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**Discouraged Borrowing, Credit Rationing and Firm Growth:
A Learning Model in Small Firms**

by

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A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of
Philosophy in Business and Management

University of Warwick, Warwick Business School

March 2021

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ACKNOWLEDGEMENT

Every journey imprints memory into someone's life and there is no exception to this four and a half year of my PhD journey. This becomes the most memorable journey that I met so many brilliant and inspiring people who I will always feel thankful that they joined my voyage.

First and foremost, I am extremely grateful to my supervisors - Dr. Stuart Fraser and Dr. Kevin Mole - for helping me sailing my journey. Without their invaluable supervisions and support through four years of PhD study at Warwick, I could not even start the journey, not saying landing the shore. Their immense knowledge and insightful feedback have helped me to direct my journey, especially in the early days when I was navigating my research. I could not finish this thesis without their sincere encouragement every time I was discouraged from struggles. I am very much appreciated their guidance and patience the whole time, and I cannot be luckier to have them on board with me from when I started sailing until I land safely.

Every journey starts with one step and I should give gratitude to Warwick Business School and the PhD Office for helping me start this first step. All the training and the intellectual environment I received has built a strong foundation for me to become a researcher. I would also like to thank Professor Stephen Roper for his help in gaining access to data which is a vital part of my journey.

Inevitably, this journey cannot be achieved without my friends who were also sailing their PhD journeys. I am very glad that I became a part of their journey and they also became an unforgettable part of mine. I could not say how lucky I am to have Ruowen Xu, ChengCheng Kang and Avis Tam hopped on my voyage and become friends for life. Thank you each of you for sharing all the laughs and cries, all ups and downs in our journeys.

I would also like to thank Professors Jeremy Phillipson and Matthew Gorton and my colleagues at NICRE for supporting me in finishing the thesis. Your understanding is a huge support for me.

Not only this journey but also in every other journey in my life, I know that my beloved parents, my sisters and my nephew and niece will always be there to share with me all the happiness and memories I experienced. I always feel calmed at heart because I know even though they were not on board, they always believe in me and let me do what I want. I cannot wait to share with them all the memories of this journey.

At last, once more time, please let me send a sincere thank you to each of you who joined my journey. Also, a thank you to me to set sailing this spectacular journey. It was my pleasure to have you all on board. Hopefully, good weather is waiting for our tomorrows!

AUTHOR'S DECLARATION

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. I hereby declare that I am the author of the thesis, that the work of which this thesis is a record has been carried out by myself, that no material contained in the thesis has been used before or published and that this thesis has not been submitted in any previous application for any degree at another university.

Thanh Thao Nguyen

March 31 2021

SUMMARY

Although asymmetric information in financial markets has been studied extensively in the literature, and the credit-rationing issue is well understood, less is known about discouraged borrowers. Studies on small businesses, however, show that discouraged borrowers account for a larger proportion of the economy than credit-rationed businesses. Overall, there is a lack of studies on the determinants of discouraged-borrowing decisions as well as how discouragement is different from credit rationing in terms of their impacts on firm performance. Although rooted in market failure, discouraged borrowing is a self-rationing decision made by the firm itself, and thus, it reflects firms' decision-making processes. In this context, this thesis will investigate firms' borrowing-decision processes. It will also study impacts of discouraged borrowing and credit rationing on firm growth. Based on learning models, it shows that firms learn from their experience in forming their future decisions. In particular, credit rationing worsens the perceived rejection likelihood, which in turn increases the tendency to make a discouraged-borrowing decision. Moreover, the learning process also channels indirect impacts of discouraged-borrowing and credit-rationing on growth through their negative impacts on the perception of financial constraints and subsequent impacts on growth expectations. Disentangling the individual impacts of discouraged borrowing and credit rationing on growth is also of interest in this thesis. Using the UK Longitudinal Small Business Survey and the UK SME Finance Monitor, this study provides empirical evidence to support the model. It shows that firms rejected in the past are more likely to self-ration in the short and long term. It also supports the model in presenting distinctive direct impacts of discouraged borrowing and credit rationing on growth. Lastly, the evidence also shows that both types of financial constraints indirectly hinder growth expectations through their negative impacts on financial-constraint perceptions, and thus, impede growth outcomes in the future. Accordingly, the findings in this thesis suggest that to resolve financial constraint issues in small businesses, policymaking should address both supply and demand sides through various initiatives. For example, while credit-reference agencies and loan-guarantee schemes help reduce the informational-asymmetry issue on the supply side, policymakers should also raise awareness on the demand side of these initiatives.

Keywords: discouraged borrowing, credit-rationing, growth, growth expectation

LIST OF ABBREVIATION

AEH	Adaptive Expectation Hypothesis
BEIS	Department for Business, Energy & Industrial Strategy
CMP	Conditional-mixed Process
EE	Entrepreneurial Event View
FM	Finance Monitor
FOSD	First-Order Stochastic Dominance
HP	Hadlock and Pierce
ICFS	Investment-cash flow sensitivities
IDBR	Inter Departmental Business Register
KZ	Kaplan and Zingales
LSBS	Longitudinal Small Business Survey
ME	Marginal Effect
MLE	Maximum Likelihood Estimation
MSME	Micro-, Small- and Medium-sized Enterprise
MW	Meza and Webb model
PAYE	Pay-as-you-earn Tax
OLS	Ordinary Least Square
REH	Rational Expectation Hypothesis
SBCS	Small Business Credit Scoring
SME	Small- and Medium-sized Enterprise
SW	Stiglitz and Weiss model
SOSD	Second-Order Stochastic Dominance
TPB	Theory of Planned Behaviour
VAT	Value-Added Tax
WW	Whited and Wu

CHAPTER I: INTRODUCTION

The UK financial market landscape has evolved markedly since the financial crisis 2007-08. Recent data shows that the financial market for small businesses has recovered from the crisis¹, with positive net growth in SME lending. Moreover, the market structure has changed significantly since then. A wider range of products becomes available, e.g., peer-to-peer lending² and new players have joined the supply side of the lending market, e.g., challenger banks, or peer-to-peer lenders.

After the financial crisis, SMEs lending was remarkably tightened and only recovered after seven years of the crisis (Bank of England, 2020). In particular, total net lending to SMEs only becomes positive in 2015 (British Business Bank, 2014, Bank of England, 2020). The gross lending to SMEs and repayment increase over the period 2012-2015, but after 2016, there is a stagnation in gross lending (British Business Bank, 2020). The Credit Conditions Survey³ (Bank of England, 2019) also shows that credit availability to small and medium businesses increases largely till 2015, then relatively being stable from 2016-2018, and decreases slightly in 2019. Furthermore, the contributions to the positive net lending to SMEs have changed in recent years. Small banks become more important than large banks in lending to SMEs, and alternative finance also increases their position in the lending market.

With the new type of providers and the new range of products, the business lending landscape is changing. The development of fintech leads to the existence of new forms of banking and financing, for example, challenger banks and peer-to-peer lending, that aim to serve banked and unbanked consumers and business customers. The existence of the new products and the new suppliers enriches the financing choices of businesses. Indeed, Bank of England (2020) shows that peer-to-peer lending has grown to 10% of total new lending to SMEs in 2017. Moreover, the

¹<https://www.bankofengland.co.uk/-/media/boe/files/fintech/open-data-for-sme-finance.pdf?la=en&hash=FD4BC43BBBD61EDEC5F8460C6BB7488EFDE647581>

²<https://www.british-business-bank.co.uk/wp-content/uploads/2020/02/Small-Business-Finance-Markets-2019-20-report-FINAL.pdf>

³ Credit Conditions Survey is quarterly conducted by Bank of England. This survey asks banks and building society lenders in the UK about their view on changes in supply, demand, loan pricings and defaults of bank lending over the past three months and the next three months. To calculate aggregate results, each lender is assigned a score based on their response. These scores are then weighted by lenders' market shares.

development of technology also improves the lending techniques used in established banks. The application of machine learning in the small business lending niche shows some improvements in the lending rates and default rates, and it also helps to diversify the concentrated credit market in the UK. Bank of England (2020) also shows that net SME lending from small banks has been increasing, and a decreasing trend can be spotted for large banks.

In a report by Cambridge Alternative Finance Centre (2020), it is shown that the UK alternative finance market has grown steadily over the period 2015-2020, from \$4.9 billion in 2015 to \$12.6 billion in 2020. Debt-based finance contributes the highest portion in the alternative finance market with \$6.15 billion in 2020 – half of the total volume. Among that, peer-to-peer/marketplace business lending raised to \$2.5 billion and \$3.2 billion in 2019 and 2020, respectively, which is 4 times higher than Italy - the highest volume in the Europe (excluding UK) of this type of alternative finance. However, it is noticed in this report that along with the increase in volume, this niche of the alternative finance market becomes more concentrated in the past two years.

Despite the development of the business lending side, there are some concerns about the decline of new applications in recent years – reported by UK Finance (2018) -, particularly, for core bank lending in the UK market (British Business Bank, 2020). British Business Bank (2020) shows that a proportion of small businesses are reluctant to use core finance products although the asset finance volumes for debt finance have grown since 2014. The report also shows that a decline in applications is seen during the period 2014-2019, and smaller businesses also underestimate their chance of success. Particularly, in 2019, British Business Bank (2020) documented a low borrowing intention among SMEs for their growth investment. This trend from the demand side is also documented in the Credit Conditions Survey (Bank of England, 2019). This weak demand can be seen from 2016 for SMEs.

This picture raises two important concerns. Firstly, given firms needing external finance, a declining application rate may reflect that firms become discouraged borrowers, i.e., they choose not to make applications although they have financial demand. This reflects in statistics by BBB (2020:5) that “70% of SMEs saying that they would forego some growth in order to avoid taking on more debt.” This issue draws important implications to the policy-makers that an improvement from the supply side might not translate into the demand side, and the story on SME finance should also be tackled from the firm side. Secondly, the application decline may come from the fact that firms become less growth-oriented, which means that they do not

have growth ambition, and they do not need external finance. Indeed, it is documented that not all SMEs aim to grow their business.

Indeed, the literature on funding gaps suggests that asymmetric information in financial markets causes two types of funding gap, namely credit-rationing due to financiers' decisions (Stiglitz and Weiss, 1981; Meza and Webb, 1987) and discouraged borrowing due to firms' decisions (Kon and Storey, 2003). While research on the determinants and consequences of credit rationing is long established, less is known about drivers and impacts of discouraged borrowing although studies show that discouraged borrowers account for a sizeable proportion of the economy (Levenson and Willard, 2000; Mac an Bhaird *et al.*, 2016) and many of them would be creditworthy (Cole and Sokolyk, 2016; Cowling *et al.*, 2016). An investigation into the consequences of funding gaps caused by discouraged borrowing and how it is different from credit-rationing's impact is necessary to mitigate the negative impacts (if any). Furthermore, in order to resolve the funding-gap issue, examining drivers of discouragement plays an important part in lessening its degree in the small business sector. This thesis aims to extend studies on this type of self-rationing behaviour in order to understand the factors that influence this decision, as well as its consequences on firm growth. Such research will help understand the behaviours of firms discouraged from borrowing and the consequences of this decision on growth. This thesis will also advise policymakers in setting and improving initiatives that aim to remove financial barriers from both supply and demand sides and to unlock growth potentials of small businesses.

Despite considerable attention extant studies have paid to the determinants of discouraged borrowing decisions, focusing especially on firm characteristics, relationship lending and environmental factors, there are many contradictory findings. For example, age and size are often studied as the main determinants of this self-rationing behaviour since younger and/or smaller firms are arguably more informational asymmetric. Empirical evidence suggests a negative correlation between size and discouraged borrowing (Chakravarty and Xiang, 2013) but mixed results are found on the impact of age on discouragement, e.g., negative relationship (Cowling *et al.*, 2016), no relationship (Cole and Sokolyk, 2016) or positive relationship (Han *et al.*, 2009). Mature firms have a longer track records which help lessen the degree of asymmetric information, which in turn, reduce the application costs and banks' screening error. Meanwhile, young firms are more optimistic about their creditworthiness (Fraser and Greene, 2006) and have a lower perceived rejection likelihood that may be biased. Hence, the offsetting effect of optimism

against track record may lead to a positive relationship between age and discouragement. This may also suggest an inverse U-shaped relationship between age and discouraged borrowing.

Furthermore, asymmetric information can be ameliorated by a strong lending relationship between firms and financial suppliers. As such, relationship lending reduces the degree of discouragement. However, empirical results do not always support this argument. For example, Han *et al.* (2009) show that this impact depends on firm's risk level and market concentration. They show that in a long relationship, discouraged borrowing tendency reduces in low-risk firms but increases in high-risk firms because a long relationship allows bank to collect information that may be unfavourable for high-risk firms. Meanwhile, Cole and Sokolyk (2016) find that discouragement propensity is reduced in the presence of multiple lending relationships but is unaffected by the length of relationship.

