncertainty or stress, which may lead to various shortcuts/heuristics in decision making and the gauging of situations (Tversky and Kahneman, 1974; Kahneman and Tversky, 1979). These shortcuts include making judgements about situations:

- Based on their similarity to comparable situations (representativeness).
- Using information that can be called to mind easily (availability).
- Relying excessively on the first piece of information available (anchoring).

In a review article, Barberis and Thaler (2002) provide a more extensive list from the psychology literature relating to how people form beliefs in practice. In addition, to representativeness, availability, and anchoring, the psychology literature indicates peoples' judgements may also be affected by overconfidence, optimism, conservatism, and belief perseverance. However, the general point is that these shortcuts used in belief formation may introduce serious errors and biases into the comprehension of a particular situation. Indeed, these biases are especially likely in situations involving informational overload (Gilbert et al, 1992), novelty/uncertainty (Fiske and Taylor, 1991), high emotions (Oaksford et al, 1996) and time pressures (Wyer and Srull, 1994). These are precisely the situations that are more often encountered and more intensely experienced by entrepreneurs leading to the inference that entrepreneurs may be especially susceptible to cognitive biases (Baron, 1998). Relating to entrepreneurial borrowing, entrepreneurs may be particularly prone to relying on heuristics during a stressful period when funds need to be raised. In the specific context of discouragement, the insight of behavioral economics is the potential for entrepreneurial perceptions of the probability of having their credit applications approved to systematically deviate from the actual probability of approval.

Relating to this issue, Baker and Wurgler (2013) provide a number of examples of heuristic biases in their review of the behavioral corporate finance literature. Particularly relevant here is the finding that borrowers and lenders use past terms as anchors or reference points for current terms. Specifically, firms that established anchor terms by borrowing from a banking syndicate between 2005 and 2007 were less likely to experience higher borrowing costs during the GFC than

comparable firms without pre crisis anchor terms (Dougal et al, 2011). Viewed from the entrepreneur's perspective, this research suggest we might expect borrowers to base their perceived approval probabilities on previous borrowing experiences which may no longer be relevant given their current situation. For example, an increased likelihood of rejection during the GFC may have had a persistent effect on future discouragement and/or perceived future borrowing needs, even after actual rejection likelihoods had begun to decline (see directions for further research below).

The psychology literature also suggests the population in general, and entrepreneurs especially, are prone to 'positive illusions'. These include: illusory superiority; illusory control; and optimism bias (Taylor, 1989). In particular, entrepreneurs are strongly motivated by a desire for control suggesting a belief at least that they can shape their own destiny (Shaver and Scott, 1991). Relatedly, entrepreneurs seem to derive utility from independence: they are happier, *ceteris paribus*, than wage workers (Blanchflower and Oswald, 1998); and the non-pecuniary benefits of entrepreneurship (i.e., the perceived independence/control over lifestyle) compensate for lower pecuniary returns compared to paid employment (Hamilton, 2000).

In the context of entrepreneurial credit control aversion/desire for independence may lead to an eschewal altogether by the entrepreneur of external financier involvement in the firm. Accordingly, whereas discouragement stops entrepreneurs with external credit needs from applying for credit, control aversion may stop entrepreneurs from developing external credit needs in the first place. In particular, control averse entrepreneurs may choose to borrow less and use more self-finance even if this means trading-off lower profits in return for greater independence (Cressy, 1995). Yet, the psychology literature suggests this gain in control is illusory (Taylor, 1989) and so the entrepreneur (and society) may be better off if they simply pursued financial objectives.

#### 4.1 Discouraged borrowers

There are three principal reasons why discouraged borrowers have received increased attention in both theoretical and empirical research. The first reason is that small firms are more likely to report discouragement than report rejection. This was first noted for the US in Levenson and Willard (2002). However, it is also true in other countries including the UK. The following chart, 'Trends in Discouragement', shows the extent of discouragement in the UK over the last decade in comparison to businesses that had their credit applications denied:

INSERT CHART 1 HERE

The second reason why understanding discouragement is important is because the likelihood of discouragement varies with the ethnic background of the entrepreneur as observed both in the US (Cavalluzzo et al., 2002; Blanchflower et al, 2003) and in the UK (Fraser, 2009b). In particular, discouragement is significantly more likely among ethnic minority groups than white owned businesses. For example, in the US firms owned by black entrepreneurs are 2-3 times more likely to experience discouragement than otherwise similar firms owned by white entrepreneurs (Blanchflower et al, 2003). This raises issues of perceived if not actual ethnic discrimination in the small firms' credit market (see section 7 below).

In terms of the broader issue of ‘who are discouraged borrowers?’ the relationships between discouragement and other firm and entrepreneur characteristics were discussed in section 3. To recap, essentially discouraged borrowers tend to be smaller, younger and more risky firms; and their owners tend to be less wealthy, have lower levels of education and less business experience (see e.g., Fraser, 2014a; Cowling et al, 2016b; Cole and Sokolyk, 2016 discussed in section 3; see also: Cavalluzzo et al., 2002; Han et al 2009a).

However, beyond ‘who are discouraged borrowers?’, a third reason why research on discouraged borrowers is important is that they provide a test of credit market efficiency. Specifically, the theory of discouraged borrowers predicts that, when information asymmetries are high, creditworthy firms self-ration (due to high effective application costs) whereas un-creditworthy firms are more likely to apply for loans. In other words, discouragement is an inefficient self-rationing mechanism when information asymmetries are high. The situation is reversed, with un-creditworthy firms self-rationing and creditworthy firms applying, when information asymmetries are low (Kon and Storey, 2003; Han et al 2009a).

To develop our understanding of how this prediction arises we will now examine in more detail theoretical frameworks for discouraged borrowers. This will also shed light more generally on the issue of ‘why do discouraged borrowers exist?’ to complement our understanding of who discouraged borrowers are in terms of their ethnic backgrounds and general characteristics. We begin by discussing the seminal model of discouraged borrowers developed in Kon and Storey (2003). Kon and Storey’s conceptual formulation of discouragement relates to ‘good’ firms/borrowers (i.e., creditworthy firms) which decide not to apply for credit because they feel they will be rejected. We will examine the implications of relaxing this borrower type assumption for discouraged borrowers later.

In Kon and Storey’s model, there are two types of firms: good and bad. In particular, the gross return from the good firm  $X_G$  is certain and it is always profitable for the bank to lend to these firms. In contrast bad firm returns are uncertain from the bank’s perspective: the return on the bad firm is  $X_B$  with probability  $p_B$  (i.e., if the firm succeeds) and 0 with probability  $1 - p_B$ . It is assumed that the expected return on lending to bad firms is negative i.e., it is not profitable to lend to bad firms. The credit market is subject to information asymmetries and all firms applying to the bank for credit incur an application cost  $K$  to cover the costs of screening. However the screening technology is imperfect and there is a probability  $b_G$  that a good firm will be wrongly identified as a bad firm and will therefore not receive credit. Likewise, there is a probability  $g_B$  that screening will classify a bad firm as being a good firm so that a bad firm will wrongly receive credit. In the basic formulation of the model, there is no collateral for entrepreneurs to signal their risk type. The opportunity cost for the bank loan application is  $w$  which represents the net return from the venture if it is financed by a ‘money lender’ (an informal creditor). No application costs are incurred in obtaining credit from the money lender. However, the money lender charges a usurious rate regardless of risk such that  $X_G - D > w$  where  $D$  is the interest rate charged by the bank.

Accordingly a good firm will apply for credit if and only if the expected return from a bank loan application is positive i.e.,

$$(1 - b_G)(X_G - D - K) + b_G(w - K) > 0$$



$$\Leftrightarrow X_G > D + w + \frac{K}{(1 - b_G)} \quad (1)$$

In other words, good firms apply for credit if their return  $X_G$  exceeds the effective borrowing cost (represented by the RHS of (1)). In particular, the term  $K/(1 - b_G)$  represents the effective application cost for good firms. Accordingly, if information asymmetries are high (implying  $b_G$  is close to unity) then good firms are likely to be discouraged from applying to the bank for credit. Conversely, discouragement decreases among good firms as information improves (i.e., as  $b_G$  falls).

In contrast, bad firms apply for credit if and only if

$$g_B(X_B - D - K) + (1 - g_B)(w - K) > 0$$

$$\Leftrightarrow X_B > D + w + \frac{K}{g_B} \quad (2)$$

Accordingly bad firms apply for credit if information asymmetries are high (implying  $g_B$  close to unity) but are discouraged if information asymmetries are low (implying  $g_B$  close to zero).

Related empirical work using SSBF 1998 data finds that longer banking relationships, associated with lower information asymmetries, increase the likelihood of discouragement among higher risk firms and reduce the likelihood of discouragement among low risk firms (Han et al 2009a). This is consistent with Kon and Storey's predictions about the relationship between the degree of information asymmetry and the type of borrower that is discouraged. In particular, the findings in Han et al (2009a) suggest that discouragement acts as an efficient (resp. inefficient) self-rationing mechanism when information asymmetries are low (resp. high) to the extent that less (resp. more) creditworthy firms self-ration in the presence of longer (resp. shorter) banking relationships.

Further, the potential for discouragement to act as an efficient self-rationing mechanism, in the presence of longer banking relationships, is greater when there is less competition in the credit market (Han et al, 2009a). This is consistent with there being greater incentives for creditors to invest in relationships when the credit market is less competitive (Petersen and Rajan, 1995). However, in terms of creditor concentration, Han et al (2009a) also find that businesses with a greater number of financial providers are less likely to be discouraged, possibly because the fixed costs of applying may then be spread across multiple applications with different lenders.

In another study looking at the credit market efficiency issue in relation to discouraged borrowers, Rostamkalaei et al (2018) use SMEFM data for 2011-2015 to separate SME's which do not apply for loans for fear of rejection (i.e., traditional discouraged borrowers) from those who do not apply because they know they will be rejected having experienced an informal turndown. This is important because traditional discouraged borrowers may manifest market imperfection while non-application due to an informal turndown could be a sign of efficient self-rationing. In this regard, Rostamkalaei et al (2018) find that older firms are more likely to choose not to apply for a loan following an informal turndown rather than being discouraged due to their fear of rejection. Conversely, younger firms are more likely to self-ration due to fear of rejection (reflecting higher information asymmetries). They also find that SME's which have a satisfactory relationship with their banks, are more likely to self-ration themselves rather than conduct an informal inquiry with their banks before deciding not to apply. This may be because firms that self-ration do so on the

basis of their own expectations and therefore do not experience the refusal of firms that made an informal enquiry (which may result in higher dissatisfaction among firms informally rejected).

Fraser (2014a) develops a theoretical model of discouraged borrowers that has three key distinguishing features compared to Kon and Storey's model. First, whereas Kon and Storey assumes only two borrower types, in Fraser's model borrowers belong to a continuum of types ranked by ability (as in e.g., de Meza and Webb, 1987; Parker, 2003, entrepreneurs are rankable in terms of first order stochastic dominance). Second, Fraser (2014a) allows for the potential for entrepreneurs to make irrational borrowing decisions due e.g., to excessive optimism/pessimism about their chances of making successful loan applications. Third, the formulation of discouragement relates to all borrower types who, despite having credit demand/needs, decide to not apply for fear of rejection. Indeed, as will be shown, Kon and Storey's model emerges as a special case of Fraser's model.

Figure 6 summarizes the key features of the model. There are two key (latent) variables in the model: entrepreneurial ability/productivity ( $\theta$ ); and entrepreneurial perceptions of the probability of credit application approval ( $\omega$ ). A productivity threshold ( $\theta_0$ ) separates businesses with credit demands ( $\theta \geq \theta_0$ ) (i.e., firms with a non-negative net marginal return from borrowing) from those without credit demands ( $\theta < \theta_0$ ). The location of this threshold depends on: the amount of capital already invested<sup>24</sup> and the interest rate<sup>25</sup>. In a perfect credit market  $\theta_0$  defines the threshold between applicants, whose productivity, and hence credit needs, are high relative to the threshold ( $\theta \geq \theta_0$ ) and non-applicants ( $\theta < \theta_0$ ). Accordingly, in a perfect credit market, all firms with credit demands are applicants.

However, in an imperfect credit market, loan applications are costly due to information issues. In this context, perceptions of the probability of credit application approval are relevant for the decision of whether or not to apply. In this respect, conditional on credit demands ( $\theta \geq \theta_0$ ), a perceived success threshold ( $\omega_0$ ) separates discouraged borrowers, whose perceived probability of approval falls below the threshold ( $\omega < \omega_0$ ), from applicants ( $\omega \geq \omega_0$ ). The location of this threshold depends on perceived application costs: factors that increase perceived application costs shift the threshold to the right (thereby increasing the likelihood of discouragement). The slope of  $\omega_0$  is negative because higher ability/productivity increases the net marginal return from borrowing (which is non-negative among firms with credit demands) which increases the likelihood of applying for credit even if the chances of approval are low.

INSERT FIGURE 7 HERE

The relationship between the models in Kon and Storey (2003) and Fraser (2014a) may be shown as follows. In Fraser's model the perceived probability of approval may be written  $\omega = \text{prob}[(\mu - \nu)/\sigma]$  where  $\nu$  is an index relating to credit risk (encompassing factors such as the interest rate and loan size),  $\mu = E(\theta)$ , and  $\sigma = \text{se}(\theta)$ . In the absence of uncertainty about ability, creditworthy ('good') firms are those with  $\theta - \nu > 0$  and bad firms (who should not receive credit) are those for which  $\theta - \nu < 0$ . In that case,  $\omega = 1$  among good firms (since  $(\mu - \nu)/\sigma = +\infty$  with

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<sup>24</sup> Under diminishing returns, the demand for additional capital is decreasing in the amount of capital already invested. In this case greater existing capital will shift the location of  $\theta_0$  upwards.

<sup>25</sup> A higher interest rate reduces demand for capital shifting the threshold upwards.

$\mu - \nu > 0$  and  $\sigma = 0$  and therefore the probability of discouragement among good firms is zero ( $\text{prob}(\omega < \omega_0) = 0$  if  $\omega = 1$  and  $\omega_0 \in (0,1)$ ). Conversely among bad firms (since  $(\mu - \nu)/\sigma = -\infty$  with  $\mu - \nu < 0$  and  $\sigma = 0$  and therefore the probability of discouragement among bad firms is one ( $\text{prob}(\omega < \omega_0) = 1$  if  $\omega = 0$  and  $\omega_0 \in (0,1)$ ). In other words, consistent with Kon and Storey's model, in Fraser (2014a) discouragement is an efficient self-rationing mechanism under perfect information.

However, if information is asymmetric, while the entrepreneur may know their own  $\theta$  with certainty, from the bank's perspective  $\sigma > 0$ . Assuming rational behaviour, then entrepreneurs will realize the information asymmetry and base their application decisions on  $\omega = \text{prob}[(\mu - \nu)/\sigma] \in (0,1)$ . In particular, under imperfect information, there is a non zero probability of discouragement among good firms (since, among good firms,  $\omega < 1$ , analogous to  $b_G > 0$  in Kon and Storey, 2003). Conversely, under imperfect information, there is a non-zero probability that bad firms will not be discouraged (since, among bad firms,  $\omega > 0$ , analogous to  $g_B > 0$  in Kon and Storey, 2003). Again, consistent with Kon and Storey (2003), in Fraser's model discouragement is an inefficient self-rationing mechanism if the credit market is imperfect. Kon and Storey's model emerges as a special case of Fraser's model when there are only two types of borrower: one good ( $\theta_G - \nu > 0$ ) and one bad ( $\theta_B - \nu < 0$ ).

Further, irrationality can be introduced into Fraser's model by allowing the entrepreneur's subjective distribution of  $\theta$  to diverge from the bank's distribution (embodied in the parameters  $\mu$  and  $\sigma$ ) on which bank lending decisions are based. In this manner, entrepreneurs may over/under-estimate the actual probability of loan approval leading to too much/too little discouragement given the degree of imperfect information in the credit market.

Developing this last point, insights from behavioral economics suggest entrepreneurial perceptions of loan application approval may deviate systematically from the actual approval probability. Indeed, based on the idea of heuristics (representativeness, availability and anchoring), Fraser (2014a) suggests the following factors may be particularly important in explaining deviations between perceived and actual approval probabilities:

- Previous experiences with lenders.
- The borrowing experiences of peers in business.
- Media reports of bank lending.
- Perceptions of a difficult economic climate for borrowing ('economic climate')
- Firm size

In particular negative past borrowing experiences (e.g., previous rejection of an application for credit) or negative media reports about bank lending (e.g., during the GFC) may cause entrepreneurs to under-estimate actual approval probabilities. Similarly, hearsay about peers' borrowing experiences and general perceptions about the borrowing climate may impact on entrepreneurial beliefs about the chances of obtaining credit. In addition, smaller firms may be less financially confident which may lead to underestimation of actual success probabilities.

Relating to the location of the application threshold,  $\omega_0$ , application costs are negatively related to firm size/age because smaller/younger firms are more informationally opaque increasing the financial and psychic costs of loan applications. In addition, due to informational opacity banks may require collateral and/or covenants as a signal of the entrepreneur's creditworthiness and commitment to the success of the business. In this respect, perceptions that banks will ask for security and/or perceptions about the terms/conditions attached to borrowing represent additional application costs (shifting  $\omega_0$  to the right). In addition, an aversion to using external debt may increase preferences for relying on internal finance (i.e., raise the psychological cost of applying for loans).

Fraser (2014a) uses econometric techniques to estimate the model outlined in Figure 6 with 9 waves of UK SMEFM data for the period Q2 2011 to Q2 2013<sup>26</sup>. In terms of perceived approval probabilities, the key finding is that discouraged borrowers significantly under-estimate their actual likelihood of application approval. Discouraged borrowers also experience higher perceived loan application costs compared to other businesses. Dissatisfaction with banking relationships significantly reduces perceptions that applications will be approved (and hence increases the likelihood of discouragement). Smaller firms are also less confident that their applications will be successful. Media coverage of bank lending has no impact on perceived approval probabilities. Consistent with other research, lower quality firms with poorer credit ratings and/or problems with debt/cash-flow management are more likely to be discouraged because their actual chances of obtaining credit is lower.

Relating to  $\omega_0$ , issues with the application process such as perceived security requirements and terms/conditions of borrowing significantly raise perceived application costs (and hence increase the probability of discouragement). Similarly, younger businesses find applying for loans more difficult/costly. Conversely, proactive banking (where the bank has approached the firm about its borrowing requirements) helps to lower perceived application costs, which reduces the probability of discouragement.

Scenario analysis with Fraser's model suggests that fully addressing bank issues associated with discouragement (improving satisfaction rates, raising awareness of lending support initiatives and approaching businesses about borrowing requirements) might lower the number of DBs from 173,000 to 50,000. In addition, an estimated 77,000 (63% of the 123,000 additional prospective

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<sup>26</sup> The model may be estimated using maximum likelihood. Based on the theoretical model summarized in Figure 7, the probabilities of observing the different borrowing decision groups are given by:  $prob(\omega < \omega_0, \theta \geq \theta_0)$  (discouraged borrowers);  $prob(\omega \geq \omega_0, \theta \geq \theta_0)$  (applicants); and  $prob(\theta < \theta_0)$  (firms with no credit demands: "non-seekers") respectively. Information about the approval/denial of loan applications allows estimation of the determinants of actual approval probabilities ( $\alpha$ , say). Then  $\omega = \alpha + \beta$  where  $\beta$  is a cognitive bias term (relating to systematic deviations between perceived and actual approval probabilities).  $\alpha$  is a function of factors relating to the creditworthiness of the business (e.g., the 5 C's).  $\beta$  depends on a different set of factors relating to previous experiences with lenders, the borrowing experiences of business peers, media reports of bank lending and perceptions of a difficult economic climate for borrowing (see above) – technically, employing a different set of variables to explain  $\beta$  enables identification of  $\omega$ . Regarding the other equations,  $\theta$ (productivity) is a function of business/owner characteristics (including human capital) and the capital demands threshold  $\theta_0$  depends on perceived borrowing costs and whether the business reports a need for more capital (as a proxy for the amount of capital already invested). Application costs  $\omega_0$  depend on the factors discussed previously (e.g., perceived security requirements/terms and conditions).

applicants in this scenario) are creditworthy and would be expected to obtain credit from the bank if they applied. This is similar to estimates in Cowling et al (2016b) which suggest that over one-half of discouraged borrowers (55.6%) in the UK would receive credit if they applied. In contrast, Cole and Sokolyk (2016) estimate that around one in three discouraged borrowers in the US would have their applications approved if they applied (suggesting lower average quality discouraged borrowers in the US).

In another scenario analysed in Fraser (2014a), fully addressing business related issues leading to discouragement (principally, improving debt/cash-flow management skills) is estimated to reduce the number of DBs to 110,000. Proportionately more (75%) of the 63,000 prospective additional applicants in this scenario (i.e., around 47,000 businesses) would be expected to obtain bank credit due to the improvements in the quality of applications brought about by addressing debt/cash-flow management issues.

We conclude the discussion of discouraged borrowers by looking at further empirical evidence from the literature regarding the determinants of discouragement. An international study of discouragement suggests that the role of demographic factors varies depending on the country's level of economic development (Chakravarty and Xiang, 2013). This study uses the 2002/2003 waves of the World Bank Enterprise Survey with data for the following emerging economies: Brazil; China; Eritrea; Ethiopia; Honduras, India; Kenya; Pakistan; Tanzania; and Uganda. Chakravarty and Xiang's main findings are that, consistent with other studies, older and larger firms are less likely to be discouraged. Greater firm competition increases discouragement whereas firms with a greater number of banking relationships are less likely to be discouraged (which is similar to the finding in Han et al, 2009a). In addition, discouragement is negatively associated with a country's GDP growth rate. Regarding the role of economic development Chakravarty and Xiang find that, in more developed economies, the main determinants of discouragement are firm size, the number of banking relationships, and total firm liabilities (the latter being negatively associated with discouragement). In contrast, in less developed economies, additional factors including firm age and competition are also important.

Mac an Bhaired et al (2016) test the firm, macroeconomic, regulatory, and banking industry determinants of discouragement in EU countries using data from the first five waves of SAFE (2009 to 2011). Consistent with previous studies, discouraged borrowers are smaller, younger, have declining turnover and an increasing debt to assets ratio (relative to loan applicants). However, among EU countries, macroeconomic development seems to be a relatively unimportant factor as the relationship between GDP per capita and discouragement is statistically insignificant. Higher regulatory quality increases the likelihood of borrower discouragement. This is consistent with a more developed regulatory system deterring moral hazard and reducing problems of adverse selection manifesting in efficient self-rationing. In terms of banking industry determinants, greater average recovery of credit under bankruptcy reduces the likelihood of discouragement. In addition, greater concentration in the banking sector reduces the likelihood of discouragement consistent with the argument that banks have an increased incentive to invest in soft information/relationship lending when competition is low (Petersen and Rajan, 1995).

Also on the issue of competition, using SAFE data for 25 developed and developing European countries in 2005-2006, Mol-Gómez-Vázquez et al (2018) show that the intensity of borrower

discouragement (measuring the number of different reported reasons for not applying for credit despite the presence of credit needs) decreases with the level of bank market power. However, allowing for non-monotonic effects of bank market power, greater bank market power may increase borrower discouragement for firms operating in less developed economies and in countries with a high degree of bank market power.

Consistent with the importance of relationship lending for small firms, Tang et al (2017) argue that small firm managers' trust in loan managers plays a central role in reducing the probability of discouragement. Using data from a 2014-2015 survey of 800 small firms in China (located specifically in Hunan and Guangdong provinces), they find that the higher the level of trust that the firm manager has in the loan manager, the lower the probability that they are discouraged from applying for a loan. Trust also mediates the effects on discouragement of the firm manager's experience and the monitoring activity pursued by the bank. In particular, more experienced firm managers display a higher level of trust in loan managers (perhaps because they have more confidence in their capabilities and their relationship with the bank) and hence are less likely to self-ration. In addition, relaxed monitoring by the bank reduces firm managers' trust in their loan managers (increasing the probability of self-rationing). This may be due to the lower frequency of personal interactions between firm and loan managers when bank monitoring is relaxed which inhibits the development of trust.