Moreover, the informational-asymmetry issue is more severe in developing economies than in developed economies, and thus discouragement is more prevalent in developing countries (Kon and Storey, 2003). Nevertheless, an empirical study across 30 economies by Qi and Nguyen (2020) found that discouragement is less likely to happen when borrowers have government connections and this effect is stronger in those developing economies where corruption is more severe and trust in legal and financial systems are low. They argued that firms with government connections have a better understanding of institutional structures and thus, are more confident in approaching banks even though they have the same likelihood of being turned down.

In general, these studies have shown that discouraged borrowers reflect firms' perception of their creditworthiness based on the information that they acquire from the market and thus, discouragement reduces with information exchange during a strong relationship with other market players. Nevertheless, further research is needed to explain firms' learning processes that lead to discouragement as well as to understand the contradictory results in the literature.

Furthermore, the consequences of discouraged borrowing on firm performance have relatively less attention. The literature mainly focuses on supply-driven financial constraint, i.e., supply contraction or credit rationing issue. A theoretical model by Carpenter and Petersen (2002) shows that in financially constrained firms, growth is more sensitive to change in cash flow, and thus it suggests that limit in accessing the

financial market constrains firm growth. However, the model does not differentiate the financial constraint issues originating from credit rationing or discouraged borrowing.

The majority of empirical studies in the literature on financial constraints has found supporting evidence for Carpenter and Peterson's (2002) model, particularly when the supply contraction is severe. For example, Mulier *et al.* (2016) develop an index to measure financial constraints for unquoted European SMEs and find that financially constrained firms have lower investment levels and resort to other options to fund their operation activities. Similarly, following a credit supply shock, firms tend to reduce their investment and employment (Dwenger *et al.*, 2020). However, some studies have found that financial constraints do not have significant impact on firm growth, particularly on employment growth (Popov and Rocholl, 2018) due to expensive employment adjustment cost. The literature, however, has not distinguished the individual impact of funding gaps caused by discouraged borrowing and credit rationing on small firm performance. Hence, studies should further advance understanding of the impacts of discouraged-borrowing and credit-rationing funding gaps.

In general, more research is needed to understand of the determinants and consequences of discouraged borrowing needs. Firstly, studies have not shown the role of information types in discouraged borrowing decisions. Kon and Storey (2003) show that discouragement is caused by asymmetric information and some empirical findings show that discouraged borrowing behaviour reflects firms' perception of information quality instead of volume of the information flow. For example, firms having governmental connections in developing countries have more informational relating to application process and legal right (Qi and Nguyen, 2020). Moreover, in a long relationship, both positive and negative information about the borrower are observed by financiers, and thus low-risk firms will benefit but high-risk firms will be penalized (Han *et al.*, 2009). Hence, low-risk firms are less likely to be discouraged but high-risk firms are more likely to be discouraged in a long relationship. As such, not only the information volume but also types of information play an important role in explaining discouragement.

Additionally, the literature has not investigated the learning process from the demand side of lending relationships. Discouraged borrowing is a consequence of decisions made by firms even though it is rooted in market failure. The relationship lending literature has focused on the supply side by studying how banks learn about firms' creditworthiness and how this learning process helps reduce the degree of credit-rationing issue. However, less is known about how firms learn from the lending

relationship, even though the asymmetric information issue can also come from their side. Therefore, it is unclear how firms learn from relationship lending about how banks evaluate loan applications. Answering this question can also provide insight into the determinants of discouraged borrowing.

Secondly, the literature has not extensively studied the individual impact on firm growth of discouraged borrowing separating from credit-rationing. Studies on the impact of credit-supply shocks only show consequences of supply friction whilst research on changes in cash flow has not identified individual impacts of discouragement and credit rationing. Although aggregation of these two types of funding gap represents the total impact of market failure on firm activities, discouraged borrowing is distinct from credit rationing. Because the borrowing decision is made by firms, it may also reflect firms' perceptions of the market friction. This issue is particularly important in small firms since owners' self-evaluation plays a critical role in firms' decision-making process.

In the literature on the impacts of financial constraints on growth, many studies have emphasized the importance of controlling for growth opportunities (Carpenter and Peterson, 2002; Carpenter and Guariglia, 2008). Various empirical strategies try to isolate funding gap's impacts on growth by controlling for growth opportunities, using e.g., Tobin's Q, but the effectiveness and validity of these measures in the context of small business is still discussed. One of the main critics is that this measure uses market value to capture growth opportunities based on the assumption that the financial market yields an unbiased evaluation of firms' prospects. Two main issues are associated with that: first, the information on market values is unavailable for small businesses since they are not listed in the market; and second, this measure reflects market's evaluation rather than a firm's self-evaluation, which also decides a firm's investment in their businesses (Gennaioli *et al.*, 2016).

Recent studies suggest that firms' self-evaluation should be taken into account in measuring growth opportunities, rather than market evaluation (Carpenter and Guariglia, 2008). Indeed, Gennaioli *et al.* (2016) show that CFOs' expectations of earnings growth correlate with investment plans and actual investment activities. Therefore, growth expectation should be used to control for growth opportunities. Examination on growth expectation will also answer how cognition plays a role in the relationship between finance and growth.

This thesis, therefore, aims at addressing three main points. Firstly, it seeks to understand the role of information that firms gather from their financiers in making

borrowing decisions. In particular, I develop a model of the firm-learning process in self-evaluating their creditworthiness (Figure 5, Chapter III). Instead of looking into the learning process on the supply side in relationship lending, this study investigates a firm learning process based on the bank's information in order to make borrowing decision. In relation, the model also examines the role of negative information, i.e., a previous credit-rationing (loan-denial) decision, in discouragement decision, and thus, it highlights the importance of information type in the learning process of forming an unbiased perception of rejection likelihood that matches with the market's decisions. Accordingly, it emphasizes the consequences of credit rationing on subsequent borrowing decisions (as presented by Arrow 1, Figure 1) and highlights that the severe impact of asymmetric information is magnified by the effect of credit rationing on discouraged borrowing. The literature on discouraged borrowing and its determinants is reviewed in Section 2.2., Chapter II. The theoretical learning model is presented in Section 3.2.1., Chapter III. The empirical evidence is shown in Chapter IV.

Secondly, this thesis studies the individual impacts of discouraged borrowing and credit rationing on firm growth. Studies on the consequences of discouraged borrowing need further development to understand financing and investment behaviour from the demand side due to the dependency of firm performance on the perceptions of small business owners. Discouragement may reflect not only market failure but also entrepreneurs' cognition. As such, its impact on firm performance may be distinctive from credit rationing. The direct impacts of discouraged borrowing and credit rationing on growth are presented by Arrow 2, Figure 1. The literature on the impacts of financial constraints on growth is reviewed in Section 2.4., Chapter II. The theoretical model on the direct impacts of financial constraints and growth is developed in Section 3.2.2., Chapter III. The empirical evidence is shown in Section 5.4.2., Chapter V.

Thirdly, this study further examines the indirect impact of funding gap on growth by studying the role of growth expectations in the relationship between funding gap and growth in small business, which has not been examined fully in an incorporated framework. Because growth expectations reflect firms' self-evaluations of growth opportunities - one of the main issues in the financial constraint literature, understanding growth expectations help addressing the issue of capturing growth opportunities in the literature. In addition, the literature of financial constraints has been showing how growth opportunities (which are captured by growth expectation in this study) affect both financial constraints and growth, but less is known about how financial constraints experience affect growth expectation in an incorporated model.

Thus, this study also aims to incorporate the formation of growth expectation and its relation to previous financial constraints in order to answer the question of indirect impacts of discouraged borrowing and credit rationing on small business growth. A first glance on the indirect impact can be seen from Arrow 3, Figure 1, which show that discouraged borrowing and credit rationing affect growth expectation which in turn affects growth outcome. Hence, growth expectation provides an indirect link from previous financial constraints to growth outcome. A fully developed model is presented in Sections 3.2.1 and 3.2.2., Chapter III and its empirical evidence is presented in Section 5.4.3, Chapter V, while the literature review on growth expectation is shown in Section 2.3., Chapter II.

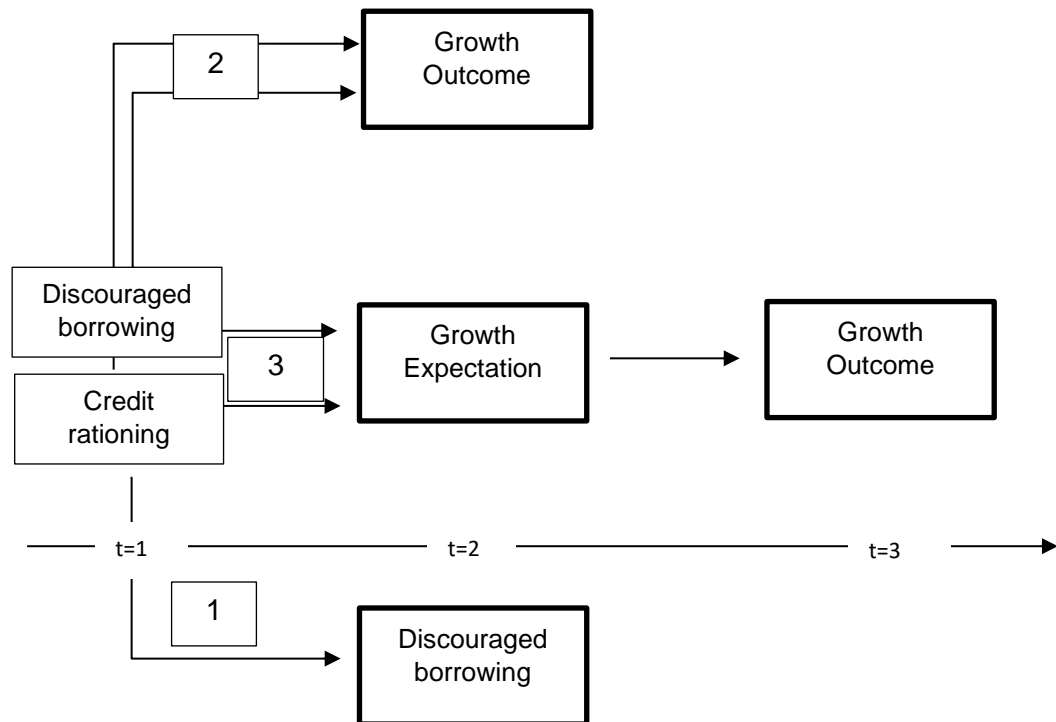


Figure 1: Discouraged-borrowing, credit-rationing, growth expectation and growth

Overall, this thesis contributes to the literature on discouraged borrowing, financial constraints and small business growth. Firstly, a Bayesian model extends the discouraged borrowing literature by studying firms' perceived rejection likelihood in a dynamic relationship between credit rationing and self-rationing decisions. It also extends the relationship lending literature by looking into firm's learning process instead of examining the learning process of financial suppliers, and thus highlights the importance of firms' cognition in the funding gap. This Bayesian model is presented in Chapter III and the empirical evidence is presented in Chapter IV.

Secondly, it extends the literature on small business growth by developing a theoretical framework that illustrates both the direct impacts and indirect impacts of

discouraged borrowing and credit rationing on growth outcome. As growth expectation is an important determinant of growth outcome, how the formation of growth expectation is indirectly constrained by financial constraints helps address the indirect channel of financial constraints on growth. Indeed, indirect impacts of these two types of funding gap on growth are transmitted through two mediators, namely perception of growth opportunities and perception of financial constraints.

In addition, it also contributes to the literature of discouraged borrowing by providing empirical evidence for the differences in the impact of self-rationing and credit rationing on small firm growth. The empirical evidence shows that discouraged borrowing has different impact on growth in terms of direction and magnitude, compared to credit rationing. It, thus, suggests that further studies should seek to explain differential impacts of these two types of funding gap due to informational asymmetry. The theoretical model is presented in Chapter III and its empirical model is presented in Chapter V.

This thesis is structured as follows: Chapter I introduces the aims of this thesis. Chapter II provides a literature review on discouraged borrowing, credit rationing, formation of perception of growth opportunities, and consequences of financial constraints on growth. Chapter III develops a theoretical framework of discouraged borrowing, credit rationing, growth expectation and growth. Chapter IV examines the causes of discouraged borrowing in a dynamic setting using UK Longitudinal Small Business Survey and UK SME Finance Monitor. Chapter V provides empirical evidence on the direct and indirect relationships between discouraged borrowing, credit-rationing and growth using the UK Longitudinal Small Business Survey. Chapter VI concludes the thesis and suggests implications for practitioners, policy makers and future research.

CHAPTER II: LITERATURE REVIEW

2.1. Introduction

The issue of funding gaps caused by market failure, which leads to financial constraints, has long been discussed in the literature. Two key strands of the funding gap literature study causes of funding gaps and their consequences on firm performance. The first strand – credit rationing - identifies informational asymmetry in the financial market as the main determinant of a funding gap. Ex-ante and ex-post asymmetric information issues between borrowers and lenders lead to adverse selection and moral hazard, causing credit-rationing (Stiglitz and Weiss, 1981). Under these conditions, a credit-rationing equilibrium exists (Meza and Webb, 1987; Parker, 2002; 2003). Heterogeneity in borrowers, financiers and environment characteristics are the main topics of focus in the credit rationing literature.

The second literature – financial constraints - studies the consequences of a funding gap on firm performance and investment. For example, Fazzari *et al.* (1988) find that financially constrained firms have higher sensitivities of investment to cash flow, even though their results are still discussed (Kaplan and Zingales, 1997) because some studies show that investments are less sensitive to cash flow in constrained firms. Financial constraints also impede R&D investment, asset growth, employment growth, and import and export activities (Carpenter and Petersen, 2002; Mancusi and Vezzulli, 2014; Manova *et al.*, 2015; Acharya and Xu, 2017)

Whereas credit-rationing issue is well studied, the funding gap caused by discouraged borrowing behaviour lacks comparable attention in the literature. Until fairly recently, most studies have ignored this demand-driven funding gap when examining the causes and consequences of financially constrained firms (Fraser *et al.*, 2015). Noticeably, among various kinds of demand-driven funding gaps, discouraged borrowing behaviour is particularly caused by market failure. Discouraged borrowers refer to those firms who thought that they would be rejected even though they might be successful if they had applied. Compared to other types of funding gaps that come from the demand side, such as risk aversion or control loss, this self-rationing behaviour arises from the asymmetric information between firms and their external finance providers (Kon and Storey, 2003). As such, market friction leads to not only credit rationing but also discouraged borrowing. Hence, the funding gap caused by market failure should also consider this type of financial constraints in order to fully capture the consequences of market friction on firm performance. This chapter will review the literature on credit rationing and on financial constraint and will proceed as

follows: Section 2.2 discusses determinants of credit-rationing and discouraged borrowing decisions, with a focus on the latter. Section 2.3 briefly discusses the literature on growth and growth intention in the context of small business. Section 2.4 discusses the real effect of financial constraints on growth and measurement of financial constraints to capture the impact of market failure on firms' activities.

2.2. Supply-driven and demand-driven funding gaps

2.2.1. Credit-rationing or supply-driven funding gap

The impact of asymmetric information on credit-rationing is one of the main discussions found in the funding gap literature. The focus is on the role of adverse selection and moral hazard with ex-ante and ex-post asymmetric information. Asymmetric information issues can arise before and after the lending decision is made, as well as before and after a project's return is realized. Adverse selection issues arise since the lenders are informationally asymmetric with regards to a firms' creditworthiness before a financial contract is established, while moral hazard issues happen because the lenders are unable to observe a firm's behaviour after agreeing to the contract. The asymmetric information between borrowers and lenders leads to the cost of screening and/or monitoring behaviours, and in the case of imperfect screening or monitoring, banks make credit-rationing decision. The next paragraphs will discuss the adverse selection and moral hazard issues in more details.

In the adverse selection model, banks have limited information to differentiate good projects from bad projects in the pool of applicants. With increasing interest rates, good quality firms may choose to withdraw from the market. Meanwhile, risky firms may choose to stay in the market, as they do not have anything to lose if they fail but gain most of the return if they succeed. Consequently, the market is left with risky applicants. Banks are aware of this situation in which the negative effect of the higher risk may offset the positive effect of the higher interest rate. As such, banks decide to avoid increasing interest rates in order to prevent a worsening quality of applicants. Thus, the adverse selection issue may lead to a credit rationing decision by the banks. Two prominent models seeking to explain the credit-rationing equilibrium in the literature are Stiglitz and Weiss (1981) and Meza and Webb (1987).

In the model of Stiglitz and Weise (1981) (SW), the existence of credit-rationing in equilibrium is explained by adverse selection. If demand exceeds supply in the market, firms that have unfulfilled demands will offer a higher interest rate to the bank until their needs are fulfilled. However, above a threshold of interest rate (r^*), firms that are willing to pay an interest rate that is higher than the threshold are riskier than

the average firm. These firms comprise a subset of applicants that have higher risk than the average of all applicants. As a result, the expected return to this subset of applicants is lower than the expected return of loan initially granted and, thus, banks would not lend to these firms regardless of the offering rate. Thus, there is excessive demand in the market to which banks are not willing to lend. In such a case, credit rationing exists, and firms are under-invested.

However, Meza and Webb (1987) (MW) provide a counter-explanation to SW. They suggest that the market will be clearing in equilibrium, which means that there is no excessive demand for credit in equilibrium. Firms will apply for funding if the project's success probability is higher than the marginal probability (i.e., the probability that offers zero-return). A higher interest rate means that applicants have higher probabilities of success than the average pool of borrowers. In this case, a higher interest rate would increase banks' profits. Hence, in a market that has excessive demand, banks would choose to increase the interest rate to bring the market to equilibrium. DW conclude that "an equilibrium must be market clearing", rather than a credit rationing situation as shown in SW model.

The differences in the results of the two models arguably stem from the assumptions of the distribution of a project's expected return. The SW model assumes that an expected return follows a second-order stochastic dominance (SOSD) or mean-preserving spread, whilst the MW model assumes that it follows a first-order stochastic dominance (FOSD). In other words, the SW model assumes that different projects (i.e., different firms) have the same return but different risk levels (i.e., different variances of return). Meanwhile, the MW model assumes that different projects have different probabilities of success (and failure) and this leads to different expected returns.

Following the SOSD assumption, consider two projects A and B that have different risk levels $\theta_A > \theta_B$ but the same mean of return R . If the distributions of these projects' returns follow the SOSD or have mean-preserving spread, the riskier project is preferred to a less risky one and, thus, project A is preferred to project B. In the SW model, they argue that if two projects have different means of return, banks are unable to distinguish between them. By assuming that the distribution of return follows SOSD, the SW model suggests that there is a marginal risk level ($\hat{\theta}$) such that a firm only applies for funding if and only if its risk is higher than the marginal value (i.e., $\theta > \hat{\theta}$). An increase in the interest rate leads to an increase in the marginal risk value ($\hat{\theta}$). As a result, a market with an increasing interest rate attracts more risky projects than the average portfolio. Banks' expected return would decrease because of the pool of more

risky applicants. This effect may offset the increase in the expected profit. Therefore, banks may choose to ration credit availability instead of increasing the quantity to meet market demand.

Following the FOSD assumption, consider two projects A and B that have different probability of success (and failure) and $R_A > R_B$. According to the FOSD assumption, a higher mean of return is preferred to a lower one and, thus, project A is preferred to project B. In contrast to the SW model, the DW model shows that the market will be clearing in equilibrium.

Overall, the difference in the conclusion of the SW model and the DW model comes from the difference in their assumptions regarding the sources of heterogeneity of project returns. The SW model assumes that firms are different in their variance of returns (i.e., risk level) but have the same mean of return, whilst the DW model assumes that firms are different in their probabilities of success (i.e., mean of return). An increase in the interest rate leads to a subsample of higher risk in the former model while it leads to a subsample of higher mean of return in the latter model. As such, in the SW model, a high interest rate will attract riskier applicants but, in the DW model, it will attract more successful applicants. As a result, in the SW model, banks hesitate to increase the interest rate to avoid risky borrowers, as the increase in risk level will offset expected profit from the increased rate. In contrast, in the DW model, banks are willing to lend to this subset of borrowers because they are more profitable from the increased interest rate and, as such, banks will increase the interest rate to clear the market.

Additionally, the DW model suggests that if the distribution of return follows FOSD, all firms are debt funded. In other words, debt is the optimal contract, and an over-investment equilibrium is possible. In contrast, when the SOSD assumption of the return distribution in the SW model holds, equity is the optimal contract and under-investment arises.

A model developed by Parker (2003) clearly shows that both the SW and DW models are possible by using only the FOSD assumption for the distribution of an individual's ability. This assumption implies that an individual has higher ability will generate either a higher income/output or a higher successful probability. Parker (2003) also assumes that paid employment is an alternative to investment (i.e., become an entrepreneur). The results in the DW model and the SW model depend on the assumption that the differences in individual's ability will lead to a larger difference in wages for paid

employment or a larger difference in returns for entrepreneurs' investment. This will be discussed as follows.

The results in the DW model are possible if the marginal entrepreneur (i.e., the individual who is indifferent between employment and entrepreneurship) has the lowest ability. This is based on the assumption that the difference between individuals' abilities result in a larger difference in returns to entrepreneurs, compared to the difference in wages to paid employment due to this difference in individuals' abilities. Since the marginal entrepreneur has the lowest ability, the average probability of success of entrepreneurs' investment is higher than the probability of success of the marginal entrepreneur. When the interest rate rises, the expected returns from the investments are lower for those individuals who have lower ability. Hence, entrepreneurs that have lower ability will switch to paid employment. This indicates that a higher interest rate results in a higher quality pool of entrepreneurs, which leads to a higher probability of success. Thus, banks' expected return increases with a higher interest rate. For that reason, banks are willing to increase interest rate to clear the market, as shown in the DW model. Parker (2003) also shows that under this condition, an equilibrium is always over-investment, similar to the DW model.

In contrast, the results in the SW model may arise if the marginal entrepreneur (i.e., the one who is indifferent between paid employment and entrepreneur) has the highest ability among entrepreneurs. This is only possible if the assumption that heterogeneous abilities of individuals leading to a wider range of wages to paid employment than the range of returns of entrepreneurs' investment is valid. Accordingly, entrepreneurs (i.e., borrowers) are those who have lower ability among individuals. As entrepreneurs' return is a decreasing function of interest rate, a higher rate reduces the return of entrepreneurs' investment. As a result, entrepreneurs that have higher ability will choose to switch to paid employment. This leads to a lower quality of borrowers. Banks' return is thus, maximised at a particular interest rate. After this point, an increase in the interest rate will decrease banks' expected return. Some entrepreneurs will be credit-rationed if their abilities are lower than the average entrepreneur, even though their projects are socially efficient. An under-investment equilibrium exists in this case, as suggested by the SW model.

Overall, two important studies in the literature on credit-rationing are Stiglitz and Weiss (1981) and Meza and Webb (1987). Their models propose different market equilibriums, but the differences come from their assumptions on the distribution of return as explained.

While these papers mainly focus on adverse selection, an ex-post asymmetric information issue - moral hazard - also plays a role in credit-rationing. The key point of moral hazard models is that a firm's behaviour is contingent on terms of the debt contract, e.g., agreed interest rate or collateral. Moral hazard is considered in both ex-ante and ex-post of realized return. In these models, banks are unable to observe firms' behaviours after the loan is contracted. Specifically, firms may choose to invest in riskier projects or to declare a lower return and banks incur significant cost to either monitor or verify firms' actions.

The ex-ante moral hazard model refers to hidden action whereby borrowers decide to switch to riskier projects after the loan contract is established. Due to this type of moral hazard, a higher agreed interest rate will encourage firms undertaking risky projects. Due to the nature of a loan contract, banks suffer the downside loss and firms benefit from the upside gain and repay the debt. Firms may decide to invest in riskier projects since they gain more in the success scenario and their banks loss most in the failure scenario. Riskier investments may also lead to a high return, which will help firm afford a higher interest rate. Thus, banks may not charge a high interest rate to avoid this risk-taking behaviour and thus, ration credit offering (Hillier & Ibrahimo, 1993).

The ex-post moral hazard model refers to the situation in which, after investing and realizing projects' return, firms may choose to declare a low project return (which is typically lower than agreed repayment) and not repay the debt (Williamson, 1987) and, thus, banks incur monitoring costs to verify the firms' realized return. A high interest rate means that the likelihood of declaring bankruptcy is higher and the monitoring costs are higher. As in the ex-ante case, banks may choose to ration credit rather than charge a high interest rate.

Some studies examine the role of collateral in restoring market clearing equilibrium by mitigating adverse selection and moral hazard issues (Steijvers and Voordeckers, 2009). Pledging collateral reduces both risk-taking behaviour and bankruptcy declaration, as firms may lose their collateralized assets. Collateral is also served as a quality signal device, as low-risk firms are more willing to pledge collateral.