#### 4.2 Absence of credit demands and control aversion

Another group highlighted in Figure 7 is the group of firms with no external credit demands. Indeed, empirically this group is much more prevalent than either discouraged borrowers or applicants and accounts for the majority of small firms (see empirical evidence in section 3). Some of these firms may have sufficient internal capital to meet their financing needs. However, others may choose not to seek external credit for reasons of control aversion despite the potential for improved firm performance with external financial support (and the fact the perceived gain in control may only be illusory).

What factors in general determine entrepreneurs' choices between different sources of finance such as internal versus external finance, debt versus equity, and short term versus long term finance? As a benchmark, finance theory predicts that if there are no taxes and bankruptcy costs, and if capital markets are perfect, then financing decisions are essentially irrelevant and have no effect on the value of the firm (Modigliani and Miller, 1958).

However, several theories have been developed from this idealized scenario by introducing market imperfections. In trade-off theory firms determine their debt levels to balance the tax-shield benefits of using more debt with rising bankruptcy costs (DeAngelo and Masulis, 1980). In contrast, pecking order theory emphasizes the role of information asymmetries (Myers, 1984; Myers and Majluf, 1984). This leads entrepreneurs to prefer using cheaper internal finance first, only followed by more costly external finance (debt followed by equity) if internal funds are insufficient. Agency theory, on the other hand, points to conflicts of interests between the entrepreneur (the agent) and the finance provider (the principal). In this situation, external debt will be more available where there is collateral to help align interests (Jensen and Meckling, 1976; Rajan and Zingales, 1995).

Overall, the empirical evidence seems to support pecking order and agency theories over tax considerations in financing decisions (Titman and Wessels, 1988; Michaelas et al, 1999)<sup>27</sup>. Firms that are more profitable (i.e., have greater access to internal finance) use less external finance (Rajan and Zingales, 1995; Chittenden et al, 1996; Michaelas et al, 1999); this is consistent with the evidence relating specifically to the determinants of external credit needs discussed in section 2. High growth firms, which have greater total funding needs, are more likely to seek external finance (Titman and Wessels, 1988; Cosh et al, 2009) although they also seem to be more reliant on short term debt than equity (Chittenden et al, 1996)<sup>28</sup>.

Evidence supporting the predictions of agency theory is provided by the finding of a positive relationship between leverage and tangible assets (Harris and Raviv, 1991; Rajan and Zingales, 1995; Chittenden et al, 1996; Michaelas et al, 1999). Industry effects, relating to the availability of collateral, also affect leverage and debt maturity (Michaelas et al, 1999). Access to external finance improves with size and age (Chittenden et al, 1996; Michaelas et al, 1999; Cosh et al, 2009) supporting the idea of a financial growth life-cycle (Berger and Udell, 1998). In addition, the economic cycle is important with reliance on short term debt increasing in a recession (Michaelas et al, 1999).

However, these explanations typically explain only between 10% and 30% of the observed variation in financing decisions. Insights from the entrepreneurship and psychology literatures applied to financial economics suggest that entrepreneurial objectives and growth ambitions (Romano et al, 2001), control aversion (Cressy, 1995; Romano et al, 2001), and entrepreneurial risk perceptions and preferences (Norton, 1991) may account for some of the remaining unexplained variation in financing decisions.

Focusing on control aversion in the context of entrepreneurial borrowing decisions, Cressy (1995) develops a model in which non-borrowing and non-growth may be optimal for the firm as a solution to the conflict between the bank's desire to monitor the firm, to mitigate agency issues, and the entrepreneur's desire for independence. Ceding control to banks in this context does not involve the bank taking an equity stake in the firm (in contrast see e.g., Mueller, 2008).

The entrepreneur's preferences are therefore defined over both profits and control (inversely related to loan size). Profits derived from borrowing increase entrepreneurial utility whereas loss of control reduces utility. The tradeoff between borrowing and control results in firm optimal borrowing lying below the profit maximizing level of borrowing. The situation is set out in the following diagram:

INSERT FIGURE 8 HERE

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<sup>27</sup> In particular the results in Michaelas et al (1999): "indicate that tax effects do not appear to influence, at any significant level, the total debt position of small firms, although, tax considerations may become an important element in the longer term capital structure decisions in these businesses." (Michaelas et al, 1999, pp.126).

<sup>28</sup> "What is of concern [for firm performance] is that unlisted dynamic small firms may be curtailing their growth to match their financial resources. The long term finance that is available to unlisted firms is provided on the basis of collateral rather than profitability." (Chittenden et al, 1996, p. 67)

The indifference curves of control averse entrepreneur (one of which is depicted as  $U$  in Figure 8) represent combinations of external debt and profits which yield the same level of utility. They are positively sloped because the entrepreneur requires more profit to compensate for the dis-utility of additional external debt. The highest indifference curve attainable is tangent to the profit/external debt function ( $\pi$ ). In the absence of control aversion the entrepreneur chooses  $L$  to maximize profits. However, control averse entrepreneurs choose to borrow less ( $L^{**}$  instead of  $L^*$ ) and use more self-finance (even though this means trading-off lower profits in return for greater independence) because this maximizes their utility. An increase in entrepreneurial wealth will therefore allow the entrepreneur to pursue bigger projects without losing control and will result in a further reduction in bank borrowing as the entrepreneur is able to substitute their own wealth for bank funds.

Further, Cressy (1995) distinguishes between movers, whose preferences become less control averse over time, and stayers whose preferences remain stationary. Movers accordingly increase borrowing over time and grow to the profit maximizing level of borrowing/output whereas stayers remain in charge of static, non-growing firms.

Romano et al (2001) conducted a study of the capital structure of Australian family owned businesses to test the role of entrepreneurial preferences and objectives in financing decisions. Overall, including business planning, growth objectives and the importance of retaining family control, alongside firm size/age/industry, in models of financing decisions raises explanatory power to almost 60% (compared to the typical figure of 10-30% noted previously for models that do not include entrepreneurial preferences/objectives). In particular, situations where family control is important are associated with an increased use of external debt and reduce the use of external equity. Use of retained earnings and external equity is more likely among family firms with growth ambitions. Reliance on family loans is more likely among small family businesses with no formal planning processes in place. Whilst the findings in Romano et al (1999) do not directly support Cressy's (1995) theory of control aversion, vis a vis external debt if not equity, they do highlight the overall importance of entrepreneurial preferences and objectives in explaining the presence or absence of external finance demands.

However, in other research more directly supportive of Cressy (1995), Mishra and McConaughy, (1999) find that family controlled firms use less bank credit as they have more to lose than non-family controlled firms if control were to change as a result of the firm being forced into bankruptcy due to too high a level of leverage. Other research, supportive of Cressy's mover/stayer distinction, suggests technology development, financial strength, size and perceived need to grow, change firms' attitudes towards external financiers leading to an increase in the likelihood of applying for credit (Berggren et al, 2000).

#### 4.3 Summary

The important roles of credit market imperfections and entrepreneurial cognition on entrepreneurs' borrowing decisions have become increasingly recognised in theoretical and empirical research on entrepreneurial borrowing. In particular, discouraged borrowers arise due to screening errors caused by information asymmetries and the presence of application costs that would not exist in a frictionless credit market (Kon and Storey, 2003). Further, some discouragement may be irrational to the extent that entrepreneurs rely on heuristics (Tversky and Kahneman, 1974; Kahneman and



Tversky, 1979) to gauge the likelihood that their applications for loans will be approved (Fraser, 2014a). In this regard, the available evidence suggests that discouraged borrowers seem to underestimate the likelihood of loan application approval (Fraser, 2014a).

Regardless of the extent of irrationality in application decisions, discouragement may have adverse consequences for the firm and wider economy. Despite appearing to be lower quality firms in terms of their observable characteristics, estimates suggest that a significant proportion of discouraged borrowers might have their applications approved if they applied (Fraser, 2014a, Cowling et al, 2016b; Cole and Sokolyk, 2016). The implication is that, with funding, discouraged borrowers would be able to invest in and grow their businesses.

At the same time, the desire for independence may stop entrepreneurs from having credit demands in the first place. In this respect, entrepreneurs may choose to trade off lower profits/growth in return for greater control over the firm (Cressy, 1995) even though any perceived increase in control may be illusory (Taylor, 1989). In this context, an increase in entrepreneurial wealth may allow the entrepreneur to grow the business without incurring a perceived loss of control.

*In terms of future research, we have limited understanding of how entrepreneurs form beliefs about their chances of making a successful loan application and how this affects their loan application decisions. The development of structural models of discouragement might help to address this gap in our understanding which previous reduced form analyses have been unable to do. In addition, more research is required to understand the extent to which control aversion, along with other factors such as growth ambitions and risk perceptions, affects entrepreneurs' credit demands.*

A lender's rejection of a credit application (relating to the issue of credit rationing on the supply-side) and discouragement (relating to self-rationing on the demand side) result in unmet credit demands that may lead to underinvestment and reduced firm performance (see Figure 1). Also, whilst control averse entrepreneurs do not have unmet credit demands, they may still be underinvesting, and their firms may therefore still under-perform, if not because of (supply side) financial constraints but rather due to entrepreneurial preferences. In this context, we turn next to a review of the literature relating to the consequences of external funding gaps (which may arise due to rejection, discouragement, or control aversion) for firm performance.

## **5. Funding gaps and firm performance**

Academics and policy makers often discuss 'funding gaps' with the implication that these gaps are detrimental to firm and economic performance (see e.g., Fraser et al, 2015). By implication, a funding gap arises when the amount of funding available to the firm falls below the 'optimal' amount. If a firm has credit needs (and credit markets are imperfect) then the funding/credit gap (at the firm level) may be equivalent to the amount of unmet credit demands (i.e., the difference between credit demands and the amount of funding available)<sup>29</sup>. States where the firm has credit applications rejected by the bank, or where the entrepreneur feels discouraged from applying for credit that the firm needs, therefore speak (potentially) to incidences of credit gaps. However, the analysis in the previous section highlights that control aversion may also result in the firm being sub-

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<sup>29</sup> If credit markets are imperfect, resulting in an under-supply of credit to the firm, and assuming that the entrepreneur is perfectly informed about their ability such that their capital demands are optimal, then the unmet credit demand is equivalent to the funding/credit gap.

optimally capitalised albeit due to entrepreneurial preferences rather than credit market imperfections.

Yet, however defined, and despite their importance, funding gaps are rarely measured directly and therefore the consequences of funding gaps for firm/economic performance are not well understood (Fraser et al, 2015)<sup>30</sup>. Instead, a large literature relating to the issue of financial constraints looks at the relationship between the availability of internal finance and firm performance (e.g., Hubbard, 1998; Fraser et al, 2015). Typically these studies involve testing whether the availability of internal finance, i.e., the entrepreneur's personal wealth (Evans and Jovanovic, 1989; Hurst and Lusardi, 2004) or the firm's cash flows (Carpenter and Petersen, 2002), affect investment or business performance.

The argument runs that, in the absence of sufficient market finance, an increase in internal funds will relax financial constraints leading to improved firm performance (Evans and Jovanovic, 1989). Put another way, in the presence of imperfect capital markets, investment decisions are dependent on financing decisions, which is not the case in a perfect market (Modigliani and Miller, 1958)<sup>31</sup>. However this 'internal finance approach' is fraught with endogeneity issues as the availability of internal finance may be correlated with factors other than liquidity which may also increase firm performance e.g., human capital (Cressy, 1996; Bosma et al., 2004), risk aversion (Cressy, 2000; Kan and Tsai, 2006), and entrepreneurial ability (Hurst and Lusardi, 2004). Simply put, the internal finance approach to testing financial constraints conflates both demand and supply side factors so it is unclear whether the effects of internal finance relate to financial constraints or other reasons related to the entrepreneur. Further, and more fundamentally, the internal finance approach is not identified (regardless of what instrumental variable is used for internal finance) because it is unable to distinguish financial from cognitive constraints (see also Malmendier and Tate, 2005; Baker and Wurgler, 2013)

In the remainder of this section, we will critique the theoretical basis for the internal finance approach to testing financial constraints and related empirical tests of this approach. We will then go on to look at alternative approaches to identifying financial constraints including the more direct approach of testing the relationship between external funding gaps and firm investment and performance (Fraser et al, 2015).

### 5.1 Internal finance approach

The seminal model of the internal finance approach to testing financial constraints in the entrepreneurship literature is developed in Evans and Jovanovic (1989) (EJ)<sup>32</sup>. EJ show that in the presence of credit market imperfections new venture creation and performance depends on the

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<sup>30</sup> A rare example in this respect is Wilson et al (2018) who provide direct estimates of the equity gap for knowledge based firms in the UK facing later stage financing issues. They estimate this 'second' equity gap to be in the range £3–£30 million per company investment.

<sup>31</sup> This follows because in a perfect market the value of the firm is independent of its capital structure (see section 4 above).

<sup>32</sup> The first application of the internal finance approach was a study in the large firm/finance literature by Fazzari et al (1988) – see below.

personal wealth of the entrepreneur. To understand how this result arises we will now develop the EJ model in more detail.

The EJ model is essentially a model of occupational choices. Individuals make a rational choice between wage employment and entrepreneurship based on the income they derive from the respective occupations. Entrepreneurial income ( $y$ ) is an increasing function of ability ( $\theta$ ) and capital ( $k$ ), and is a decreasing function of the cost of capital ( $r$ ).  $y$  is increasing in  $\theta$  because individuals with higher  $\theta$ : i) are more productive (for a given level of capital); and ii) have higher capital demands (because they have a higher marginal product of capital). On this second point the optimal entrepreneurial investment is given by  $k^*$  which is an increasing function of  $\theta$  (and a decreasing function of  $r$ ). In the absence of financial constraints the entrepreneur's capital demands are fully met by the credit market so the availability of internal finance, i.e., entrepreneurial wealth ( $z$ ), is irrelevant for the determination of investment. Accordingly, individuals may be ranked in terms of ability with the marginal entrepreneur  $\theta_0$  deriving an entrepreneurial income  $y(\theta_0)$ , which is equal to the wage rate  $w$ , with  $y(\theta) > y(\theta_0) \Leftrightarrow \theta > \theta_0$ . In view of rationality, all individuals with  $\theta > \theta_0$  will choose to become entrepreneurs (and will earn incomes higher than that of the marginal entrepreneur) as shown in the following diagram:

INSERT FIGURE 9 HERE

However, due to asymmetric information, banks do not observe  $\theta$ . Entrepreneurs therefore have to post collateral on their loans to signal their ability in order to obtain loans (as in the model by Bester, 1985 – see section 3). In this respect EJ assume that the maximum amount an individual can borrow is proportional to their wealth with a factor of proportionality  $\lambda - 1$  where  $\lambda \geq 1$ . This captures the bank's lending rule i.e., the maximum proportion of entrepreneurial wealth that the bank is willing to lend taking into account that the fire sale value of assets is likely to be less than their book value (suggesting  $\lambda - 1 < 1$ ). Accordingly the entrepreneur can use their personal wealth to invest in assets for the firm which can be used as loan collateral indicating a maximum entrepreneurial investment given by  $z + (\lambda - 1)z = \lambda z$ . It follows from this that  $\lambda$  relates to accounting leverage. Therefore, if  $0 \leq k^* \leq \lambda z$  then the entrepreneur is financially unconstrained. However if  $k^* > \lambda z$  then the entrepreneur is financially constrained. For a given level of entrepreneurial wealth more able entrepreneurs are more likely to be financially constrained because they have higher capital demands ( $k^*$ ).

How do financial constraints affect occupational choices? To understand this we need to examine how financial constraints affect the entrepreneurship threshold (i.e., the boundary between wage work and entrepreneurship). In the absence of financial constraints (i.e., if  $0 \leq k^* \leq \lambda z$ ) entrepreneurial income is independent from wealth and the entrepreneurship threshold is simply  $\theta_0$  as shown in Figure 9. However, subject to financial constraints, the maximum investment is  $\lambda z$  and therefore entrepreneurial income depends on wealth. In particular, subject to financial constraints, any given level of entrepreneurial income may be achieved with a higher level of  $\theta$  and a lower level of  $z$  or vice versa (since  $y$  is an increasing function of both ability and capital). Accordingly, in the presence of financial constraints, the entrepreneurship threshold (corresponding to the level of entrepreneurial income where  $y(\theta) = w$ ) has a negative slope in  $(z, \theta)$  space reflecting the trade-off between  $\theta$  and  $z$  to achieve a given level of entrepreneurial income.

This situation is depicted in the following diagram. The financial constraints curve, denoting the locus of points in  $(z, \theta)$  space where the entrepreneur can obtain just enough capital to meet their demands (i.e.,  $k^* = \lambda z$ ) is concave. This shape arises because, as their ability increases, entrepreneurs require more wealth at an increasing rate to remain financially unconstrained<sup>33</sup>. The entrepreneurship threshold (i.e., the income indifference curve for  $y(\theta) = w$ ) is negatively sloped in the region where  $k^* > \lambda z$  (i.e., in the region above the financial constraints curve) reflecting the trade-off between  $\theta$  and  $z$  to achieve a given  $y(\theta)$ . In contrast, the entrepreneurship threshold is horizontal and corresponds to  $y(\theta_0) = w$  in the financially unconstrained region below the financial constraints curve:

INSERT FIGURE 10 HERE

The following different types of worker may be identified in the EJ model:

*Type A*: Unconstrained wage workers. These workers could raise their optimal capital ( $k^* < \lambda z$ ) but choose wage work because entrepreneurship is not viable ( $y < w$ ). Even in the absence of financial constraints they would choose wage work because they have low ability ( $\theta < \theta_0$ ).

*Type B*: Unconstrained entrepreneurs. These workers can raise their optimal capital ( $k^* < \lambda z$ ) and entrepreneurship is viable ( $y > w$ ) which implies they have sufficient ability to become entrepreneurs ( $\theta > \theta_0$ ).

*Type C*: ‘Constrained’ wage workers. Unlike *Type A* workers, *Type B* workers would be unable to raise their optimal capital ( $k^* > \lambda z$ ) because their wealth is very low. However, like *Type A* workers entrepreneurship is not viable ( $y < w$ ) and even in the absence of financial constraints they would have insufficient ability to become entrepreneurs ( $\theta < \theta_0$ ).

*Type D*: ‘Frustrated’ entrepreneurs. These workers are unable to raise optimal capital ( $k^* > \lambda z$ ) and entrepreneurship is not viable ( $y < w$ ). However, in the absence of financial constraints, they would have sufficient ability to become entrepreneurs ( $\theta > \theta_0$ ).

*Type E*: Constrained entrepreneurs. These workers are unable to raise their optimal capital ( $k^* > \lambda z$ ) but have sufficient ability to become entrepreneurs ( $\theta > \theta_0$ ) and are able to obtain enough capital to make entrepreneurship viable ( $y > w$ ).

Regarding the internal finance approach to testing financial constraints, the EJ model makes two important empirical predictions relating to *Type D* and *Type E* workers:

1) There is a positive relationship between new venture creation and wealth if and only if there are financial constraints. An increase in wealth allows frustrated entrepreneurs (*Type D*’s) to access the finance they need to make starting a business a viable proposition:  $y \geq w$ .

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<sup>33</sup> In the EJ model capital demands  $k^*$  increase at an increasing rate in ability because the marginal product of capital is increasing in ability. However the supply of capital does not increase with ability. Accordingly, as ability increases, capital demands outpace the supply of capital from banks, and entrepreneurs are increasingly likely to fall into financial constraints.

2) There is a positive relationship between entrepreneurial income (performance) and wealth if and only if there are financial constraints. An increase in wealth allows constrained entrepreneurs (*Type E's*) to access the additional finance they need to operate at an optimal scale ( $k = k^*$ ).

EJ tested their model with the US National Longitudinal Survey of Young Men. This provides a longitudinal sample of males, aged between 24 and 34 in 1976, who were wage workers in 1976 and either wage workers or self-employed in 1978. EJ found that men with greater wealth (family assets) in 1976 were more likely to enter self-employment in 1978 (controlling for education, experience and other demographic factors). This provides support for EJ's first prediction relating to the positive effect of wealth on new venture creation when credit markets are imperfect. EJ also found that men with greater wealth in 1976 had higher self-employment earnings in 1978 (holding other factors constant). This supports EJ's second prediction of a relationship between wealth and new venture performance in the presence of financial constraints. In addition, EJ estimate that  $\lambda = 1.44$ : on average, the maximum amount that individuals can invest in their business is  $1.44 \times$  their wealth (and bank's lend a maximum of 44% of the value of entrepreneurial assets).

The theoretical implications of EJs findings are that they support Knight's (1921) view that entrepreneurs are uncertainty bearers and therefore must self-finance (which is consistent with a parameter  $\lambda = 1$ ) and they reject Schumpeter's (1911) views that the entrepreneurial and capitalist functions are distinct (which is consistent with  $\lambda = \infty$ ). In addition, the use of collateral does not solve the market failure in entrepreneurial credit markets (in contrast to Bester, 1985). In particular, some (would be) entrepreneurs are unable to obtain enough credit to meet their credit needs. Indeed, holding wealth constant, the most able entrepreneurs are those most likely to experience financial constraints. EJ's model is therefore frequently used as a theoretical justification for providing financial support to entrepreneurs. In this respect government grants and subsidised loans can help fill funding gaps ( $k^* - \lambda z$ ) in entrepreneurial finance; and loan guarantees help relax bank lending rules (thereby increasing  $\lambda$ ) (see section 6 below).

Other US studies using the internal finance approach find evidence of financial constraints on firm survival (Holtz-Eakin et al, 1994), sales growth (Holtz-Eakin et al, 1994), and employment growth (Haynes and Brown, 2009). However, Hurst and Lusardi (2004) in a detailed test of EJ's first empirical prediction, find that the relationship between personal wealth and becoming a business owner is confined to the top 5% of the wealth distribution, which is inconsistent with financial constraints. (Based on Figure 10, if EJ's model is correct we would expect to find *Type D* workers further down the wealth distribution). Instead the relationship between wealth and new venture creation may reflect that wealthier individuals are less risk averse (and therefore more willing to start a business) (Cressy, 2000), or have higher human capital (and therefore more able to start a business) (Cressy, 1996), or reflect that business ownership is due to the lifestyle preferences of the wealthy<sup>34</sup>.

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<sup>34</sup> The idea here is that business ownership is a luxury good – individuals demand more of it as wealth increases. At low levels of wealth a job is needed to make a living. At higher levels of wealth there is more opportunity for work to reflect lifestyle (non-pecuniary) preferences. There is substantial evidence that people start businesses to satisfy lifestyle preferences (e.g., to fulfil a desire for independence) more often than to satisfy pecuniary wants. For example, UKSMEF 2008 indicates that, while over 1 in 3 entrepreneurs started a business to fulfil a desire for independence, less than 1 in 10 did so to get rich.

Hvide and Møen (2010) test the second empirical prediction of the EJ model using a panel of start-ups in Norway. Consistent with EJ, they find a positive relation between founder prior wealth and start-up size. They also find a positive relationship between wealth and return on assets for the first three wealth quartiles but a negative relationship in the top quartile. In this regard, Hvide and Møen argue that higher wealth may induce a less alert or a less dedicated management.

UK studies using the internal finance approach have found evidence for financial constraints on business formation/growth based on a positive link between receiving an inheritance/windfall payment and self-employment (Blanchflower and Oswald, 1998; Taylor, 2003) or self-employment income (Taylor, 2001). However, there is no evidence that financial constraints affect business survival in the UK (Cressy, 1996; Taylor, 2001).

Large firm studies using the internal finance approach have looked at the relationship between liquid assets/cash-flows and investment (Fazzari et al, 1988 is the seminal study here; see also Carpenter and Petersen, 2002). These studies control for investment opportunities (which might otherwise lead to spurious inferences of financial constraints) with Tobin's  $Q$ <sup>35</sup>. For example, Fazzari et al (1988) use a large sample of Value Line data for manufacturing firms to test the cash-flow sensitivity of investment. They classify firms into three categories of increasing dividend payouts. They use this as an a priori criterion for identifying firms with high costs of external finance (firms with high retention/low payout policies are likely to be facing high external financing costs). Controlling for  $Q$ , the estimated cash flow sensitivities are largest in the low payout/high retention category consistent with financial constraints. At the same time, the cash-flow sensitivities diminish over longer time spans, which is consistent with a reduction in information asymmetries as (surviving) firms develop successful track records. These basic findings in Fazzari et al (1988) are robust to a wide variety of specifications and different estimation techniques.

Carpenter and Petersen (2002) develop a model in which each additional dollar in cash flows generates slightly more than one dollar in total asset growth reflecting a multiplier effect through leverage<sup>36</sup>. Testing their model on US listed firms with assets between \$5m and \$100m, Carpenter and Petersen (2002) find evidence that an increase in cash flows increases asset growth in the manner predicted by their model (controlling for Tobin's  $Q$ )<sup>37</sup>. A survey of research in this area concludes there is broad evidence of financial constraints on investment among firms most affected by information asymmetries/agency costs (e.g., smaller firms) in both developed and developing economies (Schiantarelli, 1996). However, tests of financial constraints involving Tobin's  $Q$  are inapplicable for unlisted firms (i.e., the vast majority of small firms) due to the absence of data relating to the market value of the business.

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<sup>35</sup> Tobin's  $Q$ , the measure of investment opportunities, is defined by the ratio of the market to book value of the firm.

<sup>36</sup> Similar to the EJ model an increase in internal finance increases the collateral value of the firm which gives rise to a leverage effect.

<sup>37</sup> These studies also usually involve looking at the relationship on sub-samples of firms thought more/less likely to be affected by financial constraints such as smaller and younger firms. Carpenter and Petersen (2002) split the sample by new equity issues and find, as expected, a weaker relationship between cash-flow and asset growth for high equity finance firms (i.e., firms expected to be less financially constrained).

The internal finance approach suffers from an endogeneity problem due to the likely correlation between internal finance and other factors that also increase firm performance. These other factors include observables e.g., human capital (Cressy, 1996) and unobservables e.g., entrepreneurial ability (Hurst and Lusardi, 2004). Equally, as discussed, large firm studies control for (demand-side) investment opportunities with Tobin's Q; and yet Q may not fully control for investment opportunities (Kaplan and Zingales, 1997). The problem is that failure to fully control for the influence of these other factors may result in spurious inferences of supply-side financial constraints. Accordingly, much of the literature applying internal finance tests of financial constraints have focussed on finding better instrumental variables (IVs) for internal finance to overcome endogeneity issues arising from the correlation between entrepreneurial wealth and unobservables. These instruments include: the receipt of an inheritance (Holtz-Eakin et al, 1994; Blanchflower and Oswald, 1998; Burke et al, 2002); lottery winnings (Lindh and Ohlsson, 1996; Taylor, 2001); and regional changes in house prices (Hurst and Lusardi, 2004).

A more basic problem with internal finance tests is that they are unable to *identify* financial constraints regardless of the instrument used. In particular, internal finance tests are unable to distinguish financial constraints from cognitive constraints in explaining firms' use of internal finance (see also Malmendier and Tate, 2005; Baker and Wurgler, 2013). This is a serious issue in view of the aforementioned systemic cognitive biases in the population as a whole (Tversky and Kahneman, 1974; Taylor, 1989) and among entrepreneurs in particular (Baron, 1998; Cooper et al, 1998; Lowe and Ziedonis, 2006; Mitchell et al, 2007). Consider a thought experiment in which entrepreneurial 'wealth' (i.e., funds with no direct costs to the firm and which entail no external interference) is allocated at random among an observably identical group of small firms and their subsequent investment decisions are observed. Even in this 'experimental' situation, we could not infer from observing a positive relationship between the amount of wealth received by the firm and its investment activity that capital markets are imperfect. This is because entrepreneurs may simply, as a whole, prefer to use their own wealth rather than external funds (due to control aversion: Shaver and Scott, 1991; Cressy, 1995; Romano et al, 2001; Mueller, 2008) or because, due to entrepreneurial over-optimism, they systematically misperceive funding gaps (de Meza and Southey, 1996). In other words, increased internal finance may be relaxing a cognitive as opposed to a financial constraint. This identification problem is fundamental because it occurs regardless of whether internal finance is endogenous. Accordingly, simply finding a better instrument for internal finance, or even using experimental methods, may not be sufficient to disentangle demand from supply-side explanations for using internal finance.

This identification issue is well illustrated in de Meza and Southey's (1996) model of investment decisions with over-optimistic entrepreneurs. This model highlights that new venture creation may be positively related to entrepreneurial wealth even if credit markets are perfect contrary to the EJ model. Adam Smith wrote on the prevalence of over-optimism: "The chance of gain is by every man more or less overvalued, and the chance of loss is by most men undervalued." (Smith, 1937, p.107). From more recent times, there is a large body of empirical evidence suggesting that entrepreneurs tend to over-estimate their ability and under-estimate risk (Cooper et al, 1988; Kahneman and Lovallo, 1994; Hmieleski and Baron, 2009) although this bias may diminish with experience (e.g., Fraser and Greene, 2006; Ucbasaran et al, 2010). In de Meza and Southey (1996), overoptimistic entrepreneurs who self-finance to fill misperceived funding gaps have higher failure rates than entrepreneurs using less self-finance. In other words, over-optimism bias leads to overinvestment.

de Meza and Southey (1996) begin by arguing that certain stylized facts of entrepreneurship/entrepreneurial borrowing are consistent with the bank being better informed about entrepreneurial ability than the entrepreneur themselves. These stylized facts are: i) high overall new venture failure rates; ii) reliance on bank loans for external finance; iii) high collateral provision on entrepreneurial credit; iv) entrepreneurs self-reporting they are credit-rationed; and v) higher failure rates among entrepreneurs that self-finance/post collateral on loans. However, not only are banks better informed about ability but also, due to over-optimism, entrepreneurs have biased expectations about their ability.

The theoretical rationale for this informational and cognitive stance, which is the polar opposite to Stiglitz and Weiss (1981) and the vast majority of the credit rationing literature, requires some justification at this stage. In this respect, it can be argued that: i) entrepreneurship is highly uncertain (Knight, 1921); and ii) entrepreneurship is a process of learning (e.g., von Hayek, 1937; Jovanovic, 1982) and discovery (Kirzner, 1997). Accordingly, in the absence of objective probabilities for the likelihood of venture success (Knight, 1921), entrepreneurial decision making is reliant on subjective beliefs about ability (Knight, 1921; Fraser and Greene, 2006). Consequently, individuals with high ability beliefs (i.e., those with above average optimism) are more likely to self-select into entrepreneurship (e.g., Arabsheibani et al, 2000; Fraser and Greene, 2006). And yet, as entrepreneurs learn about their ability while running their businesses (Jovanovic, 1982), and uncertainty diminishes (Fraser and Greene, 2006), those who discover their beliefs were over-optimistic will see their businesses decline and eventually fail (Jovanovic, 1982; Fraser and Greene, 2006).

So, at least in the early stages of entrepreneurship, banks, which have previous experience of lending to new ventures, may have an initial informational advantage over de novo entrepreneurs (even if the informational advantage disappears or is reversed subsequently by entrepreneurial learning). In this context, in de Meza and Southey (1996) over-optimistic entrepreneurs make excessive capital demands because they over-estimate their probability of repaying the loan. Banks who are better informed about the ability/repayment probabilities of start-ups will only lend a smaller amount than the entrepreneur believes they need. This leads the entrepreneur to misperceive a funding gap – they ‘feel’ financially constrained even though they are not in reality. The situation is depicted in the following diagram:

INSERT FIGURE 11 HERE

Optimal investment decisions equate the expected marginal return on capital ( $MR$ ) with the marginal cost of capital ( $MC = 1 + r$ ). From the perspective of the over-optimistic entrepreneur this equates  $MR_e = MC_e$  resulting in perceived capital needs  $k_e^*$ . However the entrepreneur has over-estimated the true marginal return on capital ( $MR_e > MR$ ) and under-estimated the true marginal cost of capital based on their actual risk ( $MC_e < MC$ ). The bank, which is not subject to the same cognitive biases, will only lend a smaller amount  $k^*$  at a higher interest rate (equating  $MR = MC$  in Figure 11). The entrepreneur misperceives that they are being lent too little funding by the bank ( $k^* < k_e^*$ ) at an actuarially unfair interest rate ( $MC > MC_e$ ).

To reach  $k_e^*$  the entrepreneur must ‘bootstrap’ (self-finance or use a collateralised loan) to fill the ‘funding gap’  $k_e^* - k^*$ . Start-up decisions therefore depend on personal wealth even though there is no supply-side credit market failure (because the bank has an information advantage over the



entrepreneur). And, importantly, even if we randomly allocated wealth to entrepreneurs we would still find a positive relationship between wealth and new venture creation. The issue highlighted here is not that personal wealth is endogenous but that it is simply unable to distinguish entrepreneurial over-optimism from supply-side financial constraints.

de Meza and Southey (1996) argue their model explains why some studies show that entrepreneurs who 'bootstrap' have higher failure rates than those which use uncollateralised bank loans (Berger and Udell, 1990; Han et al, 2009b). If the entrepreneur insists on bootstrapping their way to  $k_e^*$  they will end up (objectively) over-capitalised and are therefore more likely to default. In contrast, in a signalling/credit rationing regime the use of collateral signals a low risk borrower who is less likely to default (Bester, 1985 – see section 3).

In related findings from the behavioral corporate finance literature, Malmendier and Tate (2005) find that the sensitivity of investment to cash flows is higher for more optimistic CEOs. This sensitivity is especially high for more optimistic CEOs in equity dependent firms, corresponding to a situation where *perceived* financial constraints are likely to be the most binding.

## 5.2 Alternative approaches to testing financial constraints

The fundamental problem with the internal finance approach is that it is an indirect test of financial constraints. As shown, factors other than liquidity may intervene in the relationship between entrepreneurial wealth and firm performance resulting in a lack of clarity about what the relationship is actually measuring. Accordingly, other approaches have tried to measure financial constraints more directly. In this respect, some empirical studies sort firms into financially constrained or unconstrained categories depending on their finance needs or the availability of external finance (Bottazzi et al, 2014; Cole and Sokolyk, 2016).

For example, Cole and Sokolyk (2016) classify discouraged borrowers and firms which had their credit applications denied as financially constrained firms. On the other hand, firms that had their applications approved or that self-reported no credit needs are classified by Cole and Sokolyk as financially unconstrained (see further discussion of Cole and Sokolyk's findings in section 2 above).

Cole and Sokolyk's classification of firms into constrained and unconstrained groups is potentially more promising than the internal finance approach as it speaks directly to incidences of funding gaps arising from both credit rationing (i.e., denied/rejected firms) and self-rationing (i.e., discouraged borrowers). And yet, there is still something missing from Cole and Sokolyk's approach: the link between the firm's financial category and firm performance. Indeed, contrasting with the suggestion of financial constraints in Cole and Sokolyk (2016), denied firms may have been accurately assessed prior to rejection by (well-informed) finance providers so that the firms' financial category does not signify a missed investment opportunity (de Meza and Southey, 1996). Equally, discouraged borrowers may have efficiently self-rationed themselves from the credit market in which case they are not financially constrained (Han et al, 2009a – see section 4). Going yet further, and speaking to the issue of underinvestment if not financial constraints, it may be the case that firms which report having no credit needs have accurately assessed their situation and are indeed optimally capitalized (as suggested by Cole and Sokolyk, 2016). However, it may also be the case that, due to control aversion, firms reporting no credit needs are underinvesting by choice (Cressy, 1995).

Other studies measure financial constraints through constructing indicators based on aspects of firms' financial structure (Kaplan and Zingales, 1997; Whited and Wu, 2006; Musso and Schiavo, 2008). For example, Kaplan and Zingales (1997) classify a sample of US firms (the same sample as used in Fazzari et al, 1988) into five groups corresponding to varying degrees of likelihood that the firm is financially constrained. This classification is based on quantitative and qualitative data obtained from company annual reports filed in their SEC returns. Firms are classified as being "likely to be financially constrained" (LFC) based on various factors signifying difficulties obtaining finance including the postponement of an equity or convertible debt offering due to adverse market conditions. In addition, firms that cut dividends are included in the LFC group or, if other factors point to more serious issues, another group consisting of firms that are "undoubtedly financially constrained". This latter group includes firms in violation of debt covenants, or have had their usual credit source cut off, are renegotiating debt payments, or declare that liquidity issues have forced the firm to reduce investments.

Using this classification scheme, Kaplan and Zingales re-estimate the relationship between cash-flows and investment estimated in Fazzari et al (1988). Kaplan and Zingales find that firms that appear less financially constrained based on their classification scheme display greater cash-flow sensitivities than those appearing to be more financially constrained. This is clearly contrary to the predictions of the internal finance approach in the presence of financial constraints. Accordingly, Kaplan and Zingales conclude that, in contrast to the inferences made by Fazzari et al (1988) and subsequent papers using the internal finance approach, a high sensitivity of investment to cash flow does not signify financial constraints. (This conclusion is similar to the critique of the internal finance approach in the entrepreneurship literature discussed above).

Alternatively, some studies attempt to measure financial constraints based on survey data, which involves founders or managers' assessment of whether the firm is financially constrained (Winker, 1999; Generale, 2008; Campello et al, 2010). For example, Campello et al (2010) provides an early and influential study of the impact of the GFC on corporate policies and investment. They surveyed 1,050 Chief Financial Officers (CFOs) of companies in 39 countries in North America, Europe, and Asia in December 2008 to ascertain directly if their firms were credit constrained during the GFC. The classification of financial constraints is based on the CFO's response to a question of whether the company's operations are "not affected", "somewhat affected", or "very affected" by difficulties in accessing credit markets. Firms "very affected" by difficulties in accessing credit markets are classified as "constrained firms".

Campello et al (2010) then look at differences between constrained and unconstrained firms in corporate policies, relating to technology expenditures, capital expenditures, marketing expenditures, employment, cash-holdings, and dividend payouts, both before and during the GFC. They find that financially constrained firms planned to invest less in technology and fixed capital, spend less on marketing, employ fewer workers, hold less cash, and make smaller dividend payouts relative to unconstrained firms both before and during the GFC. However, these reductions among financially constrained firms are larger during the GFC i.e., the crisis exacerbated the negative differences in corporate policies between financially constrained and unconstrained firms. Constrained firms also burned through more of their cash holdings and drew down more funds from existing lines of credit (for fear that they would be withdrawn) during the GFC than unconstrained firms.

Also, speaking to the investment (real) effects of financial constraints, Campello et al (2010) find that during the crisis period, 86% of financially constrained firms report that their ability to invest in attractive investment projects is limited by access to finance versus 44% of unconstrained firms (which is bigger than the difference between constrained and unconstrained firms during normal times). However, while the approach to testing financial constraints in Campello et al (2010) is more direct than, and avoids many of the issues with, the internal finance approach (e.g., the confounding of the availability of investment opportunities with the availability of capital) their survey approach has other problems. For example the results may be driven by misperceptions of credit constraints by CFOs (or a “state of mind story” as Campello et al, 2010 put it) that may cause firms to underinvest.

An approach that addresses many of the methodological issues raised above is based on the relationship between external funding gaps and firm performance. Considering incidences of funding gaps, this approach goes the next step in Cole and Sokolyk’s (2016) approach by testing the relationship between the firm’s financial category and its subsequent performance. Essentially a (perceived) funding gap will have an adverse effect on firm performance if and only if the gap results in the firm underinvesting. Instead, if the cause of the funding gap lies on the demand rather than the supply side (for example, because an over-optimistic entrepreneur has sought too much credit and has therefore correctly had their application denied by the bank: de Meza and Southey, 1996), then the ‘funding gap’ (which arises due to entrepreneurial misperceptions) will not lower firm performance because denial did not result in underinvestment (Fraser et al, 2015). That is, the funding gap approach, unlike the approaches discussed previously, is able to distinguish supply side financial constraints from cognitive, demand-side explanations for unmet credit needs. This addresses the issue of misperceived credit constraints highlighted in Campello et al (2010) and the problem of assuming firms in particular financial categories (i.e., denial and discouragement) are financially constrained (Cole and Sokolyk, 2016) however plausible these assumptions might seem.

The funding gap approach is also able to identify control aversion among firms that report they have no credit needs. Unlike rejected firms and discouraged borrowers, there are clearly no unmet credit needs among firms reporting the absence of such needs. However, the firm may still be underinvesting if the entrepreneur is trading off lower profits for greater control (Cressy, 1995) which is contrary to the assumption of optimal capitalization among firms with no credit needs made in Cole and Sokolyk (2016). Evidence of underinvestment among firms with no credit needs could be examined by testing for *ceteris paribus* differences in firm performance between firms with no credit needs and firms with approved credit applications. If the absence of credit needs, due to control aversion or other cognitive issues, results in underinvestment then we would expect firms reporting no credit needs to under-perform relative to otherwise identical firms using credit.

The ability of the external funding gaps test to distinguish financial from cognitive constraints may be illustrated by the following thought experiment, complementary to the one presented earlier for the internal finance test, based on randomly allocating credit, at the market rate, among a group of observably identical firms. This corresponds to the ‘experiment’ implicit under random credit rationing where banks are uncertain about expected returns and/or risk and the allocation of funding is by lottery (Stiglitz and Weiss, 1981; Parker, 2003). If entrepreneurs have positive net present value projects then those lucky enough to receive credit will use the funds to invest in these projects. Observing an increase in investment activity among the group receiving credit relative to

the otherwise identical 'rejected' firms would therefore provide direct evidence of (supply-side) financial constraints.

However, if entrepreneurs are over-optimistic about the returns from their projects then lenders will take this into account in the credit market rate on offer. In particular: "relative to internal funds, the marginal cost of external funds is uplifted by the divergence between the bank's and the entrepreneur's evaluation of the probability of success" (de Meza and Southey, 1996, p. 381). Therefore, even if entrepreneurs are over-optimists, firms receiving external funding will only draw down the funds on offer if the net present value of the project is positive taking into account the 'over-optimism premium' on borrowed funds. Similarly, if entrepreneurs are control averse then they will be reluctant to draw down external funds due to the concomitant interference from lenders in the firm (there is a self-imposed 'loss of control premium' on borrowing in this case). Accordingly, in this 'experiment', and in contrast to the internal finance 'experiment' previously discussed, it is unlikely that observing increased investment activity among the firms receiving credit is due to the relaxing of a cognitive rather than a financial constraint.

Despite its apparent benefits relative to other tests of financial constraints/under-investment, applications of the funding gap approach in the literature are sporadic and generally unsystematic. (In this regard, developing the funding gaps approach is an area where more research is required – see suggestions for future research below). An early application of the funding gaps approach is by Van Praag et al (2005). After critiquing the internal finance approach, Van Praag et al (2005) propose a test of financial constraints on firm performance based on the performance effects of unmet capital needs. They implement the test using a sample of over 1,000 Dutch new ventures founded in 1994. In particular, the measure of unmet capital needs relates to the entrepreneur's perceived severity of difficulties in obtaining sufficient external capital at start-up. Van Praag et al (2005) then test for financial constraints by regressing the firm's average profits in 1995-1997 on the variable for capital constraints in 1994 and a host of other controls relating to the firm and entrepreneur also measured in 1994. Their results indicate that the capital constraint variable has a significant negative effect on subsequent profits, which is supportive of the presence of binding financial constraints on new venture performance. However, the study recognises there are problems of endogeneity with the capital constraints variable that are not addressed in their analysis (they use a standard Tobit estimator when an IV estimator would be more appropriate). In addition, the test only measures the effects of incidences of unmet capital needs and not the quantitative effects of unmet capital needs.

A more systematic application of the funding gaps approach is given by Fraser (2011). Using UKSMEF data for 2004-2009 the study implements a Generalized Method of Moment (GMM) IV estimator of the performance effects of unmet capital needs which addresses the endogeneity issues associated with the financial regressors. In Fraser's study, unmet capital needs are measured using a more fine-grained approach with dummy variables for whether the firm was denied funding or felt discouraged from applying for funding respectively. Further, relating to the issue of underinvestment due to control aversion, the models also include dummy variables for firms reporting they have no capital needs. Performance is measured by sales growth. Fraser (2011) finds that overdraft denial and a lack of demand for overdrafts are, other things equal, associated with significantly lower sales growth. This is consistent with working capital constraints among firms denied overdrafts and control aversion among firms reporting the absence of need for an overdraft

facility. In addition, firms that felt discouraged from applying for term loans grew significantly more slowly than otherwise identical businesses that successfully applied for term loans (Fraser, 2011). This suggests discouraged borrowers are constrained by a lack of funds for fixed capital investment to grow their businesses.

### 5.3 Summary

Evidence of (supply-side) financial constraints is often framed in terms of a relationship between the availability of internal finance and firm investment/performance (see e.g., Fazzari et al, 1988; Evans and Jovanovic, 1989; Carpenter and Petersen, 2002). In a perfect market the firm's investment decisions (and hence performance) are independent from its financing decisions (Modigliani and Miller, 1958). However if entrepreneurs are unable to obtain enough bank credit or other sources of external capital then an increase in internal finance will relax financial constraints and lead to higher investment/performance.

However, whilst many studies have pointed to the existence of financial constraints, based on finding a relationship between entrepreneurial wealth (e.g., Evans and Jovanovic, 1989) or cash-flows (e.g., Fazzari et al, 1988; Carpenter and Petersen, 2002) and firm performance, a general problem with internal finance tests of financial constraints is that they may capture effects that have nothing to do with liquidity. These non-liquidity explanations include human capital (Bosma et al., 2004; Cressy, 1996), entrepreneurial ability (Hurst and Lusardi, 2004), risk aversion (Cressy, 2000; Kan and Tsai, 2006), and investment opportunities (Kaplan and Zingales, 1997).

Yet, more fundamental than this endogeneity issue, is that even if wealth was randomly allocated to entrepreneurs, internal finance tests may still find spurious evidence of financial constraints if an increase in wealth overcomes misperceptions of credit constraints due e.g., to entrepreneurial over-optimism (de Meza and Southey, 1996; Fraser and Greene, 2006) or facilitates preferences not to borrow due to control aversion (Cressy, 1995). Internal finance tests therefore lack identification, being unable to distinguish financial constraints from competing cognitive explanations for entrepreneurs' use of internal finance. Simply put, there is a fundamental ambiguity about what the availability of internal finance actually measures

A more promising and direct approach (as Figure 1 makes clear) involves looking at the relationship between credit/funding gaps and firm performance. A funding gap will only adversely affect firm performance if it results in the firm underinvesting (e.g., Fraser et al, 2015). In contrast, if a misperceived credit gap reflects excessive finance demands due, say, to entrepreneurial over-optimism then it will not result in a financial constraint and hence will not adversely affect firm performance. And, equally, if there is a 'misperceived' absence of credit needs, because the entrepreneur prefers to trade-off lower profits in return for increased control (bearing in mind this increased control may itself be illusory), then, contrary to common assumptions about these firms (e.g., Cole and Sokolyk, 2016), this lack of credit needs may also be associated with underinvestment. Early applications of the funding gap approach suggest that unmet capital needs generally (Van Praag et al, 2005) and, specifically, unmet credit needs due to both denial of a credit application and discouragement from applying for credit (Fraser, 2011), lead to lower subsequent firm performance. In addition, the absence of credit needs leads to lower firm performance, other things equal, consistent with control aversion rather than optimal investment among these firms (Fraser, 2011).

*Still, there is much more work needed in relation to the funding gaps approach. This includes research that looks at the quantitative effects of funding gaps on firm performance to address the key research question: “What is the effect of a one currency unit increase in unmet credit needs on firm performance?” Also, endogeneity issues remain with the external funding gaps test so using appropriate data-sets (with the requisite instruments) and techniques in order to disentangle issues of underinvestment from the absence of investment opportunities and/or a lack of entrepreneurial ability is important (see directions for further research in the conclusion).*

To recap the discussion so far, there is substantial, if not undisputed, theoretical and empirical support for market failure in entrepreneurial credit markets operating directly through the supply side (section 3) and/or indirectly via entrepreneurial credit demands (section 4). At the same time, and subject to the methodological issues discussed in this section, there appears to be evidence from different approaches to testing financial constraints that credit market imperfections have adverse real consequences for firm performance. This leads naturally to the next topic of discussion: the issue of policies to support access to credit among entrepreneurs with viable projects unable to obtain enough credit from the market.

## **6. Government intervention in entrepreneurial credit markets**

The issue of funding gaps in the provision of entrepreneurial finance and what, if anything, policy makers should do about them, is not only a recent concern following the GFC (see introduction). Indeed, concerns about funding gaps among policy makers are longstanding and are generally based on structural factors relating to issues arising from information asymmetries and market structure. Yet while market failure may be a necessary condition for governments to intervene in the credit market it is by no means a sufficient condition.