In general, the information asymmetry issue between borrowers and suppliers leads to credit rationing in the financial market. Banks are unable to observe firms' creditworthiness and, thus, decide to ration credit supply to both good and bad firms. The abovementioned models show that the asymmetric information issue causes firms to experience financial constraint.

However, Kon and Storey (2003) argue that these models do not explain discouraged borrowing, which is a self-rationing decision made by the demand side but rooted in information asymmetries in the financial market. This type of self-rationing decision is distinct from other self-selecting decisions, e.g., risk aversion or fear of control loss, because it is rooted in market failure. If discouraged borrowing impedes firm performance and if discouraged borrowing and credit rationing have different impacts on firm growth, the funding gap caused by market failure is under-studied in the literature. A more detailed discussion of the discouraged borrowing literature is provided in following section.

2.2.2. Self-rationing or Discouragement

2.2.2.1. Theoretical model of discouraged borrowing

Kon and Storey (2003) define discouraged borrowers as good borrowers who do not apply for a bank loan because of their fear of rejection. These are applicants who would have been approved if they had applied for funding. Kon and Storey (2003) show that asymmetric information in the credit market is the main cause of this self-rationing behaviour. In their model, the supply side is informationally constrained with regards to a firm's creditworthiness. This results in firms' bearing significant application costs and banks' making screening errors, and a wedge between banks' and money lenders' borrowing costs. All of these, in turn, discourage firms from applying for external funding. Discouragement is at its low level if there is no information in the market. However, the degree of discouragement becomes more severe as the level of information in the market increases. Discouragement reaches its highest level when there is some, but not perfect, information in the market. After an optimal level of information, discouragement decreases with information availability. The next paragraphs will explain this model in more details.

Due to asymmetric information, firms bear application costs to reveal their information to the lenders, including financial costs (i.e., financial costs to collect information which is required by banks), in-kind costs (i.e., timing costs of travelling to meet bank officers or filling application) and psychological costs (i.e., psychological costs caused by application process, e.g., revealing personal information). The high application costs increase the marginal cost of external finance. Thus, discouragement increases with application costs.

Moreover, information asymmetry leads to screening errors which refer to situations wherein banks perceive good firms (i.e., low-risk firms) as bad firms (i.e., high-risk firms) and perceive bad firms as good firms. Because of asymmetric information,

banks are unable to perfectly identify good entrepreneurs from bad entrepreneurs. Information accumulation lessens the degree of informational asymmetry and increases banks' screening abilities. Consequently, a bank's screening error is lower if they collect sufficient information to differentiate good from bad firms. Relatedly, good entrepreneurs are more likely to self-ration themselves if screening errors are high. In other words, a fear of rejection due to screening errors acts as a trigger for self-rationing behaviour for good firms. Conversely, bad firms are less likely to self-ration themselves because screening errors act in their favour. These firms perceive that they now have a higher likelihood of approval, so they are more likely to make applications. As a consequence, a high screening error will lead to a pool of low-quality applicants, since good borrowers are discouraged from making an application and bad borrowers are encouraged. In such instances, asymmetric information leads to inefficient self-rationing and market failure is more severe.

As explained above, in an informationally asymmetric market, both screening errors and application costs are significant. When there is no information in the market, the rate of screening error is at its highest level because banks randomly allocate funds. Nevertheless, since firms know that banks' decision are close to random, they do not need to prepare a loan application, and thus the application cost is minimum. As such, the degree of discouragement is low in this case.

However, when more information is available, banks start to accumulate information, which leads to different impacts on screening errors and application costs. On the one hand, the rate of screening errors decreases with the increase of information. When banks collect "sufficient" information, they can differentiate good from bad firms and screening errors decline remarkably. On the other hand, since firms perceive that banks are accumulating the information and making more accurate decisions, they will spend more time and money to prepare their applications. As a result, when some information is available in the market, the application costs increase significantly. Overall, when information improves in the market, the marginal decrease of screening error increases and the marginal increase of application cost decreases.

If the information availability is below a sufficient threshold, the decline in screening errors is dominated by the jump in application costs and, thus, the degree of discouraged borrowing increases. Vice versa, above the threshold, the marginal decrease of screening error is higher than the marginal increase of application cost, this self-rationing behaviour reduce. Thus, the relationship between the number of discouraged borrowers and information availability is a reverse U-shape. It indicates that, initially, an increase of information in the market leads to an increase of

discouraged borrowers, but after an “optimal” level of information, the degree of discouragement declines gradually and equals to zero in a perfectly informed market.

In general, asymmetric information in the financial market is the main causes of discouraged borrowing— a self-rationing decision made by entrepreneurs. When banks are informationally constrained about a firm’s creditworthiness, they make errors in screening good and bad entrepreneurs, and entrepreneurs bear a costly application process. Fear of rejection discourages good firms from making applications to avoid unnecessary application costs. As a result, good firms self-ration themselves from the market and incur a funding gap. The next section will review empirical evidence on the characteristics of discouraged borrowers.

2.2.2.2. Determinants of self-rationing

Empirical research has studied the determinants of self-rationing and examined the differences in characteristics between discouraged borrowers, approved applicants, and denied applicants. Studies have found that macroeconomics, firms’ characteristics, and relationship lending have significant impacts on the likelihood of discouragement. These factors are reviewed as follows.

2.2.2.2.1. Environmental factors

The development of the economy, as well as the legal and financial systems, influences a firm’s access to the financial market and partially shapes a firm’s perceived financing obstacles (Beck *et al.*, 2005). A strong legal system enforces the rights of investors and creditors and provides better protection for both firms and financial institutions. For example, firms are forced to follow agreed covenants and banks have rights to seize collateralized assets in the event of bankruptcy. Hence, a more developed legal system supports the development of the financial market (Beck *et al.*, 2003; Claessens and Laeven, 2003; Beck *et al.*, 2008), and thus, access to financial market is promoted by a strong legal framework. Moreover, development of financial market helps alleviate financing constraints (Beck *et al.*, 2005). A financial market and its institutions have advantages in acquiring and processing firms’ information by using their expertise and networks. As a result, a developed financial market is more effective in reducing the information gap between supply and demand sides and, thus, helps overcome the problems of asymmetric information and reduces the costs of external finance to firms (Rajan and Zingales, 1998). A more developed financial system also provides more resources to the private sector (Claessens and Laeven, 2003). Empirical evidence has found that, in a more developed financial system, industries that are more dependent on external finance grow faster (Rajan

and Zingales, 1998; Beck *et al.*, 2005), have higher export shares, and have higher trade balances. It implies that access to finance in these industries is more relaxed and helps improve firms' performance.

Furthermore, the impacts of a strong legal infrastructure and a more developed financial market are heterogeneous across firm size (Claessens and Laeven, 2003). Although small firms rely more on informal finance than do large firms, particularly in economies with underdeveloped legal and financial systems, the availability of informal financial sources is significantly less than bank finance (Beck *et al.*, 2008). Small firms are also found to be more dependent on debt to fund their businesses because access to the equity market is limited. Nevertheless, compared with large firms, small firms are arguably more informationally asymmetric and have a smaller asset base. As a result, small businesses bear higher monitoring costs, higher interest rates per capital or even face credit-rationing issue more often. This suggests that small firms are more vulnerable in an underdeveloped financial system (Beck *et al.*, 2008). Thus, the development of legal and financial systems increases financial access to small more significantly than to larger firms. Indeed, Beck *et al.* (2008) show that in countries with strong property rights, access to external finance is significantly improved for small firms compared to large firms.

Overall, developed economies with strong legal and financial systems promote information quality and thus, reduce the adverse selection and moral hazard issues caused by information asymmetry. As such, screening and monitoring firms' creditworthiness are enhanced and less costly. This results in lower application costs and reduces banks' screening errors and firms' perceived screening errors. Hence, discouragement issue in developed economies is less severe than in developing countries (Kon and Storey, 2003).

Empirical studies find that the macroeconomic environment affects a firm's discouragement decision. The growth rate of national income and the development and competition of the financial sector negatively correlates with the probability of discouragement (Chakravarty and Xiang, 2013; Mac an Bhaird *et al.*, 2016). Mac an Bhaird *et al.* (2016) find that discouragement is lower in countries with a higher ratio of private credit to GDP. It implies that an improvement in credit access lowers self-selecting behaviour. Chakravarty and Xiang (2013) also find that there is heterogeneity in determinants of discouragement between high- and low-income countries. In high-income economies, a firm's size and banking relationships are associated with self-rationing, while in low-income economies, additional to these two factors, a firm's age, exporting and competition are also correlated with

discouragement. Besides, the impact of a firm' size on discouragement is larger in low-income economies than in high-income economies (Mac an Bhaird *et al.*, 2016).

Nevertheless, discussion on whether the reduction of discouragement reflects an efficient financial market has not been concluded. Qi and Nguyen (2020) found that government-connected businesses are less likely to be discouraged, compared with those who do not have government connections, and this effect is stronger in more corrupted economies. Interestingly, they found that these businesses are not more likely to receive fundings, which may suggest that risky firms that have connections with the state had applied for funding, particularly in underdeveloped economies. Hence, the decrease of discouraged borrowers may imply a higher pool of risky borrowers. Meanwhile, Mac an Bhaird *et al.* (2016) find that an improvement in regulatory quality increases the likelihood of discouraged borrowing. Arguably, in a more regulated environment, risk-taking behaviour due to the moral hazard issue is closely monitored and thus, "bad" borrowers are discouraged. This aligns with the suggestion that discouraged borrowing is an efficient market mechanism as high-risk firms are more likely to be discouraged (Han *et al.*, 2009).

Furthermore, concentration in the banking sector negatively correlates with discouragement (Han *et al.*, 2009; Mac an Bhaird *et al.*, 2016; Moro *et al.*, 2017). The value of relationship lending varies with the degree of market competition in the banking sector (Mol-Gómez-Vázquez *et al.*, 2018). A more detailed discussion on the effect of relationship lending on discouragement in competitive and concentrated financial market is presented in Section 2.2.3. on relationship lending.

Overall, the literature shows that the macroeconomic environments affect the degree of discouragement. Empirical findings show that discouragement decreases in a more developed economy and a more developed legal and financial system. These findings align with Kon and Storey's (2003) suggestion that the degree of discouraged borrowing is different between developed and developing countries.

2.2.2.2. Firm-level factors

Firms' characteristics

Firms' age and size are arguably associated with information opacity, which, according to Kon and Storey's theory, is one of the causes of discouragement. Older and larger firms' information is more transparent than younger and smaller firms. Older businesses have longer track records of performance and creditworthiness. Their survivability also signals that these firms were well managed and profitable (Vos *et al.*, 2007). Moreover, larger firms have stronger cash flows and more assets to

pledge as collateral. Firms that grew in the past can signal their soundness and their ability to meet financial obligations and repay debt. Application costs per unit of capital also decrease with firms' size. Therefore, older and larger firms are more capable of satisfying bank requirements and expect a lower rejection probability. Furthermore, since the information of older and larger firms is more likely to be available to credit providers, the rate of screening errors and application costs are lower for these firms. For these reasons, younger and smaller firms are more likely to be discouraged (Han *et al.*, 2009; Chakravarty and Xiang, 2013; Cowling *et al.*, 2016).

Firms' risk level is also an important element in the lending decision and the borrowing decision. Riskier firms may face higher application costs to prepare an application that satisfies banks' requirements. They may also anticipate a higher likelihood of rejection than would less risky firms. However, these firms are also more likely to be rejected and, thus, they are not categorized as discouraged borrowers according to Kon and Storey's (2003) definition. Han *et al.* (2009) find that riskier borrowers are more likely to be discouraged and conclude that discouragement is an efficient self-rationing mechanism in the financial market. Similarly, Cowling *et al.* (2016) find that discouraged borrowing in the UK small business market is an efficient self-rationing channel by using age and size as proxies for risk level.

Legal status also correlates with discouragement. Since personal asset or personal collateral is a device that banks use to screen out and monitor firms' risk-taking behaviour, personal collateral contains additional information about firms' quality and behaviour. Banks are allowed to seize personal assets of proprietors and of partners if firms go into bankruptcy. As a result, proprietorships and partnerships are more creditworthy than companies (Cole and Sokolyk, 2016). Cowling and Mitchell (2003) find that limited liability companies defaulted more often than sole traders and partnerships. Thus, proprietorships and partnerships are more likely to perceive a lower likelihood of rejection and less likely to self-ration themselves.

Industries also differ with regards to their respective asset bases and the capital structures. Manufacturing sector is characterized by a higher level of tangible assets that can be used as collateral. Since firms can use collateral as a signal for their creditworthiness, asymmetric information is reduced between them and suppliers, which leads to a lower screening error. Hence, these firms are less likely to be discouraged.