In particular, government intervention may ‘crowd-out’ funding and economic activity that would otherwise have been generated by the market. Indeed, there is risk that intervention may not only replicate funding already available in the market (resulting in ‘finance deadweight’ e.g., Honohan, 2010; Allinson et al, 2013) but may also displace market activity, for example, where the entry of an assisted firm into the market leads to the exit of an unassisted firm (Storey, 1994; Honohan, 2010). In this context, the rationale for government intervention in entrepreneurial finance markets is commonly based on assistance being both finance and economic additional (Honohan, 2010; Cowling and Siepel, 2013). In other words, assisted loans and investments should be additional to funding that would be provided by the market in the absence of intervention and should, net of displacement, yield economic benefits such as increased growth, job creation, and productivity. Identifying economic additionality is particularly important in conducting a cost-benefit analysis to evaluate whether the use of taxpayers’ money to fund intervention is justified (e.g., Allinson et al, 2013).

In the remainder of this section we begin by providing some background on the government support for small firms provided in three leading economies: the UK, Germany, and the US. We then discuss the role of loan guarantee schemes (LGS), the principal form of intervention in entrepreneurial credit markets, paying attention to issues of finance and economic additionality and the related issue of scheme evaluation. Due to information problems, competition policy in entrepreneurial credit markets is more challenging compared to other markets. These issues and challenges in competition

policy are reviewed before concluding this section with a brief discussion of the role of state owned investment banks.

## 6.1 Background on government support for small firms in the UK, Germany, and US

There are longstanding concerns among UK policy makers that entrepreneurs do not receive enough finance due to market failure. Important policy reports by the MacMillan Committee (1931) and Bolton Committee (1971) identified gaps in the supply of small scale equity investments to small businesses. In addition, the Small Firms Loan Guarantee (SFLG) was introduced in 1981 to overcome a perceived gap in credit availability reported in Wilson Committee (1979). More recently, the Cruickshank (2000), Rowlands (2009) and Breedon (2012) reports have drawn attention to various shortcomings in the provision of financial support for growth businesses that were intensified by the GFC. These concerns ultimately led to the formation of the British Business Bank in 2013 as a 'one stop shop' for the provision of small firms' financial assistance. The principal objective of the British Business Bank is: "to make finance markets work better for small businesses in the UK at all stages of their development: starting up, scaling up and staying ahead" thereby "creating the opportunity for smaller businesses to invest and grow, creating additional jobs and economic activity"<sup>38</sup>. The British Business Bank does not provide finance directly to small businesses but instead works with market providers of finance including private banks, venture capitalists, and business angels to achieve its objectives. At the same time, in the UK, due to high market concentration (see section 2), there are particular concerns about a lack of competition in the supply of banking services to small firms. To this end, the British Business Bank is committed to creating "a more diverse finance market for smaller businesses, with a greater choice of options and providers"<sup>39</sup>.

In Germany, the Kreditanstalt für Wiederaufbau (KfW) was established in 1948 to disburse funds from the Marshall Plan to help rebuild the economy of the Federal Republic of Germany following World War II. While KfW's investment portfolio is wide-ranging, covering infrastructure, housing, energy efficiency and environmental technologies, its main focus is SME finance with 44% of its total financing of EUR 76.5 billion in 2017 going to SME's<sup>40</sup>. Regarding its domestic promotional business<sup>41</sup>, and German SME's in particular, KfW's mission is to address weaknesses in SME finance markets and "finance start-ups and SME's so that the German economy will remain strong"<sup>42</sup>. To this end, KfW implements a strategy of "on-lending" which works as follows. KfW is able to access funds from capital markets more cheaply than commercial banks because it shares the AAA credit rating of the German government. Accordingly, KfW is able to extend cheaper loans to commercial banks than they would otherwise be able to obtain, which, in turn, allows commercial banks to lend funds to SME (and other) customers at favorable rates. This strategy eliminates the need for KfW to maintain a network of branch offices.

Similarly, in the US, the Reconstruction Finance Corporation (RFC) was formed in 1932 by President Herbert Hoover in 1932, and adopted by his successor President Franklin D. Roosevelt, to provide

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<sup>38</sup> <https://british-business-bank.co.uk/wp-content/uploads/2014/06/British-Business-Bank-Strategic-Plan.pdf>

<sup>39</sup> <https://british-business-bank.co.uk/wp-content/uploads/2014/06/British-Business-Bank-Strategic-Plan.pdf>

<sup>40</sup> [https://www.kfw.de/PDF/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc/3\\_Finanzberichte/Finanzbericht\\_2017-2.pdf](https://www.kfw.de/PDF/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc/3_Finanzberichte/Finanzbericht_2017-2.pdf)

<sup>41</sup> KfW also supports development in developing countries.

<sup>42</sup> <https://www.kfw.de/KfW-Group/About-KfW/Annual-Report/Wirkung-erzielen-die-Geschäftsfelder/Wir-fördern-Deutschland/>

federal loans for firms of all sizes in need of assistance during the Great Depression. To continue the work of the RFC after it was abolished in 1952, the Small Business Administration (SBA) was formed by the Eisenhower administration in 1953 as an independent agency of the federal government. The SBA's mission is to "aid, counsel, assist and protect, insofar as is possible, the interests of small business concerns in order to preserve free competitive enterprise...and to maintain and strengthen the overall economy of the Nation" (Small Business Act, July 30<sup>th</sup> 1953).<sup>43</sup> SBA's activities consist primarily of the 3 C's providing: capital, contracts and counselling. The SBAs financial support is provided through intermediaries including private banks, credit unions, certified development companies (CDCs<sup>44</sup>) and Small Business Investment Companies (SBICs<sup>45</sup>).

In this context, it is seen that, in terms of its operations (e.g., on-lending and providing assistance through private financial institutions), the British Business Bank drew from the examples of other countries, including the US and Germany, with long established state owned investment banks (IPPR, 2012)<sup>46</sup>.

## 6.2 The role of LGS's

A LGS is a common form of intervention in entrepreneurial credit markets worldwide. The precise form and administration of LGS's varies from country to country but, in general, it involves the government agreeing to cover a certain percentage of losses on loans made to eligible firms in the event the borrower defaults on the loan. In this manner, the bank is encouraged to make loans that would otherwise be unviable due to the level of downside risk. In the UK, for example, the guarantee level is 75% under the current Enterprise Finance Guarantee (EFG)<sup>47</sup>. EFG was introduced in 2009 by the UK government to facilitate loans to SME's of up to £1.2 million for fixed and working capital following the GFC. EFG is larger in both scale and scope than its predecessor the SFLG. Under the previous SFLG (which had a maximum loan amount of £250,000 and was intended primarily to facilitate funding for fixed capital) the guarantee level varied between 70% for businesses under 2 years old and 85% for established businesses (Graham, 2004). In the US, under the 7(a) Loan Program which provides assisted loans up to \$5.5 million, the SBA may guarantee as much as 85 percent for loans of \$150,000 or less, and for loans over \$150,000 the SBA can provide a guarantee of up to 75 percent. Under the SBAExpress Programs, which facilitates lending up to \$350,000, the level of guarantee is a maximum of 50%. In Germany, KfW's ERP Start-Up Loan StartGeld has an 80% guarantee on loans up to EUR 100,000 for capital expenditure and working capital with the bank bearing only 20% of the credit risk.

The rationale for LGS's is market failure (due to information asymmetries) and the positive externalities, principally job creation, derived from supplying credit to viable firms that would

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<sup>43</sup> [http://www.sba.gov/sites/default/files/Small%20Business%20Act\\_0.pdf](http://www.sba.gov/sites/default/files/Small%20Business%20Act_0.pdf)

<sup>44</sup> CDCs are private non-profit organizations that work with the SBA to promote economic development within local communities. They are similar to Community Development Finance Institutions (CDFIs) in the UK.

<sup>45</sup> SBICs are privately owned and managed investment funds, licensed and regulated by SBA, that use their own capital plus funds borrowed with an SBA guarantee to make equity and debt investments in qualifying small businesses.

<sup>46</sup> <https://www.ippr.org/publications/investing-for-the-future-why-we-need-a-british-investment-bank>

<sup>47</sup> However, while the guarantee on any individual loan is 75%, the maximum value of government exposure to defaults is capped at 9.75% of the outstanding value of the EFG loan portfolio. Banks are liable for all of the remaining bad debts after this limit is reached (Allinson et al, 2013).



otherwise go unfunded due to the lack of a track record and/or collateral. In this respect, the key criteria by which to evaluate a LGS are both its economic and finance additionality. However, international comparisons of LGS's are difficult given the different policy focus in different countries. For example, whereas LGS's in the UK and US emphasize the importance of finance additionality, this aspect is less emphasized in other countries. In particular, US SBA loan programs are subject to a "credit elsewhere" requirement whereby no financial assistance shall be provided if the applicant can obtain credit elsewhere<sup>48,49</sup>. However, in some European countries, e.g., France, LGS's form part of mainstream SME lending and therefore account for a much higher proportion of total SME lending (see Graham, 2004).

The role of a LGS in supplying credit to viable firms otherwise rationed out of the credit market can be understood in terms of the EJ model that was discussed in section 5.

INSERT FIGURE 12 HERE

In the above diagram, the introduction of a LGS relaxes the bank lending rule (i.e., increases  $\lambda$ ) which pivots the financial constraint curve upwards. In essence, the state guarantee reduces the bank's exposure to credit risk, which makes lending less dependent on the amount of collateral that the entrepreneur is able to post on the loan. Accordingly the number of *Type D* and *Type E* firms falls i.e., more frustrated entrepreneurs (*Type D's*) with viable projects are able to start new ventures that they would not otherwise be able to proceed with, and constrained entrepreneurs (*Type E's*) are able to grow their businesses to optimal scale.

In terms of economic additionality, it is important for the government to set the guarantee at a high enough level to encourage lending to businesses which would be viable but for the lack of collateral ( $\theta > \theta_0$ ). However, in this respect, the government faces a dilemma. Set the guarantee level too low, and the bank will be unwilling to make the LGS loan. But, set the guarantee too high, and the bank may fail to carry out adequate risk screening and monitoring of applicants leading to high default rates at taxpayers' expense.

Other analyses in the literature reach similar conclusions. In particular, Innes (1991) questions the ability of LGSs to improve social efficiency (i.e., ensure more individuals with  $\theta > \theta_0$  get the funding they require). In particular, in Innes's model the guarantee provides an incentive for entrepreneurs to overinvest with banks willing to lend as the guarantee provides it with downside protection. In essence, the state guarantee promotes moral hazard with the taxpayer bearing the agency costs. In another study, Gale (1990a) shows that, in a credit-rationed equilibrium, LGSs may increase welfare whereas an interest subsidy (which lowers the cost, but does not increase the availability, of credit) is ineffective. However subsidised loans to one target group crowd out other groups so that (costly) state support may simply end up rearranging the allocation of credit among target groups.

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<sup>48</sup> "No financial assistance shall be extended pursuant to this subsection if the applicant can obtain credit elsewhere." (Title 15 of the United States Code, Chapter 14A (Aid to Small Business), section 636(a)).

<sup>49</sup> To qualify for an EFG loan, the small business borrower must "have a sound borrowing proposal and robust business plan, but inadequate security to meet a lender's normal requirements": <https://www.british-business-bank.co.uk/ourpartners/supporting-business-loans-enterprise-finance-guarantee/eligibility-criteria/>

In a related paper, Gale (1990b) shows that a LGS may even be counter-productive. Starting from a separating equilibrium, with high risk ‘bad’ firms selecting contracts with no collateral and a high interest rate, and low risk ‘good’ firms selecting contracts with a lower interest rate and positive collateral (see the discussion of Bester, 1985, in section 3), introducing a LGS contract aimed at reducing the collateral required from good firms<sup>50</sup> may disrupt the separating equilibrium as the ‘bad’ firm covets the LGS contract. Accordingly, starting from a position with no credit rationing, the LGS may increase rather than decrease credit gaps.

The situation in Gale (1990b) may be illustrated in the Bester diagram (see Figure 5 section 3). In a situation where collateral is plentiful, the government introduces an LGS contract  $\Gamma_g^*$  aimed at reducing the amount of inefficient collateral required from the low risk firm. But the high risk firm covets  $\Gamma_g^*$  and the separating equilibrium is disrupted. However if the government also subsidises the interest rate on the bad firm contract  $\Gamma_b$  (shifting this contract down the y-axis), so that the bad firm no longer covets  $\Gamma_g^*$ , then the LGS may increase efficiency.

This situation where collateral is plentiful is not very realistic in terms of the rationale for LGS’s in practice (see above). However, Gale (1990b) also considers a situation where collateral is limited. Accordingly, there may be good firms that lack collateral that the government would like to assist. Again, the fundamental issues that arise in this case may be illustrated in terms of the Bester model. If the policy objective is to assist borrowers which lack collateral (as opposed to reducing the posting of inefficient but plentiful collateral), the location of the LGS contract  $\Gamma_s$  will be on the y-axis involving an interest rate  $r_s$  and zero collateral. The issue is where on the y-axis should  $\Gamma_s$  lie?

INSERT FIGURE 13 HERE

If  $r_s$  is set such that  $r_g < r_s < r_b$  then good firms with no collateral and high risk bad firms will take the contract. In that case, the LGS contract simply displaces the market contract for the bad firm  $\Gamma_b$  and the LGS is not finance additional. Whilst this allows good firms lacking collateral to borrow more cheaply than  $r_b$  (which increases efficiency) it also allows bad firms to borrow too cheaply (which decreases efficiency). On the other hand, if  $r_s$  is set such that  $r_s > r_b$  then no borrower will take the LGS contract (since  $\Gamma_b$  is preferable) and taxpayers’ money is wasted on scheme set up costs. Accordingly, if collateral is limited, based on this analysis it is questionable whether a LGS can bring about a welfare gain.

Another, more fundamental objection to providing LGS assistance to small firms is based on the analysis of credit markets under asymmetric information in the series of papers by de Meza and co-authors (e.g., de Meza and Webb, 1987; de Meza, 2002 - see section 3.3). In that case, because information asymmetries give rise to an amount of lending above the socially optimal level (‘overlending’), the optimal policy is to subsidize non-entrepreneurs using the proceeds from a tax on borrowing or entrepreneurial profits (de Meza, 2002). In contrast, the provision of loan guarantees will encourage lower quality entrepreneurs to start businesses, resulting in a waste of taxpayers’ funds (see also section 3.3).

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<sup>50</sup> The rationale for intervention in Gale (1990b) is that the use of collateral is inefficient (there are costs associated with realising collateral in the event of default) so that a policy which reduces the need for collateral may increase efficiency.

And yet, in the real world, we observe LGS's apparently working effectively in getting finance additional loans to entrepreneurs who are, as a result, able to build better businesses with the credit provided (see evaluation evidence below). How can we rationalize this from a theoretical perspective? Again, we can offer an explanation with the aid of a slightly modified version of the Bester model. The modification involves assuming banks are risk averse and do not offer contracts without any collateral. This is not so fanciful a suggestion as following the GFC small firms found it harder to obtain loans without providing collateral (e.g., Fraser, 2014b). Accordingly consider a situation where the high risk/bad firm contract involves a strictly positive collateral requirement  $C_b > 0$  as depicted in the following diagram

INSERT FIGURE 14 HERE

In this version of the Bester model, the bank iso-profit curves never quite touch the  $y$ -axis due to risk aversion. The LGS contract,  $\Gamma_s$ , which has a high interest rate  $r_s$  but no collateral, is therefore finance additional. The LGS contract is also incentive compatible as the bad firm is worse off if they move from  $\Gamma_b$  to  $\Gamma_s$ . (It is also apparent that the good/low risk firm with collateral has no incentive to take either  $\Gamma_b$  or  $\Gamma_s$ .) However, the high interest rate on the LGS contract may induce moral hazard among ex ante good borrowers without collateral i.e., they may have to switch to bad/high risk projects to keep up with the loan repayments. This results in high default rates on the LGS contract.

In this version of events there are three key predictions:

1. LGS loans have higher interest rates than commercial loans.
2. High interest rates, combined with the absence of collateral, induce moral hazard resulting in higher default rates on LGS loans.
3. However, LGS loans are finance additional.

Empirical evidence in Graham (2004) relating to SFLG supports the first two predictions. In particular, rates on SFLG loans between 1994 and 2004 averaged between 50 and 100 basis points above the rates charged on mainstream SME loans (Graham, 2004). Also default rates on SFLG loans between 1985 and 2000 were typically 30-35%, ranging from 27% (1985) to 60% (1990), compared to default rates of around 4% on mainstream SME loans (Graham, 2004). At the same time, default rates on SFLG loans to sole traders and partnerships are significantly lower than SFLG loans to limited companies (Graham, 2004). This supports a moral hazard explanation for the high default rates as sole traders and partnerships have unlimited liability for the debts incurred by the business. In terms of the third prediction, Cowling (2010), using Berger and Udell's (1992) loan spread stickiness tests of credit rationing (discussed previously in section 4), provides empirical evidence relating to SFLG loans issued between 1993 and 1998 which suggests the scheme was successful in alleviating credit rationing. Further evidence regarding finance additionality is considered below in the context of evaluation.

A 2010 special issue of the *Journal of Financial Stability* ("Partial Credit Guarantees: Experiences and Lessons"), which includes Cowling's 2010 study of the SFLG, looks at a range of theoretical issues and empirical evidence relating to LGS's which resonates with the discussion here. In a theoretical analysis, which echoes the earlier work of Innes (1991), a model by Arping et al (2010) suggests that while government support may raise welfare it can also have a number of negative effects including:

the lowering of lending standards if entrepreneurs substitute public for private collateral; over-investment; and the undermining of bank monitoring incentives. Indeed, support schemes follow a pecking order with guarantees forming the first source of support but when entrepreneurs start substituting public for private collateral policy should switch from a guarantee to a co-funding arrangement.

Honohan (2010) also questions the social benefits of LGS's. Clear and precise goals, against which performance is regularly monitored, realistic pricing verified by consistent and transparent accounting, and attention to the incentive features of operational design, especially for the intermediaries, are among the prerequisites for such schemes to have a good chance of truly achieving improvements in social welfare. Also, Beck et al (2010) provide a review of 76 loan guarantee schemes in 46 countries and find that government has an important role to play in funding and management, but less so in risk assessment and recovery (which should be left to financial intermediaries).

Relating to operational design, in view of the high default rates on SFLG loans, Graham (2004) made several recommendations to reduce issues of moral hazard affecting entrepreneur and bank behaviour that have continued with the EFG. Key among these recommendations is that the scheme should operate on a portfolio rather than a case by case basis. That is the bank does not need to seek government approval to make an individual assisted loan and nor does the bank claim the guarantee on individual defaults. Instead, the bank bids for a tranche of state funds which it can lend to eligible small firms without requiring further government approval. Equally, the 75% government guarantee relates to the portfolio of LGS loans rather than individual loans (see above). In this manner, lending decisions and monitoring of the LGS portfolio are devolved to the bank to a much greater extent than before. This increases the bank's stake/involvement in their LGS loans and reduces issues of moral hazard affecting bank and entrepreneurial behaviour. Thereby due attention is paid to the incentive features of the scheme's operational design as highlighted in Honohan (2010). Additional operational design changes following the introduction of the EFG have further addressed the issue of moral hazard. In particular under the EFG:

- The borrower is responsible for repayment of 100% of the loan, not just the 25% outside the government guarantee (since the aim is to encourage more lending not to provide borrower with repayment insurance).
- To this end, lenders are entitled to take security, including personal guarantees (but they are prohibited from taking a charge over a principal private residence).
- In the case of default, lenders are required to follow their standard commercial recovery procedures, including the realisation of available security before a claim can be made against the guarantee.

These design features are consistent with the empirical evidence in Beck et al (2010) for schemes in countries across the world suggesting the government's main role should be in providing scheme funding whereas the financial intermediary should play the principal role in risk assessment and debt recovery. Evidence in Allinson et al (2013) suggests these changes to SFLG/EFG operational design may have helped to reduce default rates on assisted loans.

### 6.3 Evaluation of LGS – economic and finance additionality

### 6.3.1 An evaluation framework

Storey (1998, 2000) provides a systematic framework for assessing the methodological rigour of small business policy evaluations. He identifies six approaches to evaluation, beginning with the most simple and ending up with the most sophisticated: the 'Six Steps to Heaven'. Monitoring is viewed as Steps I-III, with the more sophisticated approaches being classified as 'evaluation' in Steps IV-VI. The six steps reflect an increasing level of sophistication in assessment procedures. Monitoring (steps I-III) merely documents activity under the program and/or reports participants' perceptions of the value of the program<sup>51</sup>. Evaluation (steps IV-VI)<sup>52</sup>, on the other hand, represents analytically rigorous attempts to determine the impact of policy:

"In short, the difference between monitoring and evaluation is that monitoring relies exclusively upon the views of the recipients of the policy. Evaluation however seeks, by some means, to contrast these with non-recipients, in order to present a 'counter-factual'. The difference between actual changes and the 'counter-factual' is viewed as the impact of the policy - or its 'additionality'." Storey (1998) p. 12

In essence, as the assessment procedure becomes more sophisticated the policy maker may have greater confidence that the true impact of the intervention, holding all other influences constant, is being measured. Focusing on the evaluation stages, Step IV estimates this impact by comparing the performance in firms assisted by the policy with those that have not been assisted. The inference is that any difference in the performance of the two groups can be attributed to the impact of the policy. The advantage of this approach is that, for the first time, a 'control' group of enterprises is identified.

The problem is that firms in receipt of assistance may not be typical of firms in the economy as a whole. Therefore, in Step V the researcher formally identifies a 'control group' of firms. The process of identifying a control group is called 'matching' which involves selecting treatment and control group firms so that they are closely matched on the basis of various factors known to influence the performance of firms e.g., age, sector, ownership and geography. However, there may also be unobserved differences between the treatment and control groups (e.g., entrepreneurial talent and motivation) which leads to problems of 'selection bias'.

Accordingly in Step VI the researcher uses statistical techniques (e.g., Heckman selection models or panel data methods, depending on the available data) to take into account non-random selection into the group of firms receiving assistance. In short, on attaining Step VI the researcher, in measuring the impact of the intervention, has made a rigorous attempt to control for both observed and unobserved differences between firms in receipt of assistance and those not in receipt of assistance.

### 6.3.2 Evaluations of SBA loan programs

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<sup>51</sup> The specific form of evaluation at each step are: Step I: take-up of schemes; Step II: recipients' opinions; and Step III: recipients' views of the difference made by the assistance.

<sup>52</sup> Step IV: Comparison of the performance of assisted with 'typical' firms; Step V: Comparison with 'match' firms; Step VI: taking account of selection bias.

The Urban Institute (UI) conducted a series of evaluations of SBA programs, which were published in 2008, to address the following questions (<http://www.urban.org/projects/sba/>):

1. Does SBA assistance help firms that receive it?
2. To what extent does SBA assistance serve its market?
3. Do SBA programs duplicate or overlap with other public sector programs?

Brash and Gallagher (2008) report the results of quantitative analyses of business outcomes (annual sales, number of employees, and survival) for firms receiving assistance through the 7(a) Loan Program, CDC/504 Loan Program, or SBIC Program between 1999 and 2001. The specific research questions in this study were: (1) what happens to sales, employment, and survival before and after firms receive financing from the SBA?; and (2) what explains the changes observed in sales or employment after firms receive financing?. The data combined information from SBA administrative files with DandB data to enable multivariate analyses. The analyses involved samples of 1,500 firms for each program, which were tracked over a period of one year before financing and three years after financing.

In respect of the first research question, the results of a summary analysis of the data indicate that from before the receipt of assistance and in each year after assistance, average sales and employment increased over time for firms in 7(a), 504, and SBIC programs. However, sales and employment tended to increase more before assistance was received than after it was received (suggesting assistance did not increase sales/employment). Analysis of survival rates indicate a 76% survival rate one year after assistance and a 62% survival rate after six years (for the 7(a) loan program) and, for the same periods, 57% and 34% survival rates respectively under the SBIC program. A serious problem with this analysis is the absence of any counterfactual – what would sales/employment/survival have been in the absence of assistance? Therefore, in terms of the evaluation methodology discussed previously this study at best represents ‘monitoring’ of SBA programs and says little about the true impact of SBA assistance on firm outcomes.

The UI study also employed multivariate regression analysis techniques to analyze the firm<sup>53</sup>, market<sup>54</sup> and financing<sup>55</sup> determinants of sales and employment growth between the year of financing and three years after financing. This analysis found that firm age, industry, and region of the country were significantly related to sales and employment growth for all three programs. However, the term of the loan, interest rate and amount of SBA financing were not significantly associated with sales and employment growth. Again, it is not possible for policy makers to draw any inferences from these results about the determinants of growth for small businesses in general given problems of sample selection bias (recall the sample relates only to assisted firms).

Regarding the extent to which SBA assistance serves its market, based on interviews with small business loan managers at 23 banks (7 large national lenders and 16 community banks), the credit elsewhere analysis (Temkin and Theodos, 2008a) concluded that: lenders regard the SBA’s programs

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<sup>53</sup> Including average sales or employment growth in the year before financing, minority ownership, female ownership, veteran ownership, start-up status, age of firm, credit score, and industry.

<sup>54</sup> Including industry, region, and local unemployment rate.

<sup>55</sup> Including financing amount, interest rate, and maturity term.

as serving borrowers who do not meet the lenders' standard lending criteria; and there is little overlap between SBA and conventional lending. This seems to provide a *qualitative* indication that SBA loan programs are finance additional and are not competing with/crowding out market lending.

UI also researched the extent to which SBA is assisting firms facing 'competitive opportunity gaps' comprising traditionally disadvantaged groups such as female and ethnic minority businesses, and start-ups) (Temkin and Theodos, 2008b; see also US Senate Committee, 2014). This research, which involves a comparative summary analysis between SBA assisted and non-assisted firms, seems to indicate that SBA loans are helping firms facing competitive opportunity gaps obtain finance they might not be able to get from conventional sources. In particular, ethnic minority owned businesses have a 9.9% chance of using a conventional loan whereas the chance of obtaining an SBA assisted (7(a) and 504 program) loan is 27%. In addition, women owned businesses have a 16% probability of using a conventional loan versus a 21.3% probability of using an assisted loan (Temkin and Theodos, 2008b). And 12.2% of conventional loans go to start-ups versus 24.4% of SBA assisted loans. However, at best this analysis provides Step IV evidence of finance additionality (since no attempt is made to control for observed and unobserved differences between the assisted and non-assisted firms). In particular, further analysis in Temkin and Theodos (2008b) suggests that businesses in receipt of conventional loans are larger (and hence, in this respect, more likely to obtain loans) than assisted firms. This suggests that the actual finance additionality of SBA loan programs (taking into account differences in firm size) may be even higher than implied by the results in the above table.

Regarding the issue of program duplication, Brash (2008) found that of the four SBA programs studied (7(a), 504, Microloan and SBIC), the 7(a) program has the greatest amount of potential duplication at federal, state, and local levels. At all levels of government, there is less duplication of the SBIC program and even less of the MicroLoan and 504 programs. Brash (2008) also looked at whether 7(a) funds were being used for real estate purposes (which is the purpose of the 504 program). In this respect Brash (2008) found that almost half of the loan volume to firms receiving only 7(a) loans were used for real estate financing. In short, some duplication between programs seems to exist (suggesting some inefficiency and possibly making financing decisions unnecessarily complicated by presenting entrepreneurs with a plethora of assistance choices).

In summary, much of the UI 'evaluations' of SBA programs amount to little more than monitoring of assisted firms. Where the analysis does involve some comparisons between assisted and non-assisted firms, there are only limited attempts at controlling for observed differences between the two groups of firms and no implementation of econometric techniques that would control for unobserved differences. In other words, none of the UI evaluations get beyond Step IV in Storey's (1998, 2000) evaluation framework.

In contrast to the UI studies, a study by Brown and Earle (2012), conducted by the Center for Economic Studies, offers a much more rigorous evaluation of the impact of the 7(a) and 504 programs on employment. This study uses a large panel data-set relating to both assisted and non-assisted firms in the period 1976-2010. The methodology uses propensity score matching techniques<sup>56</sup> (to control for observed differences between assisted and non-assisted firms) and

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<sup>56</sup> Propensity score matching techniques facilitates matching treatment/control group firms using several matching variables simultaneously.

difference in difference panel data techniques<sup>57</sup> (to control for unobserved, time invariant differences between assisted and non-assisted firms). In this respect, the Brown and Earle study corresponds to a Step VI evaluation ('heaven'). The results indicate a positive average effect of assistance on employment of about 25 percent or 3 jobs at the mean. Also for each extra million dollars of assistance received by assisted firms there is an increase of over 5 jobs. Based on \$30bn of SBA supported lending in 2011, the estimates correspond to around 200,000 jobs created (which, though large, is less than the figure of over 500,000 reported by SBA). Additional analysis also suggests these findings are not driven by differential demand conditions across firms and that displacement effects<sup>58</sup> are small.

### 6.3.3 Evaluation of UK LGS's

Cowling and Siepel (2013) examine whether the SFLG represents value for money for UK taxpayers. In particular, their study addresses the questions: "do SFLG backed firms perform better or worse than otherwise similar firms?"; and "given default rates and observed performance of SFLG backed firms, does the SFLG scheme represent value-for-money or a waste of scarce resources?" They construct a sample of 1,488 SFLG and non-SFLG assisted firms matched on age, sector and size for the period 2006 to 2008. The Cowling and Siepel analysis therefore attains a Storey Step V level of evaluation. Regarding the first research question the study finds that, other things equal, the median employment growth of SFLG and non-SFLG firms between 2006 and 2008 is 0.42% and -0.13% respectively. Similar sales growth comparisons show median growth of 0.31% and 0.0% for SFLG and non-SFLG firms respectively. And SFLG firms have a higher exporting propensity than non-SFLG firms (23% versus 16%). Overall, this supports a positive response to their first research question. Regarding the second research question, Cowling and Siepel find that, excluding firms for which SFLG was not finance additional<sup>59</sup> and cases of market displacement, that SFLG generated between 3550 and 6340 extra jobs during 2006 and 2008. The similarly estimated impact on sales growth is between £74,812,000 and £149,624,800 extra sales from SFLG assistance. Set against these benefits, the costs of default and scheme administration are estimated at £35,027,400. Overall, Cowling and Siepel estimate for every £1 spent on SFLG there was a return to the economy of £1.05 in terms of additional economic output (GVA), suggesting SFLG represents value for money.

Allinson et al (2013) conduct an evaluation of the EFG using a sample of 500 EFG assisted and a matched sample of 899 unassisted firms for the period 2009 to 2012. The study also uses regression models to estimate the performance benefits (impacts on employment and sales growth) of EFG assistance. This study therefore represents another Storey Step V level of evaluation. The study makes positive findings regarding the economic and financial additionality of EFG assistance. In particular, taking account of deadweight and displacement effects, the estimated benefits to the economy over a 2-3 year time duration from the 6,700 EFG participants drawing down an EFG loan in 2009 are 6,500 additional jobs created and 12,375 additional jobs saved (Allinson et al, 2013). The

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<sup>57</sup> The 'difference in differences' treatment effect measures the difference, in the before and after treatment difference in outcomes, between the treatment and control groups. In the context of panel data, differencing the data removes the effects of unobserved time-invariant differences between the treatment and control groups.

<sup>58</sup> Displacement effects arise where assistance leads to job losses amongst non-assisted (competitor) firms.

<sup>59</sup> Around 79% of SFLG recipients reported that the loan did not replicate alternative sources of funding (i.e., it was 'finance additional').



evaluation also estimates the net economic benefit from the scheme (measured in terms of GVA) to be £1.1bn. Regarding finance additionality, 83% of EFG participants indicated they would not have been able to obtain a loan without EFG (compared to 70-76% finance additionality under the earlier SFLG). In addition, participants reported that EFG made up 91% of the total finance package compared with 48% for SFLG users (Allinson et al, 2013). These results point to the increased reliance of small firms on assisted loans following the GFC.

#### 6.4 Effectiveness of LGS's in other countries

In relation to the Canadian Small Business Financing program (CSBF), Riding et al (2007), based on a loan denial model estimated for businesses that were not eligible for CSBF assistance, estimate that 74.8% of assisted firms would have been turned down for conventional loans. This indicates CSBF has a high level of finance additionality. In terms of economic additionality, CSBF led to an additional 22,000 full-time jobs in Canada per annum (about 2.2 extra jobs per annum per assisted firm) each year.

Based on the opinions of 15 assisted firms on a Malaysian scheme, Boocock and Sharif (2005) provide an estimate of 37% finance additionality (but this only represents a Storey Step III evaluation corresponding to recipients' views of the difference made by assistance). Saldana (2003) estimated that half of the loans provided on a LGS in the Philippines are finance additional (using a less than ideal measure based on the number of loans for which the collateral was less than the total loan value).

Using a natural experiment allowing identification of the impact of subsidized export credit in Pakistan (the removal of the cotton yarn sector from eligibility), Zia (2008) found these no longer eligible firms survived with output and exports almost unaffected (suggesting little or no additionality from the scheme). Larraín and Quiroz (2006) estimated that microfirms whose bank used the FOGAPE scheme in Chile had a 14 per cent higher probability of getting a loan (suggesting finance additionality). However, there is also evidence of sizable displacement in the FOGAPE scheme with the same firms receiving a large and increasing share of successive guarantees (Galetovic and Sanhueza, 2006).

Lelarge et al. (2010) were able to control for selection bias in estimating the effects of the French Loan Guarantee Program SOFARIS by exploiting a 1995 change in the eligibility rules. Providing evidence of additionality, Lelarge et al. (2010) found that firms newly eligible for SOFARIS raised more credit (and paid lower interest rates) than other firms, although the scheme had no impact on the entry of new firms.

Previously discussed evidence in relation to the \$300 billion Japanese ECG scheme introduced during the GFC (section 2.5.1), indicates that while the scheme helped increase credit availability for SME's in Japan during the crisis, this increase in credit availability was partially offset by a decrease in non-ECG loans in cases where the main bank provided the ECG loan (Ono and Uesugi, 2014). Simply put, the scheme seems to have had limited finance additionality. There is also no evidence of economic additionality, with employment in ECG assisted firms decreasing more than in SME's that did not receive assistance with no compensating increase in profitability among assisted firms (Ono and Uesugi, 2014).

Udell (2015) identifies three main areas where more research is required into LGS's. First, more research is required into best practice in the design of LGS and the circumstances in which they work best. Second, more research is needed to understand how effective LGS's are in an acute financial crisis such as Allinson et al's (2013) study relating to the GFC. Third, extending the methodological issues highlighted in Storey (1998, 2000), we need improved methods for measuring the net efficiency gains from LGS's including measures of both short-term and longer term benefits.

## 6.5 Competition policy

The relationship between bank competition and SME credit availability is a vital policy issue due to increased consolidation in global banking markets (Carbo-Valverde et al, 2009). In this respect, as previously discussed (in section 2.3.2), financial deregulation in the US since the 1980s has led to a wave of mergers and acquisitions, reducing the number of commercial banks by one-half and increasing the size of the largest banks tenfold (DeYoung, 2014). Consolidation in the US banking industry is likely to continue in the future (DeYoung, 2014). As a result of restructuring following the GFC, in the period 2007-2014, the number of banks fell in the EU-15 by 958 (13.9%) overall, and fell in each EU-15 country except Ireland (Fernandez de Guevara and Maudos, 2017)<sup>60</sup>. France experienced the biggest fall in the number of banks (38.9%) followed by Denmark (37%), Spain (36.7%), Greece (36.1%) and the Netherlands (36.1%) (Fernandez de Guevara and Maudos, 2017). And, while assessing banking competition in Japan is difficult due to the complex structure of its banking system, strict banking regulation and segmentation may also limit competition in the Japanese SME banking market (Uchida and Udell, 2014) (see also section 2.6.2).

Should policy makers be concerned about consolidation in banking markets? To a large degree, the answer hinges on whether banking competition has a positive or negative effect on SME credit availability. However, economic theory provides an ambiguous answer supplying two conflicting arguments, the market power and information hypotheses, about the potential effects of banking concentration on the supply of credit to SME's (e.g., Berger et al, 2004; Carbo-Valverde et al, 2009; Rosen and Udell, 2017; Delis et al, 2017):

*Structure-Conduct-Performance ('market-power hypothesis')*. The standard industrial organization argument is that market power (the ability to set price above marginal cost) will result in a lower supply of credit at a higher cost. This is sometimes referred to as the Structure-Conduct-Performance (SCP) hypothesis in the context of credit market competition (Berger et al, 2004). Relatedly, in the 'competition stability' view, greater market power in the credit market may result in higher bank risk, as the higher interest rates charged to borrowers exacerbates issues of adverse selection and moral hazard (Boyd and De Nicolo, 2005; Berger et al, 2017). SCP typically involves testing market power using the Herfindahl-Hirschman Index (HHI) or n-firm concentration ratio (CRn) as an exogenous indicator of market power or an inverse indicator of the intensity of competition (Berger et al, 2004). However, the approach suffers from endogeneity as it is unclear whether market structure determines bank behaviour (the SCP hypothesis) or is determined by performance (the efficient structure hypothesis) (Berger et al, 2004; Coccoresse, 2017). In addition, the prediction

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<sup>60</sup> The overall reduction in the number of banks in the EU-15 is by 19.5% if Ireland, which changed the criteria defining credit institutions, is excluded from this figure.

of a positive relationship between concentration and profits is not consistent across all models of oligopoly (Carbo-Valverde et al, 2009).

*Information asymmetries ('information hypothesis').* In contrast to SCP, theoretical arguments that emphasize the importance of information asymmetries suggest that banks have more incentive to invest in relationships with entrepreneurs when competition is low (because they can capture future surpluses) leading to an improved credit supply (Petersen and Rajan, 1995). Increased market power may also improve screening efficiency leading to lower borrowing costs (Marquez, 2002). Relatedly, in the 'competition fragility' view, greater competition erodes banks' monopoly rents from relationship lending and encourages increased risk taking by banks to increase expected returns (Jiménez et al., 2007; Berger et al, 2017). However, other theoretical arguments based on information asymmetries suggest that competition may actually be conducive to relationship lending (Boot and Thakor, 2000) (see also the discussion in section 3.2.3)

The dispute between the market power and information hypotheses would seem resolvable by empirical analysis and yet empirical studies have come up with findings supporting both theories. Early studies looking at bank concentration in the US found that, supporting SCP, banks in more concentrated local markets charge SME higher lending rates and pay lower deposit rates (Berger and Hannan, 1989; Hannan, 1991). Other studies supporting the market power hypothesis include: Black and Strahan (2002) (the rate of new incorporations in the US increases following deregulation of branching restriction); Cetorelli (2003) (bank competition in the US accelerates the expansion of manufacturing start-ups and helps them to thrive while young); Bonnacorsi di Patti and Gobbi (2007) (consolidation reduces credit availability to Italian corporate borrowers).

In contrast, Petersen and Rajan (1995) provide empirical support for their information hypothesis using US SSBF 1987 data. In particular, using local market concentration as a proxy for market power, they find that young firms operating in areas with high bank concentration are more likely to obtain capital from banks, and with lower lending rates, than in less concentrated markets. In addition, consistent with the information hypothesis, Bonaccorsi di Patti and Dell'Ariccia (2004) find evidence from a panel of Italian provinces and industrial sectors that the rate of new firm formation in sectors characterised by higher informational asymmetries is positively related to bank concentration.

Other studies have provided a more nuanced perspective on the issue. Berger et al (1998) analyse a sample of over 6000 US bank mergers and acquisitions in the period 1980–96 to test whether consolidation of the US banking industry (measured using HHI and banks' market shares) has reduced credit supply to SME's. They find that mergers of small and medium-sized banks are associated with an increase in lending to SME's, whereas larger bank mergers are associated with a decrease in SME lending. This is indicative of a generally well-functioning dynamic banking market, where consolidation leads to the reduction of some relationship lending to SME's (by banks which no longer have a comparative advantage in making these loans), but with local lenders filling the resulting funding gaps.

In a comprehensive study of 74 countries Beck et al (2004) find that SME access to finance improves with institutional development, a larger share of foreign banks, and a smaller share of state-owned banks, and worsens in the presence of bank regulations that limit competition (e.g., restrictions on

entry and banking activities). However, higher bank concentration increases obstacles to accessing finance only in countries with low economic and institutional development.

Carbó-Valverde et al. (2009), using a sample of 30,897 Spanish SME's for the period 1994-2002, show that the relationship between bank market power and SME financing constraints depends on the specific market power measure used to test the relationship. In particular, whereas the use of HHI supports the information hypothesis, the use of the Lerner index (a structural competition indicator) supports the market power hypothesis. However, they also find that the Lerner index is a considerably more accurate measure of competition (tilting the evidence in favour of the market power hypothesis).

Delis et al (2017) analyze the effects of market power on credit supply using bank level data from 131 countries over the period 1997–2010. If not resolving the market power/information hypothesis debate, they show that both hypotheses may be correct to some degree. In particular, Delis et al (2017) finds that there is a U-shaped relationship between bank market power (proxied by the Lerner index) and loan growth, suggesting that both low and high levels of market power may be more beneficial for credit availability (with intermediate levels of market power less beneficial). Specifically, the market power hypothesis seems to hold for values of the Lerner index below a threshold of 0.308 and the information hypothesis holds above this threshold.

A key issue that needs to be resolved in this literature is the issue of controlling for lending technologies. In particular, the information hypothesis relates specifically to relationship lending whereas SME lending may involve many different lending technologies (see section 3.2). However identifying relationship loans is problematic with available data-sets (as discussed previously, but an issue which crops up again in this context):

“The bottom line in this literature is that, to one degree or another, virtually every paper on competition and SME finance at some level fails to provide a clear test of the relationship lending view [information hypothesis] because data have not been rich enough to separate out relationship loans.” (Rosen and Udell, 2017, p 336)

The UK provides an interesting case study on competition policy in SME banking markets and highlights the tension between the market power and information hypotheses in practice. In overview, policy makers in the UK have had persistent concerns about competition in SME credit markets (e.g., Competition Commission, 2002; Independent Commission on Banking, 2011). The main perceived problems are that the Big 4 banks (RBS Group, Lloyds Banking Group, Barclays and HSBC) account for 80% of the market for the supply of banking services to SME's and bank switching rates are low (historically, around 2% per annum). The implication is that the Big 4 banks have high market power leading to concerns about both the cost and availability of credit to entrepreneurs (consistent with SCP). Indeed, these concerns have led policy makers to introduce behavioral remedies, principally to make it easier for entrepreneurs to switch banks, and structural remedies designed to break the stranglehold of the big banks on the market (see e.g., Competition Commission, 2002; Independent Commission on Banking, 2011). The latter policies include measures promoting entry and enforced divestment (e.g., the break-up of Lloyds-TSB in 2013).

Looking at the issues and policy measures more closely, the report by Cruickshank (2000) provided a significant and wide ranging investigation into UK banking competition which culminated with a

formal investigation and report by the Competition Commission (the UK competition authority at the time) in 2002 (Competition Commission, 2002). Cruickshank (2000) raised fresh concerns about a lack of competition in the supply of banking services (comprising business current accounts, overdrafts, short-term deposit accounts and term loans) in the UK and its impact on SME's.

The key issues raised in this report were that the supply of banking services is highly concentrated in 'Big 4' banks. In addition, there was evidence of price discrimination, in particular free banking was provided for start-ups and businesses, which switched their account to another bank, but not for other customers. Further, there was evidence of price fixing/collusion between banks with little variation in pricing across banks. Relatedly a lack of transparency in banks' pricing/tariff structures hindered customers from making price comparisons.

On the demand-side, Cruickshank (2000) also found a general reluctance of businesses to switch banks (with only 3-4% of SME's switching per annum) possibly due to the lack of price variation and transparency making switching not worthwhile. Also, banks were found to be 'bundling' financial products so that opening a current account with the bank was pre-requisite for obtaining a term loan increasing the concentration of the supply of banking services in a single bank. Further, competition from new entrants into the market was limited due to high entry barriers caused by informational and reputational advantages of incumbent banks and the costs of establishing a branch network. As a consequence of a lack of competition, Cruickshank determined that banks were making excess profits from bank charges relating to SME accounts (if not from fees/rates on loans).

The issues raised in Cruickshank report were referred to the Competition Commission in March 2000 for formal investigation. The Competition Commission made several recommendations to promote competition in the market in both the long run and short run. In particular, it made a number of long run 'behavioral remedies' to reduce entry barriers. This included measures to promote fast and error free switching. For example, banks would be required to facilitate switches of accounts between banks within 4-5 days where there were no legal/technical impediments (e.g., transfer of loan security/collateral). And, to reduce information monopolies, banks were required to use 'portable credit histories' so that information relating to a borrower could be shared between banks. Banks were also no longer allowed to bundle services (e.g., loans and current accounts). To reduce banks' excess profits in the short run, the Competition Commission also introduced account charge remedies, which required the Big 4 banks to pay interest on SME current accounts at base rate minus 2.5 percentage points (this would have reduced banks' excess profits by £525m during 1998-2000). Alternatively, Big 4 banks had to offer SME accounts free of money transmission charges.

However, the Competition Commission's recommendations were met with academic criticism. In particular, Ashton and Keasey (2005) was critical of the neo-classical paradigm (perfect competition/SCP) which the Competition Commission applied to the banking sector to reach its recommendations. This, they argued, ignored the reality of information asymmetries and market based solutions to the problem. Principally, relationship lending is an important technology in helping SME's to access finance. While stable and monogamous relationships appear uncompetitive through the prism of perfect competition/SCP, relationship lending requires long and concentrated relationships to generate information flows. In this respect, much of the information used in lending decisions is generated from a current account. Accordingly, bank charges reflect the bank's costs of

information production (rather than uncompetitive cross-subsidies). These charges also act as informal insurance allowing the bank to 'lean against the wind' and continue to lend in periods of instability. The joint supply of bank accounts and loans is also important because of the cash-flow information derived from the account (which, for example, can be used in behavioral scoring to facilitate lending decisions – see section 3).

Simply put, and highlighting the market power versus information hypothesis debate, Ashton and Keasey (2005) argued that the Competition Commission used the wrong economic model (i.e., perfect competition) against which to judge the supply of banking services. Accordingly, Ashton and Keasey believed the Competition Commission's recommendations ran the risk of harming not promoting SME financing conditions: "To summarize, the removal of the foundations of relationship banking would be expected to reduce the quantity of loans forwarded to young and risky SME's." [Ashton and Keasey, 2005, p. 483].

In the aftermath of the GFC, Ratnovski (2013) proposes a more central role for banking competition policy which achieves an intermediate level of competition and ensures: i) incentives for excessive risk-taking are removed; ii) banks are not allowed to become too big to fail; iii) contestable markets (with the entry of foreign banks encouraged); iv) regulation of the range of activities banks can undertake (consistent with the proposals of the Liikanen report in Europe, the Volcker rule in the US and the Vickers report in the UK; and v) there is local competition for each banking product.

However, again reflecting the tension between the market power/competition stability and information/competition fragility hypotheses, policy makers in the post crisis world face a significant challenge achieving just the right degree of banking competition:

"The 'art' of competition policy is to strike this difficult balance in which a degree of competition is forgone in order to achieve greater financial stability. Only time will tell whether the roadmap many European countries have followed to put the banking crisis behind them has achieved this balance." (Fernandez de Guevara and Maudos, 2017), p 136

## 6.6 State owned investment banks

A further policy issue relates to how assistance is administered. In this respect, many countries have a state owned bank dedicated to delivering financial assistance and support to small firms. This approach potentially leads to greater coherence and efficiency in the delivery of policy (see e.g., Bhaumik et al, 2011). This approach is now followed in the UK which established a British Business Bank in 2013, modeled on the lines of the German state-owned KfW, and also drawing lessons from small firms' support agencies in other countries, including the SBA in the US and ALMI Företagspartner in Sweden. As discussed earlier in this section, the key objective of the British Business Bank is to make finance markets for small firms work better (leading to increased economic activity). In terms of entrepreneurial credit, this includes supporting the EFG and increasing competition against the banks by promoting a more diverse range of credit products including peer-to-peer lending (see below).