Innovative firms may perceive a higher rejection rate due to the uncertainty and intangibility of innovating firms' assets. The information asymmetry problem is more

intense for intangible assets compared to tangible assets. One of the reasons is that the outsiders lack the requisite information to evaluate the assets. Due to the confidentiality, the information is rarely shared between firms and the suppliers. In addition, firms cannot pledge intangible assets as collateral. The availability of external funding for innovative activities and R&D investment is limited (Acharya and Xu, 2017). Thus, the issue of asymmetric information issue is more severe for innovative firms and it increases the likelihood of discouragement.

Owners' characteristics

Owners' characteristics also relate to the decisions of firm to self-ration themselves. SMEs' access to external finance is argued to be correlated with both human capital and social capital of firms' owners. Empirical studies find that owners' age, experience, gender, ethnicity, and education are correlated with discouragement (Han *et al.*, 2009; Free *et al.*, 2012; Chakravarty and Xiang, 2013; Cowling *et al.*, 2016) as discussed below.

Older and more experienced owners and managers are supposed to have a longer track record, a broader network and a better reputation. Older and more experienced owners have a longer record of their business activities. For the small business financial market niche, owners' or managers' profiles have an important role in the decision of a bank to grant funding. The evaluation of firms' creditworthiness is also based on the creditability of firms' owners. For example, the information related to owners' financial condition and credit history is used in the small business credit scoring (Berger and Udell, 2002). Thus, information asymmetry is less severe for firms that have older and more experienced owners.

However, less experienced entrepreneurs are argued to be over-optimistic about their skills and their firms' survival probability. They are also found to be ambitious about their firms' future (Fraser and Greene, 2006). For these reasons, younger and less experienced owners are less likely to be discouraged than their older and more experienced peers (Freel *et al.*, 2012; Cowling *et al.*, 2016). Some empirical studies find that discouraged firms have older and less creditworthy owners (Han *et al.*, 2009; Cole and Sokolyk, 2016; Cowling *et al.*, 2016), while others find that firms owned by more experienced owners are less likely to be discouraged (Chakravarty and Xiang, 2013). Therefore, it is not clear whether asymmetric information or over-optimism has a larger effect on the likelihood on discouragement. It may also suggest that there is a non-linear relationship between owners' experience and discouragement.

At the same time, the education of owners or directors may also correlate with discouragement. Educated managers are trained to manage the business and their profile may signal to the lenders the creditworthiness of the managed business (Cole and Sokolyk, 2016). However, empirical evidence has not agreed on this relationship. While Chakravarty and Xiang (2013) supports the negative relationship between education and discouragement, others find a positive or insignificant effect (Cole and Sokolyk, 2016; Cowling *et al.*, 2016). This may lead to the argument that educated managers have more understandings of the market and, thus, they are less likely to try to apply.

Minority groups may be discouraged from applying because of their perception of ethnic and/or gender discrimination (Vos *et al.*, 2007; Fraser, 2009). Their perception may be mistaken if the market does not discriminate. Some find that ethnic-minority-led (e.g., Black Caribbean, African) (Storey, 2004; Fraser, 2009) and/or female-led businesses (Chakravarty and Xiang, 2013; Moro *et al.*, 2017) are less likely to apply for finance. However, the difference between groups may come from non-ethnic or non-gender factors (e.g., inexperience, lack of education, firms' size, risk level, industry). For example, women tend to run smaller businesses, typically in the service sectors (Marlow and Patton, 2005; Vos *et al.*, 2007). Relatedly, those firms are more likely to be discouraged as their asset base is lower. Storey (2004) finds that the differences in the decision to apply for financing within ethnic groups and gender groups are insignificant after controlling for their firms' characteristics.

In general, empirical studies on the determinants of discouraged borrowing focus on macroeconomic environments as well as on the characteristics of firms and their owners. While the results on environmental factors are more agreeing that more developed economies reduce discouraged borrowing, there is relatively less agreement on the relationship between firms' profiles and discouragement.

2.2.3. Relationship lending and financial constraints

Two main technologies used by banks in formulating their lending decisions are relationship lending and transaction lending (Ferri and Murro, 2015). The characteristics of information involved in the lending process define types of lending technologies. Information is often classified into hard information and soft information, although there is lack of a defined distinction between them. As the financial system developed, especially financial intermediaries, there was an emerged requirement that information could be obtained at low cost and be stored in a measurable format that is standardized and independent of context. This requirement leads to the

development of hard-lending techniques. The next parts will discuss these two types of lending technologies and their related information types.

2.2.3.1. Lending technologies and information characteristics

The first technology is relationship lending, which is based on the soft information that could not be acquired from hard-lending technologies or stored independently. In relationship lending, information is frequently collected from various sources through banks' contacts with firms, stakeholders, or the local community. Banks and firms repeatedly interact with each other to collect and gather proprietary information over time. Due to its properties, soft information is qualitative and hard to store and transfer within the banks. Additionally, the content and quality of soft information depend on the collector (i.e., bank officers) and the transmission process within the banks. Thus, the information generated from relationship lending is not exogenously constant (Bartoli *et al.*, 2013), but rather is accumulated from different sources and evolves over time. A stronger relation indicates that firms and banks frequently exchange information with the other party. The more information a bank collects, the less noisy the information becomes. They can also adapt their lending conditions according to the changing conditions of the market. At the same time, in a stronger relation, firms are aware of banks' informal evaluations. Firms can also learn about the availability of credit and banks' decision-making process. As a result, the asymmetric information issue is less problematic in a good relationship (Prilmeier, 2017).

The second technology is transaction lending which is based on hard information collected from more standardized sources, e.g., financial statements, small business credit scoring, asset-based lending, factoring, and leasing. The information collected from transaction lending is quantitative, more convenient to store, and easier to transfer between firms and banks as well as within the organization. The content and quality of hard information are supposed to be independent of the collecting and storing processes and, thus, hard information is supposedly exogenous and standardized. However, because the sources of hard information are relatively limited (Liberti and Petersen, 2019), the availability of hard information is more bounded.

Since the adoption of credit scoring in the small business market, transaction lending becomes more applicable for the small business niche. Credit scoring is a statistical approach to estimate the probability of default or delinquency. Even though the credit scoring model has been applied to consumer lending for some time, this technology has only been applied to the small business niche since the mid-1990s in the US, when it was found that the credit information of the owners can be inserted into the

process for evaluating a firm's creditworthiness. Since then, the use of small business credit scoring (SBCS) has become more important, especially in the small business credit market (Berger *et al.*, 2011).

SBCS gathers a firm's information and information on its owner and divides firms into good and bad events (i.e., firms that were defaulted or delinquent in the past). A statistical model (e.g, linear probability, logit, probit models) is then estimated as a function of the firm' and their owner' financial information in order to calculate the probability of default and non-default. This probability is then transformed into a Z-score, which is then used as the main tool in the lending decision. SBCS has several advantages, namely cost savings, objectivity and distance independence (Allen *et al.*, 2004). Since banks can purchase information from external credit vendors, they can quickly estimate a firm's default probability and make decisions based on the firm's Z-score or use it as a complement to other tools. SBCS is often claimed to be more objective than relationship lending because the information comes from objective and standardized sources (e.g., financial statement, owner credit history) and because of the independence of this method from the context where the information is collected. The information does not depend on the collection process and does not require face-to-face contact. Moreover, the model is also implemented automatically in a standardized process, rather than depending on the agents' judgments. As a result, both the inputs and implementations of the evaluation models are independent, and the lending decision is thus not constrained by geographic proximity. Consequently, access to credit for small businesses increases (Berger *et al.*, 2011). The development of SBCS has helped to solve the asymmetric information issue in the small business market (Berger and Frame, 2007) and, thus, plays an important role in developing the small business financial market.

2.2.3.2. Use of lending technologies

The literature has been discussing the importance of hard and soft information in the lending decision. Studies also acknowledge that the development of transaction lending and relationship lending depends on the organizational structure of the suppliers, as well as on the characteristics of the borrowers. Regarding the supply side, i.e., banks or financial intermediaries, there is heterogeneity in terms of size, organizational form, and decisional distance. In a large bank, there is discretion between information collectors and decision-makers. Decisional distance is supposedly significant in a large organization with multiple layers of decision-making and, thus, soft information is easily lost and costly to verify in the transmission of information. As such, transaction lending is more prominent in large banks. By

contrast, in a small bank, a bank officer is often the one that collects the information and makes decisions based on the acquired information. As a result, small banks are often arguably using relationship lending. However, large banks can imitate the structure of small banks by delegating the decision-making to the bank officers in order to efficiently use relationship lending.

Heterogeneity in the lending technologies also depends on a firm's size. Relationship lending is particularly important for small businesses because these firms are usually informationally opaque. In contrast to large corporations, the financial statements of unlisted small firms are not required to be audited and, thus, they may lack transparency and creditability. Transaction-based technology is less efficient in this credit market niche because the required information is restricted. Relationship lending, on the other hand, helps overcome the disadvantages of transaction lending in this market thanks to its flexibility, as bank officers are able to gather information from informal sources.

In practice, banks use both hard- and soft-information technologies to make lending decisions on the amount and terms of a loan, even though there are sometimes preferences towards one of them. Some studies show that large banks and foreign banks are more favourable towards transaction lending, while small banks and domestic banks prefer relationship lending (Berger and Udell, 2002; Bharath *et al.*, 2011; Bartoli *et al.*, 2013). It is found that more soft information is collected when relationship lending is used as a sole technology or as the primary technology, combined with transaction lending. Hence, the relationship strength between firms and banks is one of the main determinants of the pricing and availability of credit (Berger and Udell, 2002; Bharath *et al.*, 2011; Bartoli *et al.*, 2013).

2.2.3.3. The impacts of relationship lending on financial constraints

The literature often discusses the strength of relationship lending regarding three dimensions: the length of the main relationship, the depth of the main relationship, and the breadth of the relationship. Under relationship lending, banks and firms accumulate valuable information over time. A long relationship enriches the amount of information collected. Banks invest more time and resources in gathering information related to a firm's quality, while firms spend more resources in transferring the information about their creditability to creditors. Hence, a longer relationship lessens the information asymmetry issue between firms and their credit providers (Petersen and Rajan, 1994).

Depth or intensity of the main relationship indicates that firms use different services from the same main bank. A deep relationship means that banks have more sources to collect and confirm the information about a firm's creditworthiness. The information gap between firms and their banks is reduced in a deep relationship. Hence, the collected information is more convergent, and banks' evaluation becomes less biased.

Meanwhile, relationship breadth indicates that firms are having relationships with many different suppliers. Multiple relationships mean that firms diffuse the relationship lending across banks, which reduces the information gap between the firms and other financial institutions. They also have more sources to approach and learn about the credit market and its decision-making process. However, multiple relationships may also mean that the information gap between the current lenders and other financial institutes are smaller.

While all three dimensions represent relationship strength, depth and breadth are also used as proxies for relationship concentration. While a concentrated relationship indicates exclusivity, multiple relationships suggest high diversity or low concentration. Exclusivity implies that there is less direct competition between the inside bank and the outside banks (Elsas, 2005), which will have impacts on the information gap between borrowers and their current suppliers as well as between their current suppliers and other potential suppliers in the market.

Overall, relationship lending has two effects on asymmetric information. On the one hand, it reduces the information gap between firms and their main banks. Both parties learn about the other side along the development of the relationship. By interacting with firms over time, banks can observe a firm's creditability with prior creditors, employees, or trade creditors in the past and use this information to evaluate a firm's creditworthiness (Petersen and Rajan, 1994). By providing multiple services to firms, the bank has more channels rather than only loans or overdrafts from which they can gather information (Degryse and Van Cayseele, 2000). For example, banks can observe a firm's cash flows coming into the current account and evaluate its ability to repay interest and debt. Moreover, the fixed costs of monitoring and producing information are also spreading across different services. A more concentrated relationship reduces monitoring costs and improves the lender's control over the information, as well as strengthen the relationship (Petersen and Rajan, 1994). Banks benefit from relationship lending and, thus, transfer part of the benefits to firms. As a result, a strong relationship, which is represented by a long and deep relationship, increases the probability of loan approval (Bharath *et al.*, 2011), lowers the probability

of credit rationing (Bartoli *et al.*, 2013), increases credit availability (Petersen and Rajan, 1994), lowers financial constraints (Behr *et al.*, 2013), reduces the borrowing rate and collateral requirements (Berger and Udell, 1995), and requires less strict covenants (Prilmeier, 2017).