Looking at state owned banks generally, while there is no evidence that they promote economic growth (La Porta et al, 2002; Körner and Schnabel, 2010), perhaps because the performance of these banks is sensitive to political influence (Sapienza, 2004; Micco et al, 2007), they do help to smooth

lending over the business cycle (Micco and Panizza, 2006; Bhaumik and Piesse, 2008). In addition, the credit channel of transmission of monetary policy works much better when banks are state owned (Bhaumik et al, 2011). Further, the impact of state owned banks on economic development appears to be higher in countries with well-developed financial and political institutions (indicative of well-functioning control mechanisms on decision-making by politicians/financiers: Körner and Schnabel, 2010). In these countries, the agency costs associated with state owned banks are likely to be lower so that they are less open to interference from politicians.

## 6.7 Summary

Government Intervention in entrepreneurial credit markets is typically in the form of a LGS in which the state underwrites a certain percentage, usually around 70-80% (the state guarantee), of the credit risk on an individual or portfolio of assisted loans. The objectives of LGS's should be to fill actual rather than perceived funding gaps and boost firm and economic performance to justify the cost of intervention to taxpayers (Cowling and Siepel, 2013). Simply put, the LGS should be both finance and economic additional. In this respect, the target group for assistance is typically entrepreneurs with viable projects but insufficient collateral to receive credit on standard commercial terms.

Yet theoretical models of credit market intervention provide at best qualified support that LGS's are able to achieve additionality. A key problem is that LGS's create agency issues due to the presence of the state guarantee. This may create an incentive for entrepreneurs to over borrow with banks complicit in lowering their lending standards and monitoring as they share the downside with the state (Innes, 1991; Arping et al, 2010). In this context it is important for policy makers to pay close attention to the incentive features of the scheme's operational design (Honohan, 2010) to mitigate agency issues (see also Graham, 2005).

In addition, some models raise the question of whether a LGS can improve on the market outcome (involving a separating equilibrium with good borrowers posting collateral) and increase efficiency (by reducing the amount of inefficient collateral required from good borrowers). Indeed, the introduction of a LGS may remove the incentive compatibility of market loan contracts, disrupting the separating equilibrium achieved by the market, and result in more not less credit rationing (Gale, 1990b). Alternatively, if not making the situation worse for entrepreneurs subject to credit rationing, the introduction of a LGS may crowd out existing market credit and have little justification on grounds of finance additionality (Gale, 1990a). And, if information asymmetries give rise to favorable selection and too much lending in entrepreneurial credit markets, then a LGS will simply exacerbate the problem by supplying credit to borrowers who should, instead, be discouraged from entrepreneurship (de Meza, 2002).

However, LGS's may be additional if lenders are very risk averse and are therefore unwilling to lend without the provision of collateral – a situation that pertained following the GFC. In that case, by providing a contract for good firms without collateral, the LGS may provide a source of credit not elsewhere provided by the market. Indeed, following the GFC many governments significantly ramped up their assisted lending to small firms, which seems *prima facie* justified by increased lender risk aversion.

Providing empirical evidence of program additionality raises methodological issues about measuring firm performance in the presence and absence of assistance (i.e., the counterfactual). Yet many evaluations of LGS's rely mainly on recipients' subjective views of the impact of assistance on the firm and/or summary comparative analyses between assisted and non-assisted firms (reaching only Step III or IV of the six steps to evaluation heaven in Storey, 1998, 2000). Therefore, lacking a rigorously identified counterfactual, these studies provide little robust evidence of program additionality. However, some studies using large samples of assisted firms, along with large samples of unassisted 'control group' firms matched with assisted firms on observable characteristics (a Step V evaluation in Storey's classification scheme), allow a more robust identification of program impacts. In this respect, Step V evaluations of the SFLG (Cowling and Siepel, 2013) and EFG (Allinson et al, 2013) provide robust evidence that assistance raised firm and UK economic performance and provided a return on taxpayers' money. Going yet further, and controlling for both observed and unobserved differences between assisted and unassisted firms (a Step VI evaluation in Storey's scheme which controls for 'selection bias'), Brown and Earle (2012) find that SBA loan assistance helped create 200,000 jobs in 2011 in the US.

*Overall, more research is required: into best practice in the design of LGS and the circumstances in which they work best; to understand how effective LGS's are in an acute financial crisis; and to develop improved methods for measuring the net efficiency gains from LGS's including both short term and long term benefits (Udell, 2015)*

On the issue of competition policy there exists a tension between standard industrial organization arguments suggesting that market power will raise the cost and restrict the supply of entrepreneurial credit, and the argument that, with imperfect credit markets, market power raises incentives to invest in banking relationships which reduces information asymmetries and improves credit supply (Petersen and Rajan, 1995). This tension has, for example, repeatedly surfaced in the context of the highly concentrated UK SME banking market, with policy makers' attempts to increase competition (Competition Commission, 2002) being met with the criticism that such moves may adversely impact on the supply of entrepreneurial credit (Ashton and Keasey, 2005).

*In respect of future research into banking competition, there is a need for data-sets that are better able to identify relationship loans in order to provide a purer test of the information hypothesis (see also section 3.5). In addition, understanding how bank competition, and its relationship with SME credit availability, continues to evolve post GFC is an issue of ongoing importance for both academics and policy makers.*

It was noted in the discussion of SBA program evaluation that women and ethnic minority owned businesses have a higher likelihood of using an SBA assisted loan than a mainstream loan. A superficial reading of this result is that women and minority owned businesses are discriminated against by credit providers and therefore have a greater reliance on assisted credit than male and non-minority owned businesses. However, the issues underlying apparent gender/minority discrimination in the credit market are complex and therefore merit a separate discussion.

## **7. Is there gender and ethnic minority discrimination in entrepreneurial credit markets?**

The basic question is why would a finance provider discriminate against a borrower on grounds of gender or ethnic minority status? Neo-classical economic theory would argue that gender/minority



discrimination should not occur in the credit market. Banks which discriminate between customers on non-economic criteria would lose profits and go out of business. However, the supply of banking services does not conform to the neo-classical paradigm so in principle 'irrational' lending behaviour is possible.

In particular, economic theory posits two explanations for discrimination:

*Taste discrimination* (Becker, 1971): In this case, all gender/minority groups, controlling for differences in other entrepreneur and firm characteristics, have the same repayment probability distribution. However, the bank sets a higher repayment threshold for women/minority owned firms because of an irrational dislike (by its loan officers) for female/minority entrepreneurs ('prejudice'). The consequence of setting a higher threshold for women/minority owned firms, given they have the same risk distribution as male/non-minority owned firms, is that the bank will lose out on profitable lending opportunities. Loan officers' prejudice therefore costs the bank lower profits. A potential market solution to taste discrimination is competition, which will drive inefficient banks (which fail to monitor its loan officers to ensure they use only commercially relevant information in their lending decisions) from the market.

*Statistical discrimination* (e.g., Blanchflower et al, 2003): In this case, there are differences in the ceteris paribus repayment probability distributions across gender/minority groups. The bank may therefore set a higher repayment threshold for women/minority owned firms, if they have a lower average repayment probability, with the rational aim of equalizing average repayment probabilities across gender/minority groups. However, as a result, some women/minority owned firms, with the same repayment probability as male/non-minority owned firms, will be denied credit as a result of the higher average risk of their group. These women/minority owned firms will feel prejudicially discriminated against by the bank compared to otherwise similar male/non-minority owned firms. Statistical discrimination also raises the question of why might women/minority owned firms have lower ceteris paribus repayment probabilities than male/non-minority owned firms if indeed there are such differences.

This last point raises the problem that statistical discrimination may be no more than a respectable cloak for prejudice. For example, historically poor access to finance, due to prejudice, might reduce the average repayment probabilities among groups subjected to prejudice, leading to statistical discrimination (even when society no longer tolerates prejudice). In that case, seemingly rational grounds for discrimination in the present would disguise a legacy of prejudice in the past.

Recognising this problem, anti-discrimination legislation makes no distinction between taste and statistical discrimination and both are therefore illegal. In the context of credit markets, this means that any difference in loan denial rates or borrowing costs across gender/minority groups, not attributable to characteristics other than gender/ethnicity, would contravene anti-discrimination legislation. Accordingly a significant adverse effect of gender/minority status on financing conditions, controlling for firm and entrepreneur characteristics, is usually taken as sufficient evidence of discrimination (e.g., Coleman and Robb, 2009; Blanchflower et al, 2003).

Potential gender/minority discrimination in credit markets is mediated by the lending technologies used by banks. For this reason, credit and behavioral scoring models do not use information on the gender, ethnicity or religion of the applicant as this would represent statistical discrimination in contravention of anti-discrimination legislation. Therefore, in principle, businesses with the same

financial ratios, credit histories and account performance would receive the same score, and hence have the same access to finance and pay the same interest rates, regardless of the owner's gender, ethnicity, or religion. However, statistical discrimination on ethnicity could enter indirectly into scoring systems insofar as postcodes, which may be used in credit/behavioral scoring models, are strongly associated with ethnicity (e.g., Holmes and Horvitz, 1994).

Equally, credit/behavioral scoring is often used as a complement to relationship lending which relies on the development of close ties between a loan officer and the entrepreneur. In this respect, the loan officer is acting as the bank's agent in lending decisions which creates an agency problem between the bank (principal) and the loan officer (Berger and Udell, 2002). Therefore, in principle there is scope for the loan officer's credit assessment to be influenced by the gender/ethnicity of the business owner even if this is contrary to anti-discrimination laws/policies and the profit maximising objectives of the bank. Accordingly, the 'human element' underpinning relationship lending may potentially increase the chances of gender/minority discrimination compared with cases where lending decisions involve credit/behavioral scoring (Cavalluzzo et al, 2002; Blanchflower et al, 2003).

Also, to the extent that women and minority entrepreneurs have lower personal wealth they may have less collateral to offer on loans (e.g., Riding and Swift, 1990; Fraser, 2009b). Again, this may indirectly lead to poorer credit conditions among women/minority owned firms although the underlying reason is low wealth. This may also help explain the higher take-up of assisted loans by women and minority entrepreneurs noted in the previous section (e.g., Temkin and Theodos, 2008b).

### 7.1 Gender differences in entrepreneurial borrowing

Early robust statistical analyses present mixed findings of gender differences in entrepreneurial financing conditions. While Carter and Rosa (1998) find that male entrepreneurs tend to start-up with less overall capital, Haines et al (1999) find no gender differences in the terms of borrowing.

Carter and Rosa (1998) make comparisons of the financing conditions of women owned and male owned UK businesses controlling for a limited number of non-gender related factors including sector. The paper is highly cited because it is among the first quantitative studies in the field of gender differences in entrepreneurial finance to use a large sample of male and female owned businesses (300 of each type of business) and to implement robust statistical methods to make gender comparisons. Carter and Rosa (1998) identify four areas in the financing process that pose particular difficulties for women:

1. Women may be disadvantaged in their ability to raise start-up finance.
2. Women may lack the personal wealth and track record required for external financing.
3. Women's inability to penetrate informal financial networks may result in finance being less available for their ongoing businesses.
4. Female entrepreneurs' relationships with banks may suffer from discrimination and gender stereotyping.

Carter and Rosa find that women typically use less start-up capital than men (£2,000 versus £6,000) and this pattern holds across different sectors and ownership structures. In addition, the amount of start-up capital is positively related to current performance (measured by capital assets, sales, and employment) so that shortfalls in initial capital may disadvantage the development of women-owned firms. However, they find no statistically significant gender differences in the use of guarantees which does not support the view that women are less likely to be able to offer collateral.

Carter and Rosa also find that women-owned ongoing businesses are less likely across sectors to use bank loans and overdraft facilities and they are also less likely to access trade credit which speaks to issues of difficulties in penetrating informal financial networks. However, interestingly, women owned businesses have lower credit denial rates (relating to overdraft facilities and term loans) than male owned businesses. In addition, Carter and Rosa find no gender differences in how entrepreneurs perceive their banking relationships suggesting, on this evidence, that discrimination/gender stereotyping is not a significant issue.

However, even if there are gender difference in financing conditions, and the evidence here is mixed (e.g., Haines et al, 1999), there are competing explanations for these differences. In particular, while gender differences in financing conditions may be due to gender discrimination by loan officers, they may equally arise from demand side debt/risk aversion, or from structural differences between male-owned and female-owned businesses (Carter et al, 2007). In this respect, while women entrepreneurs may in some cases perceive gender discrimination by loan officers (Fabowale et al, 1995), the majority of the evidence seems to point to structural explanations, relating to differences in business size, age, sector, and the business experience of the entrepreneur rather than gender discrimination (see e.g., Fay and Williams, 1993; McKechnie et al, 1998; Kepler and Shane, 2007). Indeed, as Fay and Williams (1993) note, risk averse banks receiving applications from entrepreneurs with: "limited education and experience and low proposed equity (as in female proprietors) loan officers not surprisingly refuse requests for finance." (Fay and Williams, 1993, p. 365)

And yet, some econometric studies have still found residual gender differences in the availability or cost of finance even after including extensive controls for structural differences (see Fraser, 2005; Verheul and Thurik, 2000; Coleman and Robb, 2009).

An important example of this is the study by Coleman and Robb (2009) which, in the spirit of Carter and Rosa's (1998) earlier UK study, use US Kauffman Firm Survey data to examine gender differences in the use of start-up capital and subsequent investments in the firm. Key summary findings in this study are that women use significantly less start-up capital in the baseline year (2004) compared with men (\$54,375 versus \$80,285) and women entrepreneurs are more likely to use personal debt (including personal credit cards and bank loans), and less likely to use external bank debt, than male entrepreneurs. In terms of subsequent investments (in 2005-2006), controlling for a wide range of firm and entrepreneur characteristics (including entrepreneurial experience and education), female entrepreneurs are significantly less likely to make new debt or equity investments than male entrepreneurs. In addition, firms run by female entrepreneurs invest, both at start-up and subsequently, significantly lower amounts of both debt and equity than otherwise similar firms run by male entrepreneurs. However, despite the extensive list of controls used in Coleman and Robb's analysis, whether their findings reflect supply side discrimination or differences in unobserved demand-side factors remains open to question.

In terms of these hard to control for demand side factors, some studies view gender differences in entrepreneurship and access to credit as the outcome of a gender socialization process that begins in childhood (Bandura, 1977; Marlow and Patton, 2005; Carter et al, 2007). In this view, occupational choices are influenced by gender socialization, which causes men and women to pursue occupations that conform to gender stereotypes (Bandura, 1977; Marlow and McAdam, 2012; Klyver et al., 2013). Women may be less likely to pursue entrepreneurship in general, and high risk/return entrepreneurship with higher capital requirements in particular, as these are perceived by most as masculine occupations (Marlow and McAdam, 2012). Accordingly, women may be more likely to pursue (high risk/return) entrepreneurship (with higher capital requirements) where female entrepreneurial role models are more visible and accessible to help raise women's entrepreneurial self-efficacy (Chen et al, 1998), provide mentoring (Kelley et al, 2015), and disconfirm masculinized stereotypes of entrepreneurship (Greene et al, 2013; Marlow and McAdam, 2012).

In view of its pervasive nature, gender socialization and gender stereotypes are likely to affect the decisions of all involved in the entrepreneurial credit journey. In particular, gender socialization may affect the perceptions of both entrepreneurs, leading to different credit demands and perceptions of discrimination (e.g., Fabowale et al, 1995), and the perceptions of loan officers potentially affecting actual credit outcomes (Carter et al, 2007). In terms of loan officers' perceptions, Carter et al (2007) finds broad similarities between the criteria used by male and female loan officers although there were significant differences between them in terms of the negotiation process and lending criteria used by male and female loan officers. Of concern in this respect, male loan officers are more likely to question the commitment of female loan applicants. In particular, this raises concerns of persisting gender stereotypes relating to female loan applicants that may lead to unfair gendered barriers to finance (Carter et al, 2007).

Other studies view gender differences in entrepreneurs' use of credit as related to demand side risk aversion (Jianakopulos and Bernasek, 1998), and/or gender differences in the economic and social motives for working (Boden, 1999; Saridakis et al, 2013). According to this argument, female entrepreneurs choose to run low risk/return ventures (Kepler and Shane, 2007), with lower capital requirements, due to risk aversion and/or their prioritizing of social motives such as caregiving (Boden, 1999) which increase the importance of flexible working over profit (Rouse and Kitching, 2006; McAdam, 2013). Of course, this is related to gender socialization, which may lead to gender differences in risk aversion, entrepreneurial self-efficacy, and career motives in the first place (Marlow and McAdam, 2012).

On the specific issue of risk aversion, empirical support for the view that women are more risk averse than men is mixed. Whilst some survey based research has found greater risk aversion among women (Jianakopulos and Bernasek, 1998; Grable, 2000; Ackert et al, 2002), other experimental based research finds no gender differences in risk attitudes when individuals are faced with identical financial decisions (Schubert et al, 1999). In this respect Schubert et al (1999) argue that survey based studies which report that women are more risk averse than men (e.g., Jianakopulos and Bernasek, 1998) only weakly control for differences in the socio-economic contexts and wealth constraints underlying financial decisions. In other words, apparent gender differences in risk aversion may actually be due to differences in socio-economic contexts in which decisions are made. Accordingly, apparent gender differences in risk aversion (leading to different venture financing

conditions) may be due to underlying processes of gender socialization (rather than pre-determined biological differences).

Yet as Coleman and Robb (2009) note: "Whatever the cause, the fact that women use dramatically smaller amounts of start-up capital and rely on personal rather than external sources has implications for their ability to develop new products and services, grow their firms, hire employees, and survive periods of adversity." (Coleman and Robb, 2009, p. 409)

## 7.2 Ethnic differences in entrepreneurial borrowing

Similar arguments and findings pertain to differences in credit market outcomes between ethnic minority and non-ethnic minority entrepreneurs. Also, as with the studies of gender differences, over time there have been improvements in the methods used to identify ethnic differences in financing conditions. This includes the increasing use of larger samples and more robust statistical methods to disentangle ethnic from structural explanations for differences in financing conditions.

The general finding of the research in this field is that, based on summary comparisons at least, ethnic minority owned business, especially those owned by black entrepreneurs, experience worse financing conditions than businesses owned by white entrepreneurs. In an early study by Curran and Blackburn (1993), interviews were conducted with 76 ethnic minority owned businesses from the Greek-Cypriot, Bangladeshi, and African-Caribbean communities in the UK to find out how they financed themselves at start-up and to fund the expansion of their businesses. The study found that African-Caribbean entrepreneurs are more likely than other ethnic groups to rely on non-market sources of finance at start-up. In this respect, almost 70% of African-Caribbean entrepreneurs relied on personal savings compared to 50-60% of Greek-Cypriot and Bangladeshi start-ups. Curran and Blackburn (1993) also found that one-half of the African-Caribbean businesses reported that they found it very difficult to raise finance for expansion compared to only 10% of the Greek-Cypriot and Bangladeshi entrepreneurs that reported the same degree of difficulties.

The Curran and Blackburn (1993) study is limited not least by the small sample size used in the research and the lack of any comparison with financing conditions among the majority UK ethnic group i.e., businesses run by entrepreneurs from a white ethnic background. A larger study of 403 small firms in 15 localities in the UK carried out by Jones et al (1994), found that 60% of the Asian owned businesses in the sample had sought a bank loan compared to 40% of the African-Caribbean and white owned businesses. In addition, 40% of the African-Caribbean loan applicants reported they had encountered difficulties obtaining credit (either due to the denial of their application or they felt the terms of borrowing offered to them were unreasonable). Similar issues obtaining loans were reported by around a third of the applications by Asian entrepreneurs and by only 20% of the applications by white entrepreneurs. Jones et al (1994) also report that African-Caribbean businesses are more likely than Asian or white owned businesses to rely on non-market sources of finance at start-up (50% versus 30-40%).

In an even larger study of ethnic differences in financing conditions, Smallbone et al (2003) carried out telephone interviews with 856 businesses from the African-Caribbean, Indian, Pakistani, Bangladeshi and Chinese communities along with 1,350 interviews with businesses owned by white entrepreneurs. Interestingly the study found that African-Caribbean entrepreneurs were the most likely to have formal management training or qualifications and yet they also had the poorest access

to bank finance at start-up (21% versus 49% of Chinese owned start-ups). In addition, African-Caribbean businesses had the least success in obtaining external finance in the 12 months prior to interview (62% versus 88% of Bangladeshi owned businesses). An important general finding of Smallbone et al (2003) is that there is more variation in financing conditions between ethnic minority groups than between minority run firms in aggregate and white owned businesses. In particular, in contrast to African Caribbean businesses, Asian and White-owned businesses were largely convergent in terms of experiencing relatively good access to bank loans at start-up. This led the authors to conclude:

“For policy makers, this raises the question of whether or not it is useful and/or appropriate to treat ethnic minority businesses as a category from a finance and business support standpoint. One of the implications for public policy makers is to recognize that access to finance issues are greater in some ethnic minority communities than in others...” (Smallbone et al, 2003, p. 308/9)

Yet while Smallbone et al (2003) use a large sample, improving on previous studies, their analysis is based only on summary comparisons between ethnic groups. This study (and, indeed, UK studies which preceded Smallbone et al, 2003) do not control for structural differences relating to the creditworthiness of the firm and entrepreneur. Accordingly poorer credit outcomes among businesses run by black entrepreneurs may reflect greater risk and not ethnic discrimination by finance providers. Indeed, a review of the early literature and evidence on ethnic minority finances before Smallbone et al's study found no evidence that finance providers were engaging in ethnic discrimination (Bank of England, 1999). However, the report recognised the possibility that there are mistaken perceptions of unfair/prejudicial treatment by finance providers among ethnic minority entrepreneurs. The Bank of England report gave the following possible explanations for these misperceptions:

*Differences in default risk/creditworthiness* - Banks base lending decisions on their assessment of the likelihood that the borrower will repay the loan. A higher non-repayment risk will result in higher cost of borrowings, shorter loan maturities, provision of less credit than requested or the outright denial of credit if the risk is too high. Loan amounts and conditions, which seem more favorable to white entrepreneurs, may therefore reflect risk differentials not ethnicity.

An important source of risk differentials are ethnic differences in sectoral concentrations. Ethnic minority entrepreneurs are often more concentrated in sectors with high failure rates (retail, catering and transport) which makes lending to their businesses less attractive to risk-averse creditors regardless of the entrepreneur's ethnicity. The report also points to differences in business planning, experience, and family background as possible underlying explanations of ethnic variations in credit outcomes. In this regard, increased business planning and a background in entrepreneurship will improve access to finance. The relative success of some Asian groups in obtaining bank finance may reflect greater backgrounds in running a business (e.g., through having a self-employed parent/family member). However, the report also highlights evidence that black owned firms are more likely to write business plans which seems at odds with their poorer credit outcomes (and which resonates with the subsequent findings of Smallbone et al, 2003).

*Lack of collateral/location in deprived areas* - Due to information asymmetries, banks may require borrowers to post collateral on loans to signal their creditworthiness (see e.g., Bester, 1985). In this respect, the Bank of England report highlights the lack of collateral (low housing equity) among

Caribbean and Bangladeshi entrepreneurs as a potential reason for the poorer financing conditions observed in these ethnic groups. The collateral issue is closely related to the greater tendency of Caribbean and Bangladeshi businesses to be located in deprived inner city areas. Deprivation may create further obstacles for ethnic minority businesses through skills shortages, higher levels of crime, and poorer health and access to health care.

*Information issues* - The Bank of England report identifies the problem of poor information flows between banks and ethnic minority businesses exacerbated by a lack of data. Cultural and language barriers create additional impediments on information flows. Information deficiencies and poor communications may make ethnic minority businesses seem more risky to banks resulting in poorer access to finance and perceptions among ethnic minority entrepreneurs that they are being unfairly discriminated against by banks.

An Ethnic Minority Business (EMB) Taskforce was established by the UK Government in June 2007 to promote the start-up and growth of businesses by ethnic minority entrepreneurs. An important part of the Taskforce's remit was to investigate the reasons for poorer credit outcomes among ethnic minority entrepreneurs found in earlier research. The research related to the EMB Taskforce investigation of credit outcomes is reported in Fraser (2009b). This study involved a large sample of data from UKSMEF 2004 and an ethnic minority booster survey conducted in 2005. This provided a large sample comprising 2,373 white owned businesses, 202 Indian owned businesses, 202 Pakistani owned businesses, 103 Bangladeshi owned businesses, 203 Black Caribbean owned businesses, and 200 Black African owned businesses. The credit outcomes investigated in Fraser (2009b) relate to discouragement, credit denial, funding gaps (differences between amounts of loan requested and amounts received), and loan margins.

The key summary findings reported in Fraser (2009b) are as follows:

**Discouragement:** 45.9% and 40.6% of Black African/Caribbean businesses in need of credit felt discouraged from applying for it. These rates of discouragement are significantly higher than found among Indian (11.6%), Pakistani (22.9%) and white owned businesses (7.1%).

**Credit denial:** 37.4% and 28.1% of Black African/Caribbean owned businesses, which needed new finance, experienced outright denial of their application. This is significantly higher than denial rates among Indian (5.8%), Pakistani (13.2%) and white owned businesses (10.4%).

**Funding gaps:** These gaps (representing the difference between the amount of funding sought and the amount received) are highest among Black African owned businesses (£14,102 on average, equivalent to 50% of the amount sought) and Pakistani owned businesses (£13,518 on average, which is 22% of the amount sought). White and Indian owned businesses have the lowest funding gaps amounting to £5,435 and £4,911 respectively on average (or 9%-10% of the amount sought).

**Loan margins:** Black African owned businesses paid the highest margins (3.7 points over base on average). White and Indian owned businesses paid the lowest margins (2.3 points over base on average).

However, as pointed out by Bank of England (1999), these often very large ethnic differences in credit outcomes may have explanations rooted in underlying structural differences between firms in different ethnic groups. In this respect Fraser (2009b) found that Indian and white owned

businesses are larger (less risky) in terms of sales and business assets (suggesting they have more collateral to offer) than black owned businesses. Asian owned businesses are heavily concentrated in the highly competitive wholesale and retail sectors whereas black and white owned businesses are more concentrated in less competitive business services sectors. Relatedly, white owned businesses are more profitable (they have a higher return on assets) than Bangladeshi and Black African businesses. Compared to white owned businesses, all groups of ethnic minority businesses are disadvantaged by their location in deprived areas (especially Bangladeshi and Black Caribbean businesses).

Regarding entrepreneurial characteristics, Indian, Pakistani, and white entrepreneurs hold more personal assets to offer as collateral (with £300,000-£400,000 on average) than black and Bangladeshi entrepreneurs (with £200,000 on average). White entrepreneurs have more business experience (21 years on average) than black and Bangladeshi entrepreneurs (11 years on average). However, resonating with earlier research, Black African entrepreneurs are the most academically qualified. In terms of credit histories and financial delinquency, 18.2% of Black Caribbean owned businesses missed loan repayments compared with only 2.9% of White owned businesses. Black African and Caribbean owned businesses are also more likely to exceed their overdraft limit (50.5%/40.8%) than white owned businesses (24.7%). In terms of the length of financial relationships with their main bank, Indian and white owned businesses have significantly longer relationships (11-15 years on average) compared to other ethnic groups (4-6 years on average).

In short, there are significant variations in firm and entrepreneur characteristics across ethnic groups, which may account for the observed ethnic differences in credit outcomes. In particular, lower business profitability, fewer business and personal assets, deprivation, higher rates of financial delinquency, and shorter financial relationships may account for poorer credit outcomes especially among black and Bangladeshi owned businesses. Indeed, Fraser (2009b) goes on to conduct an econometric analysis of credit outcomes and found, in general, that having controlled for firm and entrepreneur characteristics there was no residual role of ethnicity in explaining credit outcomes.

However, with the exception of Indian owned businesses, Fraser (2009b) finds evidence of *ceteris paribus* higher rates of discouragement among ethnic minority owned businesses. This suggests the psychic costs of application are higher for ethnic minority entrepreneurs, possibly due to the perception they will be turned down on account of their ethnic background. In other words, ethnic minority entrepreneurs seem to perceive ethnic discrimination by finance providers even if there is no evidence of actual discrimination (based on the econometric analysis of denial rates, funding gaps, and loan margins). Evidence in Fraser (2009b) also indicates that misperceptions of discrimination are aggravated by poor communications between black entrepreneurs and their banks.

In terms of improving credit outcomes for ethnic minority businesses, Fraser (2009b) points to the need for better communications between banks and ethnic minority businesses to increase minority entrepreneurs' awareness of lending criteria and the negative impact of financial delinquency on credit outcomes. This may also help to deal with high discouragement rates and perceptions of discrimination aggravated by poor communications. At the same time, the underlying reasons for financial delinquency including poorer financial skills, poorer business performance, and deprivation need to be addressed by policy makers to improve the situation for ethnic minority entrepreneurs.



Blanchflower et al (2003) conducted a rigorous econometric test for ethnic discrimination in the US small business credit market. They estimated models for loan denials and interest charges with data from the 1993 and 1998 SSBF's, using dummy variables for ethnicity (black, Hispanic, Asian/Pacific Islander and Native American) to test for ethnic discrimination, controlling for business/owner characteristics, credit ratings and credit histories. The study finds that black owned firms are, *ceteris paribus*, about 25 percentage points more likely than white owned firms to be denied a loan and pay, on average, over a percentage point more in interest charges. Blanchflower et al (2003) interpret this finding as pointing to actual discrimination in the small business credit market, which contrasts with the UK findings in Fraser (2009b). Blanchflower et al's study also finds that perceptions of discrimination among black entrepreneurs are high. In this respect, black entrepreneurs are about 26 percentage points more likely than otherwise similar white entrepreneurs to decide not to apply for loans for fear of rejection (i.e., discouragement rates are higher, *ceteris paribus*, among black entrepreneurs). The study also finds that perceived prejudice underlies these fears of rejection.

Bringing issues of gender and ethnic minority discrimination into joint focus, Asiedu et al (2012) test for evidence of discrimination on the basis of race, ethnicity, or gender in US small business credit markets using data from the 1998 and 2003 SSBF's. In particular, they test for *ceteris paribus* differences in loan denial rates and borrowing costs across ethnic minority and gender groups of firms. Their main findings are that black owned firms faced increased discrimination in accessing credit in 2003 than 1998 whereas Hispanic firms encountered less discrimination in 2003 than 1998. There was no *ceteris paribus* differences in interest rates on loans to black owned businesses compared to white owned businesses in either 1998 or 2003 although Hispanic firms paid higher interest rates on their loans in 2003 than otherwise similar white owned firms. Finally white women entrepreneurs were not discriminated against in terms of access to credit and they paid a lower interest rate on their loans than otherwise similar firms run by white male entrepreneurs in 1998. Unfortunately, there is no analysis of discouragement in Asiedu et al's paper.

### 7.3 Are there other groups of entrepreneurs underrepresented in the credit market?

Age has opposing effects on entrepreneurship. On the one hand, the willingness and intention for new venture creation decreases with age due to the increasing opportunity cost of time (Lévesque and Minniti, 2006; Zhang and Acs, 2018). On the other hand, the capability for new venture creation increases with age due to higher accumulated physical, social, and human capital (Lee and Vouchilas, 2016). These opposing effects are consistent with both a non-monotonic (e.g., Parker, 2009<sup>61</sup>) and monotonic effect of age on entrepreneurship (Zhang and Acs, 2018)<sup>62</sup>. Older entrepreneurs have not only had more time to accumulate personal wealth to help finance their businesses with internal funds, but they are also likely to have a longer personal credit history to demonstrate their creditworthiness to external lenders. This suggests that age should have a positive effect on entrepreneurial borrowing. However, the available empirical evidence on this issue is sparse and ambiguous. Using US SSBF data for 1993, 1998, and 2003, Cole and Sokolyk (2015) find that while

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<sup>61</sup> Parker (2009) finds a non-linear effect of age on entrepreneurship which peaks for individuals aged 35-44 years.

<sup>62</sup> Zhang and Acs (2018) find that entrepreneurial propensity rises with age until around 80. The positive effect of age is lower (but not negative) at age levels above 80 (suggesting the capability effect dominates throughout individuals' lifetimes).

older entrepreneurs are more likely to have credit needs or to apply for credit, their age has no effect on whether they receive credit (other things equal). In contrast, using US Kauffman Firm Survey data, Coleman and Robb (2009) find that older entrepreneurs have significantly higher amounts of start-up capital (both debt and equity). Overall, it would seem that younger entrepreneurs are disadvantaged in terms of accessing credit to start their businesses if not to fund the ongoing operations of an established business (recalling that SSBF relates mainly to the financing of established SME's).

Do religious beliefs affect access to credit? Dana (2009) argues that religion and related beliefs influence values and thus shape entrepreneurship. In particular, entrepreneurship in religious groups may be affected by credit networks, employment networks, information networks and supply networks of co-religionists (Dana, 2009). Some instances of entrepreneurs being dependent on co-religionists for access to credit have been discussed in the literature. For example, Dana and Dana (2008) highlight a historical dependence on co-religionists for finance among Jewish and Muslim entrepreneurs in Morocco. Galbraith et al (2004), looking at Catholic Hispanics, suggest a co-ethnic capital market appeared to be the last dimension developed within an ethnic community. In the context of a modern secular society, with credit institutions that use a variety of (arms' length) lending technologies, it would seem unlikely that entrepreneurs with particular religious beliefs are systematically constrained by the availability of credit from co-religionists. Still, in some cases, issues of ethnic and religious discrimination may go hand in hand (making disentangling religious from ethnic discrimination a challenging task). However, the author is not aware of any recent studies that test rigorously whether entrepreneurs are discriminated against on faith grounds in the credit market.

Traditionally, relationship lending has relied on geographical proximity between the borrower and lender for the effective transmission of soft information (see section 3.2.3). Consequently, entrepreneurs located in communities that are geographically distant from lenders may be disadvantaged relative to those closer to lenders (e.g., Agarwal and Hauswald, 2010; Kysucky and Norden, 2015). Arguably, technology has led to the 'hardening' of SME lending over time (Udell, 2015) which is manifested in terms of the growing distance between borrowers and lenders (Petersen and Rajan 2002, Wolken and Rodhe 2002) and the introduction of small business credit scoring (DeYoung et al, 2008). However, Udell (2015) questions the extent to which technology has reduced the importance of proximity in SME lending. To begin with, the reductions in distance noted in the literature (e.g., Petersen and Rajan 2002, Wolken and Rodhe 2002) are not very large (around one mile). In addition, the reduction in distance likely relates to only a few lending technologies (principally small business credit scoring). More fundamentally, it is not established in the literature the extent to which soft information can be effectively hardened and therefore transmitted, with minimal loss of information, over greater distances (Udell, 2015). In this context, despite technological change, entrepreneurs located in some rural and inner city communities, without a nearby bank branch, may still be disadvantaged in terms of access to credit (Ergungor, 2010)

Technological change may yet facilitate the 'democratization' of entrepreneurial finance, reducing potential underrepresentation in the credit market due to the entrepreneur's gender, ethnicity, age, religion, or geographical location. In this respect, in the context of UK equity crowdfunding deals on the Crowdcube platform, Cumming et al (2018) find that younger entrepreneurial teams are both more likely to launch equity crowdfunding offerings than IPOs, and are more likely to successfully

complete an equity crowdfunding offering. The same outcomes hold for companies in remote locations. However, female and ethnic minority entrepreneurs are not more likely than males/non-minorities to successfully raise funds by equity crowdfunding (although minority entrepreneurs do attract a higher number of investors) suggesting the democratization of entrepreneurial finance may not yet extend fully to these underrepresented entrepreneurs. In the next section, we explore some of these issues in more detail specifically in relation to peer-to-peer lending.

### 7.3 Summary

Anti-discrimination legislation outlaws the use of ethnicity or gender (or religious beliefs or disability status) in credit scoring models. Therefore, legally at least, there is no distinction between taste discrimination (prejudice) and statistical discrimination (Blanchflower et al, 2003). Yet ethnic minority/gender discrimination may still potentially affect credit outcomes to the extent that disadvantaged groups are located in more deprived areas, which may be picked up by postcodes in credit scoring models, or have fewer business/personal assets to offer as collateral (Fraser, 2009b). Equally, relationship lending creates agency issues such that a prejudiced loan officer's lending decisions may be influenced by the gender/ethnicity of the entrepreneur even if this is contrary to anti-discrimination laws and the bank's profit maximising objectives (Cavalluzzo et al, 2002; Blanchflower et al, 2003).

The empirical evidence on gender differences on credit outcomes indicates that women use less capital at start-up and are less likely to access bank credit subsequently (Carter and Rosa, 1998; Coleman and Robb, 2009) and this may not be entirely due to structural differences e.g., relating to sector and experience, between male and women owned businesses (Coleman and Robb, 2009). One explanation for these *ceteris paribus* gender differences is that they are the outcome of gender socialization and gender stereotypes. Gender socialization/stereotypes may cause women to choose to run lower risk/return businesses with lower capital requirements (Marlow and McAdam, 2012) and may result in (male) loan officers viewing applications by female entrepreneurs as being less credible than those by male entrepreneurs (Carter et al, 2007). Relatedly, higher risk/debt aversion among women (Jianakopols and Bernasek, 1998) may reduce credit demands among female entrepreneurs although support for the view that women are more risk averse than men is contested (Schubert et al, 1999).

The empirical evidence on ethnic differences in credit outcomes highlights the variation in these outcomes across ethnic minority groups. Looking at the UK for example, Indian owned businesses seem to experience just as favorable credit outcomes as white owned businesses (Smallbone et al, 2003; Fraser, 2009b). However, businesses owned by black entrepreneurs experience much poorer credit outcomes compared to white/Indian owned businesses. The UK evidence suggests these ethnic differences are explained by structural differences in the firm rather than ethnic discrimination. Principally, Fraser (2009b) shows that ethnicity does not explain differences in loan denial rates, funding gaps, and borrowing costs having controlled for firm and entrepreneur characteristics such as wealth and financial delinquency. This is in contrast to the evidence for the US small business credit market reported in Blanchflower et al (2003) which finds *ceteris paribus* ethnic differences in loan denial rates and borrowing costs, particularly affecting black owned businesses, suggesting the presence of ethnic discrimination (see also Asiedu et al, 2012).

In one key respect, there is consistency between the findings for the US and UK, in that both Blanchflower et al (2003) and Fraser (2009b) find that black owned businesses are more likely to report discouragement than otherwise similar white owned businesses. This suggests that perceptions of discrimination among black entrepreneurs in both the US and UK affect their credit application decisions. However, while this discouragement appears to be based on misperceptions of racial discrimination in the UK, given the lack of evidence for actual ethnic discrimination in the UK, in contrast Blanchflower et al's evidence of actual ethnic discrimination in the US suggests discouragement among Black American entrepreneurs is based on well-founded beliefs that they will be discriminated against.

*Developing structural models of underrepresented groups' access to credit, which are able to disentangle taste from statistical discrimination, may help reconcile the conflicting findings on discrimination from extant reduced form analyses. In addition, once more relating to the need for data-sets that are better equipped to test hypotheses about SME lending technologies/channels (Udell, 2015 – see section 3.5), information about the types of lending technologies used in lending to underrepresented firms would allow testing of how different lending technologies affect discrimination.*

The literature suggests that entrepreneurs who are younger, based in remote locations, or belong to particular religions may also be disadvantaged in terms of access to credit. However, technological change may lead to the 'democratization of entrepreneurial finance' reducing barriers in the credit market for traditionally underrepresented groups of entrepreneurs. This brings us to the final topic of peer-to-peer lending in the next section.

## **8. Peer-to-peer lending**

We conclude the substantive discussion of the entrepreneurial borrowing literature by reviewing a relatively recent innovation: peer-to-peer (P2P) lending. Given the focus here on entrepreneurial borrowing, the reader is directed elsewhere for reviews of the equity crowdfunding literature (see e.g., Wallmeroth et al, 2018; Belleflamme et al, 2014). P2P lending is a new form of loan origination in which borrowers are able to raise unsecured loans directly from private credit-providers (investors) via an online lending platform. The first lending platform in the UK (and Europe as a whole) was Zopa established in 2005. The first US P2P lender was Prosper.com established in 2006. The first UK small business P2P platform was Funding Circle, which up to April 2019 has facilitated £5bn in loans to 49,000 businesses since it started operations in 2010.

P2P lending is an area of fast growing importance for entrepreneurial credit. Following the 2008-2009 financial crisis many entrepreneurs were left undersupplied with credit and unhappy with their bank (see e.g., Fraser, 2014a, and the discussion in section 2). P2P lending therefore provided an alternative means for raising credit that bypassed the banks. In addition, technological advances have helped spur the growth of P2P lending and other financial innovations over the last decade (Bruton et al, 2015). Looking at the UK, in terms of general awareness, 45% of SME's had heard of P2P lending platforms in 2016 compared to 24% in 2012 (British Business Bank, 2017). Also, whilst the flow of P2P credit to SME's, at £1.58bn in 2016, is still a relatively small proportion of the corresponding £49bn in total SME credit flows, the market for P2P SME credit has grown almost 80-fold since 2011 (from £0.02bn in 2011: British Business Bank, 2017). In this context, supporting P2P lending forms a core strategy of the British Business Bank in promoting greater diversity in

entrepreneurial credit markets (see section 6 above). To help achieve this objective, BBB have provided the largest UK P2P lender, Funding Circle, with support facilitating £165m in lending to small businesses since March 2013<sup>63</sup>. Funding Circle has also formed an alliance with Endurance Lending Network in the US and provides business loans in the US.

The principal function of the online platform is to facilitate a credit transaction between a private credit-provider and borrower. While the online platform will require financial, and sometimes also personal and social, information from the borrower, the actual decision based on this information about whether to provide credit and the interest rate on the loan is left to the private credit-provider. In this respect, the principal function of the online platform is brokerage rather than the functions traditionally associated with financial intermediaries (i.e., screening, contracting and monitoring). Equally, since the online platform, unlike a bank or non-bank lender, does not originate and hold the loan it is therefore not subject to the same regulatory capital requirements as a traditional lender. On the upside for borrowers, this can result in cheaper credit as the online platform does not have the same regulatory overheads as a bank. In addition, the private credit-provider has greater control over the investment decision and level of risk allowing them to earn higher returns than they would on a bank deposit. On the downside, the private credit provider, as an investor, does not have the same regulatory protection as a bank depositor in the event of default.

On the issue of investment risk, Funding Circle reports a default rate of 3.9%, which compares favourably with the default rate on a traditional small business loan book. This low bad debt rate reflects the much tighter credit checks that online platforms now conduct on prospective borrowers compared to the early days of P2P lending. For example, in 2011, Quakle, a UK P2P lender founded in 2010, closed down with a near 100% default rate after attempting (unsuccessfully) to measure creditworthiness according to a group score based on social media ratings.

The P2P lending market has become subject to tighter regulation in recent years. In the UK, the industry became subject to regulation by the Financial Conduct Authority in April 2014. Under these regulations, online platforms must give prospective investors a detailed explanation of how the loans work and the risks involved. In this respect, the online platform is required to provide plenty of accessible and clear information about prospective borrowers so credit-providers can make informed investment decisions. In addition, P2P lenders are required to have a capital buffer of at least £20,000 depending on the amount of total lending (which increased to a minimum of £50,000 from April 2017). Further, investors in start-up businesses must confirm that they are investing no more than 10% of their assets in such projects (excluding property and pensions). However, the protection afforded to P2P investors still falls well short of the protection, of up to £85,000 per account holder, available to depositors under the Financial Services Compensation Scheme (for banks failing after 1<sup>st</sup> January 2017).

In the US, P2P lending grew steadily between 2006 and 2008 but encountered difficulties in 2008 when the Securities and Exchange Commission (SEC) required that P2P loans should be registered as securities. This resulted in Prosper and Lending Club temporarily suspending the offering of new

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<sup>63</sup> In November 2018, the BBB committed up to a further £150m for lending to UK small businesses through Funding Circle. The transaction, under the BBB's ENABLE Funding programme, is designed to accelerate lending to small businesses and is expected to support the growth of more than 2,000 UK firms.

loans on their platforms and resulted in the UK based Zopa leaving the US market entirely. However, both Prosper and Lending Club adjusted to the new legislative framework and resumed their rapid growth trajectories (see e.g., Mach et al, 2014). The Jumpstart Our Business Startups (JOBS) Act 2012 relaxed rules on equity crowdfunding allowing entrepreneurs to raise up to \$1 million per annum from unseasoned individual investors ('Aunt Millie' investors). However, the overall impact on P2P lending is as yet unclear (Mach et al, 2014).

### 8.1 What factors affect entrepreneurs' chances of obtaining credit from an online platform?

In a recent general review of the crowdfunding literature, based on an analysis of 51 crowdfunding articles found on ISI Web of Science, Kaartemo (2017) identifies four important elements of a successful crowdfunding campaign:

- Campaign related factors: e.g., price (for equity campaigns), funding targets, financial information about the firm, and campaign video/visuals.
- Crowdfunder related factors: e.g., personal characteristics, motives, and geographical location of funders. Close geographical and/or cultural proximity of the fund seeker to the crowd engender perceptions of shared values between funder and fund seeker (increasing the chances of obtaining funding).
- Crowdfunding platform related factors: e.g., type of platform (donation, reward, debt, or equity based) and the screening/endorsement by platform staff of the campaigns hosted on the platform.
- Fund seeker related factors: e.g., personal characteristics, experience, and social networks of fund seeker engendering 'shared values' with the crowd (see above).

Although not focussed specifically on P2P lending, Kaartemo's analysis does provide a general framework for understanding what factors might affect the chances of entrepreneurs obtaining debt funding via online platforms<sup>64</sup>.

In view of the fundamental problem of information asymmetries in entrepreneurial credit markets which may lead to credit rationing (Stiglitz and Weiss, 1981), a key issue is whether private credit providers on P2P platforms are able to screen borrowers effectively and thereby allocate credit efficiently (Iyer et al, 2009). Typically, the online platform will provide private credit providers with a financial overview of the borrower including a credit rating and other key financial information relating to the borrower's ability to repay. In addition, some platforms provide 'soft' information about the borrower including demographic characteristics such as gender, race and age (Pope and Sydnor, 2011) and allow borrowers to provide social information such as a personal photograph (Pope and Sydnor, 2011; Duarte et al, 2012).

Based on an empirical analysis of 54,077 US loan listings on Prosper.com, Klafft (2008) finds that verified bank account information and the credit rating are key determinants of whether a borrower is funded. Personal information (e.g. photos of the borrower) and, to a lesser extent, online peer

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<sup>64</sup> The reward based platform Kickstarter provided the data used in 19 of the 51 articles (37%) contributing to Kaartemo's analysis. This was followed by another reward based platform Indiegogo, which provided the data used in 5 studies, with both Crowdcube (an equity based platform) and Prosper.com (a debt based platform) providing the data used in two studies contributing to Kaartemo's analysis. In total, 33 different platforms provided the data used in the studies contributing to Kaartemo's analysis.

groups also impact on the likelihood of funding. Interest rates are primarily determined by credit ratings and debt-to-income ratios. At least regarding the importance of financial information, these findings suggest that P2P screening is not too dissimilar from the criteria used in traditional banking. Klafft (2008) also finds that 57.4% of all loan listings have a high risk credit rating and only 5.5% of these listings receive funding. In contrast, 54% of AA- borrowers are funded. This suggests that while P2P lending may help some entrepreneurs spurned by traditional banks others with poorer credit histories or riskier business models will still need to improve their creditworthiness or look elsewhere for funding.

Pope and Sydnor (2011) analysed 110,333 US loan listings on Prosper.com between June 2006 and May 2007 in order to understand how signals from photographs relating to race, age, and gender, affect the likelihood of funding and the interest rate charged. In findings that chime with the evidence in Blanchflower et al (2003) of discrimination against Black American entrepreneurs in the market for traditional bank credit, Pope and Sydnor (2011) find that online loan listings with Black Americans in the attached picture are 25% to 35% less likely to receive funding than those of White Americans with similar credit profiles. In addition, the interest rate paid by Black Americans who receive a loan is 60 to 80 basis points higher than that paid by otherwise similar White Americans.

In terms of the effect of perceived age, Pope and Sydnor (2011) find that compared to a base group of 35-60 year olds, there is a 40 to 90 basis points higher chance of getting funded for those who appear in the photograph to be younger than 35 years old. Also, those who appear to be 60 years and older are between 1.1 and 2.3 percentage points less likely to obtain funding. This provides an interesting contrast with findings that suggest that older entrepreneurs are able to raise more capital from traditional debt/equity sources than younger entrepreneurs (e.g., Coleman and Robb, 2009: see section 7). In terms of gender, loan listings with a photograph of a woman are actually 1.1 percentage points *more* likely to receive funding other things being equal. In addition, single females are charged interest rates that are 40 basis points *lower* than males.