On the other hand, an exclusive relationship between firms and their main banks increases the information distance between firms and other banks in the market, as well as between the insider bank and outsider banks (Prilmeier, 2017). According to the lock-in effect (Sharpe, 1990), in a strong relationship, banks gain proprietary information that other financial institutions cannot observe. Moreover, in a concentrated relationship, establishing a new relationship with another bank bears a costly switch because the collected soft information is hard to be transferred and verified by outsider banks. If the switching cost is high, firms are locked into the main relationship. Because of the informational monopoly, the main bank has bargaining power over firms' activities (Rajan, 1992) and uses this information advantage position to charge firms a higher price (Prilmeier, 2017). For that reason, a stronger relationship leads to an increase in the interest rate. Degryse and Van Cayseele (2000) find that the interest rate increases with the length of the relationship and declines with the breadth of relationship lending. Moreover, the impact of the relationship length also depends on the breadth of relationship lending. They also find that the impact of relationship length on increasing the interest rate is smaller for firms with concentrated relationship lending.

Importantly, the value of relationship lending on credit terms and conditions varies largely in different types of financial markets. Some studies examine the impact of market competition on relationship lending, since competition induces incentives to invest in collecting soft information and the extent of monopoly rents in relationship lending. The literature has two opposite views on the impact of market concentration on the value of relationship lending.

The first view - information hypothesis - argues that fiercer competition reduces the value of relationship lending, and, thus, increases the cost of borrowing and the availability of credit. In an intensely competitive market, switching is less costly, and firms can easily switch to other banks if the first main relationship is not beneficial. Banks are less able to extract rents from their information advantage and, thus, banks have a lower incentive to invest in accumulating information or developing strong lending relationships with firms. Hence, the value of relationship lending on the information gap and credit contract is low when the banking sector is less concentrated (Kano *et al.*, 2011).

Meanwhile, the market power view suggests that fiercer competition leads to lower cost and more credit. In order to compete in a competitive market, banks use relationship lending as a device for product differentiation. A close relationship with firms helps banks extract private information and shield informational rents (Degryse and Ongena, 2007). Banks benefit more from relationship lending in a more competitive market. Thus, they are motivated to establish and maintain the relationship with firms in order to gain informational advantage position in the market. Accordingly, the value of relationship lending is higher in a more competitive market. As a result, firms enjoy a lower loan rate and more funds, which is opposite to the information hypothesis.

Interestingly, empirical studies support both views. Petersen and Rajan (1995) provide evidence that supports the information hypothesis. They find that young firms obtain more external funding in concentrated markets than in competitive markets. Meanwhile, Degryse and Ongene (2007) find a positive relationship between competition and use of relationship lending. Chong *et al.* (2013) find that a more competitive market alleviates financing constraints, which implies that market power view is valid. Some studies suggest a non-monotonic relationship between concentration and relationship lending. Elsas (2005) suggests that the effect of market concentration on relationship lending follows a U-shaped effect, drawing on a sample of large firms in the US. In a low- or intermediate- concentrated market, increasing bank concentration decreases the likelihood of establishing a relationship. However, in a highly concentrative market, a higher magnitude of concentration fosters relationship lending likelihood.

The literature on relationship lending and discouragement suggests that relationship lending lessens self-rationing decisions. Relationship lending reduces informational asymmetry which is the main cause of discouragement. A strong relationship facilitates information exchange between firms and banks. On the one hand, banks can observe firms' behaviours along the development of the relationship and acquire information about firms' creditability. Thus, banks can distinguish their clients from the pool of low- and high-risk firms and, as such, screening errors by banks decrease in a strong relationship. Declining rates of screening errors lead to a reduction in discouragement.

On the other hand, firms also accumulate information about banks' decisions through relationship lending. Firms may perceive a lower likelihood of rejection as they know that relationship lending increases the availability of credit and lowers the strictness

of covenants. Frequent interaction helps firms collect more information about banks' processes of evaluation and repeatedly adjust their perceived rejection likelihood.

Empirical evidence supports the positive role of relationship lending on discouragement. Freel *et al.*'s (2012) study on the UK credit market suggests that firms that have strong relationships with their main banks are less likely to be discouraged. Cowling *et al.* (2016) also find that during the recession period in the UK, a good lending relationship increased the likelihood of making an application, conditional on their need. Because relationship length is one important dimension, a long relationship reduces self-rationing. Evidence from the US supports this argument (Han *et al.*, 2009; Cole and Sokolyk, 2016). Moreover, Chakravarty and Yilmazer (2009) find that a wide relationship breadth associates with a higher likelihood of application decision from firms, whereas it reduces the likelihood of approval by banks. Han *et al.* (2009) also find that firms with more lending relationships are less likely to make self-rationing decisions. Cole and Sokolyk (2016) find a similar result that, comparing to applicants, discouraged borrowers have fewer relationships. Using World Bank Enterprise Surveys, Chakravarty and Xiang (2013) also support the positive role of multiple relationships on the reduction of discouragement.

Furthermore, the impact of relationship lending on discouragement varies with market concentration. As discussed above, market concentration has a significant impact on the value of relationship lending. The information hypothesis suggests that, in a more competitive market, banks have less incentive to invest in relationship lending and the value of relationship lending is low. Accordingly, the information gap is not minimised in a competitive market and, thus, the degree of discouragement is higher. In the meantime, the market power hypothesis suggests that market competition increases banks' incentives to invest in relationship lending in order to compete with other lenders. As such, asymmetric information is reduced between borrower and financiers in a competitive market, which in turn, leads to a lower degree of discouragement. In other words, the impact of relationship lending on discouragement is stronger in a competitive banking market.

Empirical results from Han *et al.* (2009) support the information hypothesis. They find that the likelihood of discouragement is higher in competitive markets than in concentrated markets. They show that for good borrowers (i.e., low-risk firms), relationship length reduces the likelihood of discouragement in both competitive and concentrated markets. For significantly risky firms, market competition affects the impact of relationship lending on discouragement. According to the information hypothesis, banks are motivated to invest in relationship lending in a concentrated

market and acquire more information to identify high-risk firms. Thus, a longer relationship discourages risky firms from making an application in a concentrated market.

In general, relationship lending is argued to be beneficial for both sides of the relationship. However, the value of relationship lending has two opposite effects on the informational asymmetry issue. Accordingly, its impact on credit-rationing is still discussed. Empirical results suggest that if a (net) positive effect is found, the reducing informational asymmetry dominates the lock-in effect and vice versa. At the same time, empirical results on relationship lending and discouragement so far agree on the benefits of relationship lending. This implies that the positions of relationship lending on credit-rationing and discouraged borrowing are distinct, which has not been addressed in the literature. This may reflect the differences in the processes of evaluating the benefits of lending relationship between firms and suppliers.

Overall, this section has reviewed the theoretical and empirical models of determinants of credit rationing and discouraged borrowing. Since both types of financial constraints are caused by market failure, studies on consequences of market failure on firm performance should fully capture both credit rationing and discouraged borrowing. Before reviewing the impacts on firm growth, section 3 will briefly discuss small business growth in relation to growth intention.

2.3. SME growth and growth intention

Small firm growth has been an important part of policy-making to boost economic growth at regional and national levels. In general, small businesses account for more than 99% of total firms in an economy, and they employ half of the workforce. As such, the policy aims at supporting firms overcoming obstacles to growth and achieving growth. However, micro, small and medium firms (MSME) do not always aim to grow their business (Davidsson, 1989; Fraser et al., 2015). Instead, some of them may choose to remain relatively small rather than grow their business. Accordingly, identifying growing firms and non-growing firms and understanding why firms intend to grow are critical steps for an effective policy.

The literature on growth does not always agree on the view that growth is explained by its past growth or other factors, such as, size, age. One debatable strand of the literature on small firms' growth is whether firms' growth follows a random walk. According to Gibrat's Law, there is no association between the current growth rate and previous growth. No firm is more likely than any other to grow, and all size differences are caused entirely by the luck of the draw (Denrell et al., 2015). In other

words, firm growth in the past does not have an impact on firm growth in the next periods (Levinthal, 1991). Coad *et al.* (2013) found that firm growth follows a random walk while its survival is led by the growth rate. Coad *et al.* (2016) suggest that predicting firms' growth is unfeasible for new ventures in the UK. Frankish *et al.* (2013) also recommend that, in a dynamic environment, the context constantly changes and growth outcomes follow a stochastic process, and, thus, there is little effect of experience or other factors on predicting future outcomes. They also argue that the impact of entrepreneurial learning is very marginal or if it even takes place.

Lotti *et al.* (2009) argued that Gilbrat's Law is not a general rule that can be applied to the whole population of firms, but it is only applicable for those large and mature firms who already achieve the minimum efficient scale level of output, but not for small businesses. On the other hand, Serrasquero *et al.* (2010) use a quantile approach for a Portuguese dataset and suggested a non-linear relationship between growth and size. They find that, in low quantiles of size, size is not significantly associated with growth, but in large quantiles, size is significantly associated with growth. They suggest that Gibrat's law is not rejected for small firms, but it is rejected for large firms. Other studies rejected Gibrat's Law, as they found that smaller and younger businesses have a higher growth rate compared to older and bigger firms (Aghion *et al.*, 2007). Examining Gilbrat's Law during the global economic crisis, Peric and Vitezic (2016) reject the Law of Proportionate Effect, as they find that size of surviving firms has a significant and positive effect on turnover growth in the manufacturing and services sectors. It means that large and medium-sized businesses did grow faster than small firms. In other words, these studies suggest that size correlates with growth. Overall, it implies that growth can be explained by various factors.

Indeed, the literature on small business growth also finds that growth is impacted by various factors. Among them, many studies have well realized that only a small proportion of entrepreneurs aim to grow their business and that growth intention is the most important determinant of growth outcome (Davidsson, 1989; Wiklund *et al.*, 2003; Wiklund *et al.*, 2009; Fraser *et al.*, 2015;). These studies emphasize the critical role of firms' perception on growth, and Wiklund *et al.* (2009) also show that growth provides feedback to growth intention. Hence, the next section will review the literature on why entrepreneurs have growth intention.

2.3.1. Growth intention

Studies show that entrepreneurs chose to start their own businesses for various reasons other than maximizing economic outcomes. For example, they may have

sought to pursue an idea, autonomy in decision-making, or flexibility at work. Since growth is associated with both positive and negative outcomes and requires considerable resources and effort, growth may clash with an entrepreneur's interests and controls. Therefore, studying the relationship between an owner's motivation and perception of controls over growth plays a critical role in understanding growth intention. Indeed, the growth intention literature examines how relative economic and non-economic benefits shape intention toward growth.

Furthermore, the literature also assesses the importance of perceived controls over growth as well as its interactive effects with motivation on growth intention. In the growth intention literature, two prominent views - the theory of planned behaviour (Ajzen, 1991) and the view on entrepreneurial event (Krueger *et al.*, 2000) - discuss precedents of growth intention. The former view - the theory of planned behaviour (TPB) - sees growth as a planned behaviour that is predictable by growth intention, which in turn depends on one's attitude toward growth, the social norms toward growth, and one's perceived control over growth. The latter - the entrepreneurial event view (EE) - suggests that growth intention is formed based on perceived desirability, propensity to act and perceived feasibility. A comparison of these two views proposes similarities between them in explaining growth intention. Attitude and social norm factors of TPB and perceived desirability factor of EE associate with perceived values of growth. Meanwhile, perceived control of TPB and perceived feasibility of EE relate to perceived capability to actualize growth. Thus, the precedents of growth intention proposed by these two views converge toward perceived values of growth and perceived capability to achieve growth.

Perceived values of growth depend on the attitude or perceived desirability of growth. From the economic perspective, a decision is dependent upon an opportunity's expected utility. Based on their preference, entrepreneurs assess utility derived from an opportunity that could either grow the business or keep the business at the current size. From the assessment, they decide to pursue the opportunity that offers the highest utility.

An opportunity comes with a variety of outcomes, including economic and non-economic results. Economic outcomes refer to income and wealth generated from a profitable venture. Non-economic outcomes include autonomy in decision making, control over business, independence, risk taking, work enjoyment or job satisfaction, well-being, achievement, as well as recognition or status (Wiklund *et al.*, 2003; Wiklund and Shepherd, 2003; Hessels *et al.*, 2008; Douglas, 2013).

The decision to pursue an opportunity is based on expected values of these economic and non-economic results. Expected value of each of the outcomes is, in turn, influenced by their motivation and preference. Hence, since firms have their own motives and preferences to start and run the business, utilities from a growth opportunity are heterogeneous across firms.