Interestingly, Pope and Sydnor (2011) also find that the estimated average net return on a dollar from investing in a loan from a Black American borrower is 7.3 to 8.6 percentage points lower over a three-year period compared to a White American borrower. The implication is that although Black Americans are discriminated against in the lending process, the higher interest rates that they pay are not enough to compensate for their higher default probability. This is contrary to the predictions of both accurate statistical discrimination against ethnic minorities (which would result in equal net returns) and taste-based discrimination (which would result in higher net returns on loans to ethnic minority borrowers: see e.g., Fraser, 2009b).

At face value, these results suggest prejudice *in favor* of Black American borrowers. One plausible interpretation of this surprising result is that while P2P credit providers understand the correlations between race and unobservable characteristics that are relevant for predicting default (which leads to statistical discrimination), they underestimate the importance of these unobservable characteristics. In other words, P2P credit-providers do not statistically discriminate enough against Black American borrowers suggesting the existence of biased beliefs and inefficient credit allocation at the market level. However, more research would be necessary to investigate this issue and, not least, the underlying causes of increased financial delinquency among black borrowers such as deprivation and low financial skills (see e.g., Fraser, 2009b, and the issues discussed in section 7).

This highlights another situation where a structural model to disentangle taste from statistical discrimination may provide a clearer answer.

Regarding platform related factors, Iyer et al (2009) find that online private credit providers are able to use additional hard and soft information provided by the platform to accurately price P2P loans within a given credit rating category. They find that lenders are able to use this information to infer a third of the variation in creditworthiness that is captured by a borrower's credit score. Credit providers are able to use this additional information to charge an interest rate 140 basis points lower for borrowers at the top of a typical credit rating category relative to borrowers at the bottom of the category. In other words, P2P credit-providers are able to make valuable inferences about borrowers' creditworthiness with the information available from online platforms and are able to use this information to price loans more accurately than if rates were solely based on the credit rating category. In the language of the credit rationing literature, the information available on online credit platforms allows private credit providers to 'separate types'.

Based on 17,837 Prosper listings, including 6,821 listings that include photographs, Duarte et al (2012) find that entrepreneurs that look trustworthy are more likely to receive funding and pay a lower interest rate than those that appear less trustworthy. Interestingly trustworthy looking borrowers also have better credit grades and are less likely to default suggesting looks based discrimination has some basis. However, similar to the findings of Pope and Sydnor (2011) in the context of race, lenders do not seem to discriminate enough based on looks as the lower rates charged to trustworthy borrowers are not low enough to fully account for their lower default probabilities.

Regarding social networks, Freedman and Jin (2008) find evidence that endorsements of friends may reduce adverse selection problems for loan listings on Prosper (see also Lin et al, 2013). In particular, they find that loans with endorsements and bids of friends have fewer late payments and significantly higher rates of returns. The implication is that, through personal relationships, friends are better informed about borrowers' private information and are therefore in a superior position to gauge risk. Equally, monitoring and peer pressure within social networks creates a stronger incentive to repay the loan.

The narrative relating to the opportunity, provided on the platform by the entrepreneur, also seems to impact on whether funding is received and the likelihood of repayment. In a study based on 400,000 loans made via the platform Kiva, Moss et al (2015) find that narratives signalling autonomy, competitive aggressiveness, and risk-taking, are more likely to receive funding, and to receive it more quickly. In contrast, narratives signalling conscientiousness, courage, empathy, and warmth are less likely to receive funding. Narratives signalling proactiveness, conscientiousness, courage, warmth, or zeal are negatively associated with loan repayment.

Mach et al (2014) conducted a rigorous econometric analysis of 670,000 rejected loan applications and 100,000 funded loans on the Lending Club platform between 2007 and 2012. The study firstly tested whether small businesses are more or less likely to receive funding than other types of application controlling for the amount of loan sought, employment tenure of the applicant, average house prices in the applicant's state, the applicant's FICO credit score, and the application year. Encouragingly for entrepreneurs, Mach et al find that small business applicants are twice as likely to be funded as non-small business applicants controlling for other aspects of applicant quality. In



terms of other 'campaign related factors', each additional \$1,000 requested reduced the probability of the loan being funded by 4 percent. In terms of fund seeker related factors, having worked for less than a year reduces the probability of funding by 97 percent. Also, each additional point in the applicant's FICO score (implying increased creditworthiness) raises the likelihood of funding by 2 percent. And average house prices in the applicant's state are also related to funding success (although it is unclear whether this represents a demand or supply side effect).

However, regarding interest rates on funded loans, small businesses were charged one percentage point higher interest than non-small business applicants holding other aspects of applicant quality constant. Mach et al (2014) also looked at the determinants of loan performance and in particular whether small business P2P loans are more likely to be delinquent (i.e., charged off, in default, or 31-90 days delinquent) than other types of loans. In this respect, the study finds that, controlling for other aspects of applicant quality, small business loans on the Lending Club platform are 250 times more likely to perform poorly than loans for other purposes. In this context, the higher interest rates charged on small business loans is hardly surprising. Mach et al (2014) conclude:

"Given the relatively higher rate paid on such [small business] loans, it may be in the best interest of the business owner to pursue more formal options. More research is required to understand the long-term impact of such loans on the longevity of the firm and more education to potential borrowers is likely in order." (Mach et al, 2014, p. 10)

## 8.2 Summary

The role of P2P lending (and other forms of crowdfunding) in helping to fill funding gaps, due to banks' reduced lending following the GFC, has been an issue of great interest to academics and policy makers in recent years. Indeed, platforms such as Propser.com in the US and Funding Circle in the UK have grown very rapidly since the GFC. For example, SME lending on Funding Circle grew almost 80-fold between 2011 and 2016. Part of the attraction of P2P lending platforms is that their main function is to facilitate a credit transaction between a private investor and borrower without the same costly overheads and regulatory framework as mainstream banks. This may result in cheaper credit for borrowers and higher returns for investors. On the downside, credit checks conducted by online platforms may be less stringent and, as investors, credit providers do not have the same regulatory protection as bank depositors. However despite high early default rates (e.g., Quakle), P2P lenders typically now implement rigorous credit checks before allowing prospective borrowers onto their platforms. As a consequence, for example, Funding Circle's 3.9% default rate is similar to that on a traditional small business loan book.

The factors that affect the chances of an entrepreneur obtaining credit on an online platform relate to: the campaign e.g., financial information about the venture and videos/photographs of the entrepreneur; the crowdfunder e.g., spatial, cultural, and social proximity of the investor to the entrepreneur; the platform e.g., the screening/credit checks conducted by the platform; and the fund seeker (i.e., entrepreneur) e.g., the personal characteristics, experience, and social networks of the entrepreneur (see Kaartemo, 2017).

Financial information plays the same important role in affecting the chances of obtaining P2P credit as it does in bank lending. In short, the better the credit rating and other financial information relating to the campaign, the higher the chances of obtaining credit (Klaft, 2008). At the same time,

soft information from visuals also matters with more trustworthy looking entrepreneurs having a higher likelihood of obtaining credit (Duarte et al., 2012). However, a less savoury aspect of providing visual information is that it creates another potential channel for racial/ethnic discrimination to be exercised in credit markets. In this respect, Pope and Sydnor (2011) find that, among online loan listings with similar credit profiles, those with a Black American in the campaign photograph are less likely to receive funding, and are charged a higher interest rate, than those with a photograph of a White American. In contrast, loan listings with a photograph of a women are more likely to receive funding and pay a lower interest rate than those with a photograph of a man (Pope and Sydnor, 2011). In addition, campaigns by younger looking entrepreneurs are more likely to be successful (Pope and Sydnor, 2011). This evidence suggests that peer-to-peer lending may be helping to 'democratize entrepreneurial finance' for women and younger (looking) entrepreneurs, if not minorities (Cumming et al, 2018)

Platform screening/information also plays a valuable role with the additional hard and soft information on projects provided by the platform allowing P2P credit-providers to price loans more accurately than if rates were solely based on the credit rating category (Iyer et al, 2009). In other words, the information provided by the platform allows P2P credit-providers to better separate types, which will increase the chances of entrepreneurs obtaining credit (see section 3). Again, on the plus side for entrepreneurs, there does seem to be an appetite among investors on P2P platforms to lend to small businesses albeit the rates charged to them are higher than on loans for other purposes (Mach et al 2014). Indeed, small business P2P loans are much riskier and much more likely to default than loans for other purposes (Mach et al 2014). This raises issues about the performance of P2P loans to small businesses and investors' awareness of the risks they are undertaking by lending to small businesses.

*There is no shortage of directions for future research in P2P lending. A fundamental issue is: what information should (unsophisticated) online investors use in determining whether to lend online? In particular, what is the value, if any, of the extended information (e.g., pictures and borrower narratives) used in peer-to-peer lending decisions? Or, should peer-to-peer lenders simply rely on traditional hard metrics (indeed, do unsophisticated investors understand what these metrics mean)?*

*P2P lending is also a rapidly evolving market with an increased reliance on institutional funding<sup>65</sup>. But, a key issue for researchers to keep track of is how will changes in the P2P lending market play out for entrepreneurs? In particular, the market may evolve to depend more on social connections and soft information, but at the cost of limiting the size of the market and the cost savings of scale and automation. Alternatively, the market may evolve to depend more on hard information (as has been the case with P2P mortgage lending) leading to faster and less expensive lending decisions due to automation with associated scale economies:*

*"How the market develops will determine the potential cost reductions and the type of information that can credibly be communicated. What is clear is that the set of data upon which lenders make credit decisions has expanded." (Liberti and Petersen, 2018, p37)*

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<sup>65</sup> According to Liberti and Petersen (2018), institutional investors provide 80% of the capital on the two major US platforms (see also Morse 2015).

*Relating P2P lending to entrepreneurial credit journeys more generally, what factors influence entrepreneurs to look for credit from online platforms in the first place? For example, do previous experiences in the mainstream credit market such as rejection and discouragement increase the likelihood of seeking credit from online platforms? And, if so, what are the outcomes for such firms (in terms of subsequent loan and firm performance)? Overall, what are the differences between online and offline entrepreneurial credit journeys? That is, what are the differences in the factors affecting credit needs, application/discouragement decisions, lending decisions, and firm outcomes for online versus offline borrowers?*

## **9. Conclusion and main directions for future research**

Our understanding of different stages of the entrepreneurial credit journey has increased considerably in recent years. The GFC provided a new set of evidence regarding the impact of financial crisis on entrepreneurial credit conditions to add to findings from previous crises. In particular, and in contrast to supply side focussed research relating to previous crises, the discussion of the empirical literature in section 2 highlights the effects of the GFC on both the supply and demand for entrepreneurial credit (including discouragement). Also, as discussed in section 3, initial theoretical debates in the credit market literature largely focussed on supply side issues, in particular the problem of credit rationing which may arise with an imperfectly informed lender (Stiglitz and Weiss, 1981). However, even at that stage of the debate, researchers showed that, in theory at least, asymmetric information might equally give rise to too much lending (de Meza and Webb, 1987).

In terms of demand side issues, it became increasingly recognised in the late 1990's and early 2000's that credit market imperfections may lead to problems of not only credit rationing by banks but also of self-rationing by borrowers themselves (Levenson and Willard, 2000). This led to a rich vein of theoretical and empirical research, reviewed in section 4, into the issue of discouraged borrowers (Kon and Storey, 2003). Developments in behavioral economics (Kahneman and Tversky, 1979) have also increasingly informed the entrepreneurial borrowing literature and it is now better recognised that credit outcomes may be as much affected by entrepreneurial cognition and decision making (e.g., Mitchell et al, 2007), relating to issues such as over-optimism (Kahneman and Lovallo, 1994; de Meza and Southey, 1996; Malmendier and Tate, 2005), as by supply side credit constraints.

The issue of the real effects of credit gaps, due to credit- and self-rationing, on firm performance was examined in section 5. However, as highlighted in the discussion, there are problems with inferring financial constraints from finding a positive relationship between internal finance and new venture creation or performance (Evans and Jovanovic, 1989). From an entrepreneurial borrowing perspective, entrepreneurs may prefer to self-finance to retain control of the firm (Cressy, 1995) or, due to cognitive biases, they may misperceive financial constraints having sought, and rightly been denied by a well-informed lender, an amount of credit which is objectively too much (de Meza and Southey, 1996). In both cases, the availability of internal finance (entrepreneurial wealth or firm cash-flows) may affect entrepreneurs' decisions to start up or grow their ventures even if credit markets are operating perfectly. In this context, a more direct approach to testing financial constraints based on the relationship between funding gaps and firm performance was also discussed in section 5 along with some early findings using this approach.

In addition to entrepreneurs and lenders, the third key stakeholder in the entrepreneurial credit journey are policy makers, representing taxpayers, who benefit from the jobs created and other economic gains from providing entrepreneurs with assisted loans, mainly in the form of loan guarantees, to reduce funding gaps. However while some theoretical models discussed in section 6 suggest LGS's may not improve credit market efficiency, a review of the LGS evaluation literature provides general empirical support for the view that such schemes help entrepreneurs obtain credit that they cannot get elsewhere and provide an economic return on taxpayers' investment in the scheme. In addition, it was noted that, in the aftermath of the GFC, there is a more central role for banking competition policy. In this respect, achieving the right level of competition to promote access to finance and financial stability is a significant ongoing challenge for policy makers.

The discussion of gender and ethnic discrimination in entrepreneurial credit markets in section 7 highlights that despite anti-discrimination legislation there still exist significant gender/ethnic differences in entrepreneurial finances. In particular, women entrepreneurs use less capital at start-up and are less likely to access bank credit subsequently than their male counterparts; and black entrepreneurs are more likely to be discouraged or denied credit, and pay higher interest rates on credit received, than white entrepreneurs. While some of these differences may be explained by structural differences between firms which have nothing to do with gender/ethnicity, some of the literature still finds evidence that suggests entrepreneurial credit outcomes are affected by issues of gender stereotypes and ethnic/racial discrimination. Technological developments such as crowdfunding may help to 'democratize entrepreneurial finance', promoting access to finance among groups of entrepreneurs that are traditionally underrepresented in the mainstream credit market (such as women, ethnic minorities, and young people)

Regarding entrepreneurial borrowing in particular, P2P lending, discussed in section 8, is a rapidly growing market, which an increasing number of entrepreneurs, many of whom felt let down by banks, have turned to since the GFC. P2P lending is also potentially beneficial for traditionally underrepresented groups in the credit market. However, while there is no evidence of gender discrimination in P2P lending, issues of racial/ethnic discrimination seem to arise once more with black entrepreneurs seeking credit via online platforms less likely to receive credit and charged higher interest rates if they do receive credit. In addition, there are issues for policy makers and the P2P lending industry going forward in terms of improving the performance of small business loans made on P2P lending platforms, and ensuring investors who provide credit on lending platforms are aware of the risks they are undertaking.

What are the main directions for future research regarding entrepreneurial credit journeys that, in the author's view, deserve special attention due to their fundamental nature? The five proposals that follow in this respect draw on the directions for future research put forward in the section summaries<sup>66</sup>. As a reminder, suggestions for further research have been made in the following areas:

- The collection of more data in relation to entrepreneurial credit journeys (section 2);

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<sup>66</sup> See Udell (2015) for a recent 'top 10' list of under-researched areas in relation specifically to lending technologies and lending channels. The 'top 5' proposals here for entrepreneurial credit journeys may be viewed as complementary to Udell's list.

- Addressing issues relating to lending technologies (drawing mainly on insights from Udell, 2015, in particular – the distinction between inside/outside collateral, the ability of technology to harden soft information, and the collection of data-sets which identify lending technologies) (section 3);
- Identifying information asymmetries and the nature of selection in entrepreneurial credit markets (section 3);
- The development of structural models of discouragement (section 4);
- Developing tests of underinvestment (e.g., the external funding gaps approach) that are better identified than existing internal finance tests (section 5);
- The optimal design of LGS's and measuring scheme effectiveness/additionality (section 6);
- Understanding how bank competition, and its relationship with SME credit availability, is continuing to evolve post GFC (section 6);
- Developing structural models of underrepresented groups' access to credit (section 7); and
- In relation to P2P lending, researching the value of extended information sets, the evolution of P2P lending markets, and understanding differences between online and offline entrepreneurial credit journeys (section 8).

The intention here is not to review each of the above issues again in detail, but to draw out and elaborate on those that seem fundamental for our overall understanding of entrepreneurial credit journeys, and which have received hitherto insufficient attention in the literature.

#### *Data on entrepreneurial credit journeys*

A fundamental issue is the need for more data relating to entrepreneurial credit journeys. In particular, data should be collected more widely for entrepreneurial credit needs, application/discouragement decisions, lending decisions (along with amounts of loan received and borrowing terms), and firm outcomes such as profitability and growth. (Along with background data relating to firm and owner characteristics to use as explanatory variables in models relating to entrepreneurial credit journeys). The (defunct) US SSBF is the template researchers should aspire to in this regard. Some researchers have attempted to follow the example of SSBF (e.g., UKSMEF and SME Finance Monitor in the UK) in spirit if not in every detail. An improvement on SSBF would be to develop the surveys as longitudinal studies of firms rather than as repeated cross sectional studies. The UK Longitudinal Survey of Small Business Finances, an annual survey started in 2015, whilst not a specialist finance survey, does at least track individual firms over waves and provides key data relating to entrepreneurial credit journeys. However, introducing a longitudinal SSBF 2.0, in the US and other countries, would provide researchers with invaluable detailed data for testing theories about entrepreneurial borrowing and lending.

#### *Testing the presence of information asymmetries and the nature of selection in entrepreneurial credit markets*

Information asymmetries and the nature of selection are fundamental determinants of entrepreneurial credit journeys. However, there is little direct empirical evidence on the presence of information asymmetries in SME credit markets (as an exception, see the discussion in section 3.4 of Karlan and Zinman's, 2009, experimental evidence of information asymmetries in the credit market). Further, we have no direct empirical evidence relating to the nature of entrepreneurial selection

(favorable or adverse) in credit markets (Parker, 2003). These issues are fundamental because information asymmetries are almost invariably assumed in both theoretical and empirical analyses of SME finances. Also, even if these informational assumptions are warranted, the consequences of information asymmetries, and the appropriate policy responses to information asymmetries are very different depending on the nature of entrepreneurial selection in the credit market i.e., whether selection is adverse or favorable (see section 3). Developing non-experimental methods (using the proposed data-sets on entrepreneurial credit journeys) would represent a low cost (and therefore more easily replicable) approach to testing these issues.

#### *Relationships between stages of the entrepreneurial credit journey*

If entrepreneurs' investment decisions in a project are based on the net present value of the project cash-flows, then there is no reason for current borrowing decisions to depend on previous borrowing and lending decisions. Yet an important insight from behavioral finance is that anchoring affects borrowing and lending decisions (Baker and Wurgler, 2013). Further, discouraged borrowers provide a potential direct link between previous borrowing experiences (specifically, rejection) and future borrowing decisions. However, there are a number of important unanswered questions about relationships between stages of the entrepreneurial credit journey. In particular, does previous rejection by a lender increase the likelihood of subsequent discouragement? Also, how do entrepreneurs form beliefs about the likelihood of rejection (is anchoring and/or other heuristics involved; or are entrepreneurs rational Bayesian learners)? And, what happens to discouraged borrowers? Do they return to borrowing subsequently (after prospects for the firm and/or economy pick up again)? Or, are they scarred by their rejection experiences, so that they give up their investment plans altogether and become non-borrowers? And, what about non-borrowers (which form the majority of SME's)? Having become a non-borrower, is the firm likely to borrow again in the future or does it become a 'permanent non-borrower'?

If such evidence were found, this would be similar to the issue of unemployment persistence ('state dependence') in the labour market literature (e.g., Arulampalam et al, 2000). Analogous policy implications to the labour market situation might also follow in that case, with short run policies to reduce credit rationing (e.g., loan guarantees) also having longer run effects by reducing the equilibrium rate of non-borrowing (suggesting intervention yields greater economic additionality in the long run). A further related issue is the following: what is the effect of non-borrowing (and other states) on firm performance? This links in to the next proposed line of research.

#### *Disentangling financial from cognitive constraints (external funding gaps testing of underinvestment)*

In the context of testing underinvestment, this topic of research relates specifically to testing the relationship between external funding gaps (arising due to non-borrowing, discouragement, and rejection) and firm performance. As argued in section 5, the external funding gaps test is able to disentangle financial from cognitive constraints on firm investment and performance, in contrast to existing internal finance tests. However, more research is needed in this area to develop appropriate identification strategies to disentangle issues of under-investment from the absence of investment opportunities and/or a lack of entrepreneurial ability that may be associated with external funding gaps. Having tackled these remaining identification issues, it is important to understand how the effects of external funding gaps on firm investment/performance vary over

different groups of entrepreneurs (e.g., female and ethnic minority entrepreneurs) and different types of credit product (e.g., short term versus long term credit).

Overall, this approach will help identify the differential effects of underinvestment arising at different stages of the entrepreneurial credit journey. For example, is discouragement more detrimental to firm investment/performance than rejection (since rejected firms, who make more progress along their credit journey, may have some of their credit needs met)? Beyond understanding the qualitative effects of external funding gaps arising at different stages of entrepreneurial credit journeys, there also needs to be a better understanding of the quantitative effects of funding gaps. This will help provide a direct answer to the fundamental question: “What is the effect of a one currency unit increase in unmet credit needs on firm performance?” This links back to the need for more (longitudinal) data on entrepreneurial credit journeys, in particular, the need for data about the amount of credit required and the amount actually received.

#### *Entrepreneurial and bank learning over recurrent credit journeys*

Repeated interactions between entrepreneurs and lenders during the course of a lending relationship facilitates learning by both parties. Yet, the (supply-side) focus of the finance literature has predominantly been on the consequences of information asymmetries for credit market failure (Stiglitz and Weiss, 1981 etc.) and the role of transactional and relational lending technologies in helping lenders to become better informed about the firm’s prospects over time (e.g., Berger and Udell, 2002; Kysucky and Norden, 2015). However, consistent with the view that entrepreneurship is a process of learning and discovery (Kirzner, 1997), helping move markets towards equilibrium (von Hayek, 1937), it seems more plausible that both banks and entrepreneurs begin uncertain about the firm’s prospects and only learn about these prospects over time (Jovanovic, 1982). In addition, entrepreneurial tendencies to rely on misleading anchors (e.g., Dougal et al, 2011) or proneness to over-optimism (e.g., de Meza and Southey, 1996; Malmendier and Tate, 2005) may be mitigated as the entrepreneur gains experience from running their business and interacting with lenders (Fraser and Greene, 2006; Ucbasaran et al, 2010). Despite the fundamental nature of the issues involved, there is little formal analysis of credit market outcomes where both parties to a credit agreement are ill-informed about the venture’s prospects, but where both parties also have the capacity to learn from experience.

Overall, this view of the entrepreneurial credit market suggests that as banks and entrepreneurs learn, and uncertainty is resolved, the market may increasingly allocate funds efficiently. Conversely, by implication, obstacles to bank and entrepreneurial learning may impede the achievement of an efficient equilibrium. An example of such an obstacle might be a previous rejection experience, leading to discouragement or non-borrowing and therefore causing a ‘breakdown’ of the relationship between the bank and entrepreneur (as discussed above), stopping the learning processes. (By way of additional motivation, a recent empirical example is the relational breakdowns between banks and entrepreneurs observed following the GFC, reported in the literature and covered extensively in the media.)

In any case, even without a relational breakdown, does bank learning reduce information asymmetries or does entrepreneurial learning proceed at a (faster) rate that maintains the entrepreneur’s information advantage over time? (And, what then are the consequences for credit market equilibrium?) In addition, does bank/entrepreneurial learning influence the nature of

selection in entrepreneurial credit markets (by increasing the separation of types in entrepreneurship relative to the outside option)? (This renders the nature of selection endogenous in a model of bank/entrepreneurial learning, in contrast to the parametric selection in existing models of the credit market).

Theoretical modelling and empirical analyses are required to test such conjectures rigorously. However, as a starting point, the concept of the entrepreneurial credit journey, which provides a dynamic perspective on the demand and supply of credit, provides a natural framework for this analysis.

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