A proportion of firms seek to achieve economic benefit for their own businesses. Firms that seek a stable income level often aim to generate a sustainable cash flow from a profitable business. In order to obtain profit and stable cash flows, businesses often must grow to a sufficient size. Since growth plays an important role in the value-creation process, which subsequently generates income or economic benefit, the pursuit of growth is critical in achieving a substantial income. A high-growth business promises to offer a substantial and sustainable income, while a low-growth business restricts potential income (Cassar, 2007). A higher level of economic benefit requires a longer and more sizeable growth to survive market pressure and to generate significant profit. Thus, firms that primarily pursue economic benefits perceive growth as essential to expand their businesses and, thus, look for any opportunities that allows their businesses to grow.

Firms are also different in their risk-taking preferences. Some entrepreneurs are risk taking while others are risk averse. Growth often associates with a higher level of risk since it requires substantial initial financial investments as well as frequent reinvestments. Moreover, different types of growth require different levels of investment. For example, a business seeks to increase its market share using its current product range for the same market niche. This scale-up strategy involves a low level of risk as it does not cause a significant disruption to the business model. Growth can also be achieved by expanding the current market by approaching a wider pool of customers with the same products and services used to serve the current market. This plan often asks for an expansion to its current business model and associates with a moderate risk level. Meanwhile, a business that aims to expand its product ranges to serve the same market or a new market niche requires a substantial investment in R&D, which leads to a significant risk level. As such, risk tolerance is one of the main determinants of the growth decision. A risk-taker is more likely to pursue an expansion of products range while a risk-averse entrepreneur is more likely to choose a scale-up strategy. As a result, growth is highly valued by risk-taking businesses but considered unfavourable by risk-averse businesses. Thus, expected values of growth highly depend on the risk preference of entrepreneurs.

Moreover, some entrepreneurs place a high value on achievements and challenges that are often associated with growth. Managing a growing business becomes more challenging and more complex, since growth leads to a larger pool of stakeholders, including increasing numbers of customers and suppliers. Growth in employment also means that an increasing number of employees with different skill sets will require more complex management skills. The quicker the business expands, the more challenging and the more difficult business management becomes. The business faces more challenges in its daily business operations (Cassar, 2007) and overcoming these challenges is necessary to achieve growth. As such, recognition for achievements is often associated with owning a growing business. Its owner gets intrinsic rewarded for overcoming the challenges of growth. As need for achievement or competence is one of the main factors motivating the decision to start a business (Davidsson, 1989; Douglas, 2013), growth is expected to provide a higher value to those who seek achievement, compared to those who seek stability. By contrast, an individual who does not have need of competence or does not have a desire to overcome such challenges may be pushed back.

Furthermore, volitional control decreases over time in a growing venture (Wiklund and Shepherd, 2003). Growth associates with high levels of uncertainty from both internal and external environments. In an expanding business, the decision-making process is more dependent on the internal structure, e.g., employees, as well as the external stakeholders, e.g., customers and suppliers. It also demands on-the-go decision-making rather than a standardized solution. A higher degree of flexibility in decision-making is also needed to run the business. The decision-making process, indeed, becomes more interrelated with other parties. As such, autonomy in managing the business deteriorates over time. However, autonomy in decision-making and business controls are two prominent motives for becoming an entrepreneur. Hence, an owner that seeks autonomy or control over their business is less likely to favour a growth opportunity.

As flexibility and well-being are prominent motives for running one's own business, having full control over when and how to do the work has been one of the main advantages of running their own business. However, time commitments become more demanding as the business evolves (Cassar, 2007). A more intensive and longer workload occupies entrepreneurs' attention over their personal interests. A growing business comes with a growing portfolio of stakeholders, which requires a greater amount of effort and time to manage day-to-day operations. These tasks will shift entrepreneurs from pursuing their interest, which is one of their primary motives to

start the business, and this is particularly true for lifestyle entrepreneurs. Besides, as the work becomes more intensive, work enjoyment degrades overtime. Hence, growth is less likely to be valued from flexibility and well-being perspectives.

Overall, entrepreneurs pursue various objectives when they run their businesses and growth may not always be their priorities. Instead, growth intention depends on the utility of a growth opportunity to the entrepreneurs. The above discussion shows that growth has different utilities to the entrepreneurs, depending on their objectives. Thus, growth intention is dependent upon motivation and preference of the entrepreneurs. Entrepreneurs pursuing economic benefits, risky investments, or getting recognition and achievement perceive growth as a valuable and essential opportunity. Meanwhile, for those whose motives are autonomy and independence as well as well-being and flexibility, growth is not seen as a crucial part of their business. Since entrepreneurs vary in their motivations for starting a venture and in their preferences running a business as well as in the weights they put on preference, their desirability toward growth is not identical. As such, growth intention is not necessary for their business, and it depends on the ultimate utility of a growth opportunity offered to them.

As mentioned above, both the theory of planned behaviour and the view of entrepreneurial event suggest that growth intention is constrained by the perceived feasibility of decisions that are required to achieve growth (Krueger *et al.*, 2000). Perceived feasibility can be seen as the probability of achieving growth (Steel and König, 2006), while growth intention is dependent on perceived capability to realize growth. It means that growth intention is formed only if the business perceives that they have sufficient resources to pursue behaviours that are necessary to achieve growth. Schlaegel and Koenig (2014) argue that perceived feasibility, self-efficacy, and perceived behaviour control share similarities and are overlapping even though they are different constructs. They suggest that self-efficacy is the confidence that a business possesses the necessary skills and resources for executing growth, while perceived feasibility refers to the expectation of feasible execution of growth. Meanwhile, perceived behaviour control is the perceived ability to control outcomes associating with growth, e.g., higher risk level as well as external factors that may constrain the realization of growth. In general, all of them refer to a firm's ability to control factors that affect the process of achieving growth. As such, firms' perception of resources that are necessary for growth affects firms' growth intention.

Furthermore, the growth intention literature also recognizes that perceived desirability and perceived capability are not independent constructs. Instead, they are interrelated in their relationships with growth intention. In particular, perceived feasibility

negatively moderates the impact of perceived desirability on growth intention (Fitzsimmons and Douglas, 2011). It means that growth intention is lower if a business perceives that it does not possess the necessary resources or does not have control over growth, even though they think growth is essential. By contrast, growth intention is boosted if they perceive that growth is achievable with current capabilities, even though they have low desire for growth. However, since perceived desirability decides the values of a growth opportunity, growth may have little value to the business if it conflicts with the firm's motivation or preferences. In that case, perceived desirability places a limit on growth intention regardless of perceived feasibility.

Moreover, heterogeneity of perceived feasibility is not only across entrepreneurs but also within an entrepreneur. Perceived feasibility is viewed as the perception of sufficient means to exploit an opportunity. In other words, it refers to the perceived capability to control internal and external factors. Accordingly, perceived feasibility varies over time, responding to changes in internal and external environments. Firms are heterogeneous in their perception of capability. As such, perceived capability is argued to be influenced by various factors, such as experience and environments (Newman *et al.*, 2019).

As discussed above, perceived capability negatively moderates the impact of perceived desirability on growth intention. In the case of Quadrant I in Figure 2, if both perceived desirability and perceived feasibility of growth are low, the firm does not aim to grow the business in both the long term and short term.

Meanwhile, in either Quadrant II or III, if one of them is high, growth intention is at a moderate level. However, there are differences between these two situations. In the case of Quadrant II, where growth desire is low and perceived capability is high, growth intention is a temporary rather than stable state. Because perceived desirability is low, values of a growth opportunity is relatively low to the firms, and thus, growth intention is relatively low. However, when a firm perceives that the feasibility of growth is high, it may still aim at growth. Since perceived feasibility is transient according to state of resources and conditions, growth intention is not stable, but rather responsive to the perceived capability. Hence, growth intention is capped at a certain level, regardless of how feasible the growth opportunity is. Accordingly, if the entrepreneur has a low desire to grow the business, their growth intention is transient and fluctuates, depending on market conditions as well as their resources.

By contrast, in Quadrant III, if the firm has a strong desire for growth, growth has a high value and thus, growth intention is stable, even though in the short term, the

firm's growth intention is bounded by perceived level of resources. In other words, the growth intention may fluctuate over a short period due to their perception of constrained feasibility in the short term, but it is stable over a long period.

Figure 2: The paradox of growth intention		
	Perceived desirability LOW	Perceived desirability HIGH
Perceived feasibility HIGH	Unexpected growth intention (Quadrant II)	High growth intention (Quadrant IV)
Perceived feasibility LOW	No growth intention (Quadrant I)	Bounded growth intention (Quadrant III)
	Intermittent growth intention	Intermittent high growth intention

In Quadrant IV, growth intention reaches its highest possibility if the entrepreneur has a strong desire for growth and perceives high feasibility of growth. Nevertheless, similar to the situation of Quadrant III, growth intention is bounded by perceived feasibility in a specific period. Overall, the level of growth intention is stable over the long term if growth is desired and has a high value for the firm, but it also fluctuates over time because the perceived feasibility varies over time.

In general, this section has reviewed the literature on growth and growth intention. Studies have more consistently shown that small business growth is determined by various factors. Among them, growth intention drives the direction of growth outcome. At the same time, growth intention is shaped by entrepreneurs' desire for growth as well as their perceived controls over growth. In the next section, I will review the literature on the impacts of financial constraints on growth. The discussion in the literature of financial constraints and bricolage will reveal two opposite views on the impacts of financial constraints on growth and related issues in measuring financial constraints.

2.4. Funding gap effects on growth

The effect of financial constraint on firm performance in small firms starts with the theoretical work of Carpenter and Peterson (2002), in which they show that growth of a financially-constrained firm is constrained by availability of internal finance. Empirical

evidence supports their theory and shows that an increase in market supply will relax the credit rationing situation and improve firm performance. Nevertheless, the literature on bricolage and financial slack argues that a financially-constrained situation will stimulate efficiency and creativity and, thus, improve firm performance (Baker and Nelson, 2005; George, 2005). Some studies found that financial pressure stretches a firm's capabilities to leverage current level resources. These strands of the literature will be discussed in more detail in the next subsections.

2.4.1. Financial constraints inhibit firm growth

Carpenter and Peterson (2002) studied the relationship between internal finance and growth in small firms. They propose that, in a financially constrained firm, total asset growth is more responsive to a change in internal cash flow. A financially unconstrained firm can easily replace internal cash flow shortage by external capital. As such, internal and external finance are interchangeable and firm growth is not affected by a shortage in internal cash flow. However, when a firm is externally constrained, it faces a significant wedge in the costs between internal and external finance, and in the extreme case of credit rationing, it cannot secure external finance. A more financially constrained firm faces a larger wedge. A firm that is short in internal cash flow is more dependent on external funding to finance their businesses, while a firm that has limited access to external finance is more dependent on internal cashflow. An increase in internal cash flow relaxes firms' dependence on external finance and vice versa. An improved internal cash flow also reduces the cost of external finance because it increases the value of assets used as collateral (Rahaman, 2011). In sum, the literature suggests that, in an externally financially constrained firm, the availability of internal finance binds firm growth, and an ease in access to external finance reduces dependence of growth on internal finance.

Empirical evidence supports the dependence of growth on internal cashflows in financially constrained firms. Carpenter and Peterson (2002) use a data set of US quoted small firms and find supporting evidence for the hypothesis that for one unit increase in internal cash flow, there is a greater than one unit increase in asset growth. Moreover, firms using less equity have a higher increase in asset growth compared to those firms using a high proportion of equity. It implies that the growth of a constrained firm is more sensitive to cash flow. Rahaman (2011) also studies the relationship between financial constraints and employment growth in both quoted and unquoted sample of UK firms and obtain similar results to Carpenter and Peterson (2002). They find that for a 10% increase in internal finance, employment growth rises by 7.39%. Moreover, comparing between low bank credit and high bank credit, they

find that the former has a more sensitive employment growth than the latter, which implies that constrained businesses are more dependent on internal finance to fund their employment growth than less constrained ones. As well, Haynes and Brown (2009) use the Survey of Small Business Finance 1993 and 2003 to study the sensitivity of employment growth of small and private US businesses to internal finance. They, too, find a positive relationship between internal finance and employment growth and that this relationship is stronger in small firms, compared to large firms. Their findings converge with previous studies.

2.4.2. Financial constraints push firm efficiency

However, some empirical studies found that, under financial pressure, firm performance and, particularly, productivity improve. This is to say that financial constraints positively correlate with firm performance. Musso and Schiavo (2008) studied the impact of financial constraints on survival and growth for businesses. They found that access to external finance increases survival likelihood. They suggest that constrained firms are forced to improve efficiency and that financial pressure helps resolve agency issues and push firm performance. The literature on financial slack and entrepreneurial bricolage addresses the “less is more” role financial constraints on growth, i.e., financial constraints improve growth.

One strand of the financial slack literature also supports the view that financial constraints affect firm performance (George, 2005; Vanacker *et al.*, 2017). Financial slack can be viewed as the opposite of financial constraints, implying that, while being financially constrained refers to a low level of financial slack, having abundant slack shows a low degree of financial constraints. On the one hand, financial slack acts as a buffer against the uncertainties of the internal and external environment. As such, financial slack helps shield firms from a disruption from the environment or changes from internal structure (George, 2005). On the other hand, financial slack is seen as a signal of inefficient use of current resources. Accordingly, financially constrained firms are forced to maximize economic values of financial capital.

Financial constrained firms arguably deploy efficiently their financial capital in their operating and investing activities since they need to leverage and stretch the current level of resources. Tan and Peng (2003) suggest that, from the agency theory, slack signals inefficiency in a business's activities, even though from the organizational slack view, it is viewed as a costly buffer against uncertainties. Due to its low stickiness, finance is considered as an unabsorbed resource and can be easily withdrawn and allocated to different activities if firms redirect their decisions

(Natividad, 2013; Vanacker *et al.*, 2017). For that reason, financial slack is considered as a waste of resource since it does not provide economic profit to the business (Nohria and Gulati, 1996; Mishina *et al.*, 2004). Moreover, financial slack may result in inefficient investment because it allows a firm to pursue a trial-and-error approach. As such, financial constraints push firms to be deploy their financial capital efficiently. Furthermore, financial constraints reflects risk taking behaviour, while financial slack associates with a risk-averse attitude(Nohria and Gulati, 1996). Financial slack allows entrepreneurs to do more experimentation with their resources. However, it creates related disadvantages. Business owners may become more comfortable with the current level of resources and be discouraged from seeking more opportunities (Bradley *et al.*, 2011). The literature on entrepreneurial management argues that the incentive to experiment negatively correlates with slack availability. Firms with excessive slack may become inward-looking, since growth means disruption to standard routines, particularly product expansion. Besides, with plenty of slack at hand, they can acquire tools and equipment that fit with existing plans, rather than discover a more novel approach (Hoegl *et al.*, 2008). Excessive slack indicates that firms are in a position of abundant resource. Firms may want to protect their current positions, instead of excessively involving in experimentation, since they may feel comfortable with their current positions and are likely to hold the attitude that they are doing relative well. They also have more to lose if the experimentation fails and thus, financial slack reduces the threshold at which the entrepreneurs are encouraged to seek for expanding their opportunity sets.

By contrast, financial constraints encourage firms to take risks and seek opportunities for experimentation (Paeleman and Vanacker, 2015). As opposed to financial slack, financial constraints may indicate that firms are in a deficit position. In such a position, they may become more eager to discover opportunities that enable them to leverage their current positions. They are prompted to take on more risk as they have less to lose if they fail, but more to gain if they are successful. More importantly, financially constrained firms have to allocate their limited resources optimally to overcome the financial pressures they face. Maximizing value creation from the current resources becomes a priority in constrained businesses. It means that they are forced to stretch their limited levels of resources in order to achieve economic growth. Thus, financially constrained firms tend to utilize resources more efficiently. Nickell (1999) and Sharpe (1994) found that under financial pressure, firms are less likely to involve in labour hoarding but instead, attempt to improve efficiency.

Moreover, the bricolage literature also seeks to explain this positive role of financial constraints on performance. In general, the concept of bricolage— making do with what is at hand – suggests that entrepreneurs use their limited level of resources to search for a more innovative approach to achieve their ultimate goals, or even reach more optimal solutions.

Baker and Nelson (2005) explored the precedents of bricolage on several firms and suggested that there are three necessary elements, which are: a 'making do' attitude, available resources, and combining them. Bricoleurs are required to have some resources at hand, even though they can be evaluated as useless or of very little use. They also have a 'making do' attitude, which means that they refuse to be constrained by their limitations and are biased towards actions. When entrepreneurs face resource constraints, they may choose to abandon their plans or leverage use of current resources. Lastly, by combining and reusing the available resources for different purposes, they may discover innovative solutions.

As such, instead of giving up, the entrepreneurs try to find a new combination of their current resources in order to discover new opportunities that are suitable for their available resources (Stenholm and Renko, 2016). More importantly, instead of withdrawing existing resources from their current use, Baker and Nelson (2005) emphasize on the importance of redeploying resources that are viewed as useless or not important in the current process. By recombining or transforming these redundant resources, bricolage transforms unproductive resources and employs into an useful process (Baker, 2007). Overall, bricoleurs refuse to be constrained by the resource environment and instead, they transform scarce, sometimes useless inputs, into outstanding outputs (Desa, 2012). Entrepreneurs with bricolage capabilities know when and where to apply bricolage skills and, thus, are able to act promptly on resource constraints and achieve growth.

2.4.3. Curvilinear relationship between financial constraints and performance

Many studies have been discussing the curvilinear relationship between financial constraints (or financial slack) and performance. The impact of financial slack on growth follows an inverse U-shaped relationship, even though some studies found a diminishing positive effect (Vanacker *et al.*, 2017). When a firm keeps a minimum amount of financial slack, it helps improve its business growth, but an abundant level of it will hinder long-term growth. As discussed above, financial slack has both positive and negative impacts on firm growth. At a low level of slack, its positive effect

dominates the relationship between them. However, after reaching an optimal degree, this positive effect will be offset by the negative effect and eventually lowering growth rate.

The non-linear relationship between can be seen from two points. Firstly, financial slack initially increases performance by reducing liquidity risk, but a high level of financial slack eventually reduce performance. As discussed earlier, financial slack, e.g., cash reserves, smooths business operations as it provides liquidity and helps prevent unexpected disruptions to operating and investing activities. Moreover, firms can take advantage of new opportunities if they have available financial resources (Mishina *et al.*, 2004). However, financial slack also signals that firms were unable to extract available resources to promote growth. A high level of financial slack indicates that firms are struggling to find opportunities to use up their slack. Besides, financial slack does not generate measurable profitability and, thus, excessive financial slack will deteriorate financial performance. As such, when financial slack is above an optimal level, the negative impact on profitability will offset its positive effect of precautionary motive and results in a deficit position.

Secondly, financial slack increases performance by allowing experimentation with new strategies but a high level of slack may induce inefficient experimentation. As also discussed above, financial slack allows for experimentation, which is strategically important for incumbent and new firms. Since financial resources have low stickiness, it provides flexibility for trials of different strategic choices at the same time. Accordingly, financial slack helps boost long-term growth. Nevertheless, slack abundance may lead to suboptimal investment (Mishina *et al.*, 2004). Firms may tend to widely adopt a trial-and-error approach, thanks to a large base of resources. They may even be reluctant to terminate projects that do not have promising prospects. Eventually, this suboptimal behaviour will deteriorate growth. In general, a moderate level of financial slack provides businesses with the necessary resources to pursue growth, but a high level induces inefficient decisions that may harm business growth. As a result, the relationship between financial slack and growth follows an inverse U-shape.

This inverse U-shaped relationship converges with the ideas of selective and parallel bricolage of Baker and Nelson (2005). They argued that only “selective bricolage” leads to growth while “parallel bricolage” dampens long-term growth. In general, “selective bricolage” refers to a selective use of bricolage at a small scale and “parallel bricolage” indicates use of bricolage at a large scale within a firm. Selective bricoleurs only apply bricolage temporarily in some domains or at a narrow scale (Fisher, 2012)

and, thus, provide optimal solutions to specific problems, but such solutions can be difficult to adopt to a broader context (Senyard *et al.*, 2014). Since selective bricolage is applied at a limited scope, it encourages discovering new application of current resources and stimulates innovation. After reaching a solution, selective bricoleurs drop bricolage search and turn back to the standard procedure instead of continuing bricolage. As such, it does not consume all the attention of the entrepreneur or of the organization. Instead, when entrepreneurs apply parallel bricolage on every dimension, it becomes a norm within the businesses and is often applied at every problem and department. However, the discovery process is an exhaustive procedure that requires a tremendous level of attention. Furthermore, it will bind the firm within the current level of resources instead of reaching out to resources outside of their hands or their networks. Eventually, this behaviour will hinder long-term growth. This implies that a limited extent of bricolage improves firm performance, whilst too much bricolage deteriorates performance. As such, bricolage has an inverse U-shape relationship with growth.

Overall, while the financial constraint literature focuses on the negative impact of financial constraints on growth, the literature on financial slack and entrepreneurial bricolage offers an opposite view to this relationship. Financially constrained firms lack funding to pursue their goals, and thus, operate at suboptimal level. However, financial constraints also encourage firms to be more productive with limited resources and optimize value creation from their current financial position. Furthermore, since a funding gap exists due to market friction, its impact on firm performance acts as an indicator of the market failure's real effect on business. Hence, further examination is needed to study which effects are more dominating and under which conditions.

2.4.4. Financial constraint measurement

Measuring financial constraints, particularly in small and unquoted businesses, is still discussed in the literature. Empirical studies on the real effects of financial constraints on a firm's activities examine differences in the behaviours, activities, and performance of financially constrained and unconstrained firms. For example, Fazzari *et al.* (1988) find that financially constrained firms have higher investment-to-cashflow sensitivities. Financial constraints also impede R&D investment (Mancusi and Vezzulli, 2014; Acharya and Xu, 2017), asset growth (Carpenter and Petersen, 2002), employment growth (Campello *et al.*, 2010), and import and export activities (Manova *et al.*, 2015). However, the discussion on the approach used to capture financially constrained firms is still going on in the literature on financial constraints.

The funding gap is studied from two different views, namely: internal financial constraints (e.g., liquidity issues) and external financial constraints (e.g., the wedge of internal and external financial costs) (Cleary *et al.*, 2007). The internal view considers financial constraints as the reliance of growth on availability of internal cash flow, while the external view takes a standpoint of the ease of access to external finance (Guariglia, 2008). From the former view, financial constraint is identified by the responsive degree of growth or investment to a change in internal finance. Meanwhile, from the latter view, financially constrained businesses are disproportionately benefit from an increase in the supply side, since they are informationally asymmetric.

From the internal view, a firm's operations and investment depend on the availability of internal cash flows. Firms with a relatively high amount of liquid assets or cash flows are argued to be less financially constrained (Kaplan and Zingales, 1997) because these assets are less sticky and can be quickly deployed into firm activities. Relatedly, the issue of liquidity suggests that a firm does not have sufficient internal cash flows for their operating and/or investing activities.

One of the main papers taking the view of internal financial constraints is Kaplan and Zingales (1997). They examine financially constrained firms by considering the availability of internal funds as well as the firm's liquidity status. For example, unconstrained firms are those that have "*initiated or increased cash dividends, repurchased stock, or explicitly indicated that it had more liquidity than it would need for investment in the foreseeable future*" (Kaplan and Zingales, 1997, p.180). In other words, financial constraint is captured by the relative gap between the internal cash flow position and the firm's investment level. A narrower gap indicates that a firm has a stronger cash position and that investment is not rationed by a lack of funding. Thus, the firm should not be considered financially constrained. In contrast, a weak cash position (e.g., low coverage ratio) may be used as an indicator of internal financial constraints. Some other studies also examine financial constraints using internal proxies, such as current ratio (Guariglia, 2008), coverage ratio (Cleary *et al.*, 2007).

From the external view, the response of investment and/or operation to fluctuations in internal cashflows indicates a gap between internal and external costs. External financial constraints refer to a firm's difficulties in obtaining external funding. In an asymmetric information market, firms may face higher external financial costs, or at the extreme, a fully-rationed situation (e.g., credit rejection). According to pecking order theory (Myers, 1984, Myers and Majluf, 1984), when internal financial resources are exhausted, firms start seeking outside debt and equity, respectively. Thus, market

failures create a funding gap that firms are unable to fulfil. In such a case, the amount of accessible external finance affects operation, investment, and performance.

Some empirical studies use size and age to classify firms into unconstrained and constrained groups (Fazzari *et al.*, 1988). According to these studies, financially constrained firms are those which potentially face a higher degree of information asymmetry. This is because asymmetric information leads to adverse selection and moral hazard issues, which in turn causes a significant gap in the costs between internal and external funding and a lower probability of getting external finance, as discussed in the credit-rationing section. Age and size are popular measures of financial constraints because younger and/or smaller firms are more informationally asymmetric, compared to older and/or bigger counterparts. Similarly, dividend pay-out ratio also signals long-term prospects, since high-dividend pay-out signals that a firm has a good prospect (Guariglia, 2008).

Overall, the impact of financial resources on a firm's performance is studied from the perspectives of both internal and external financial constraints. Both views are based on the assumption that in an imperfect capital market, investment and/or operations are sensitive to internal funding. The internal view does not explicitly reflect the impact of supply disruption on a firm's real activities, but it shows how firm performance is dependent on available internal finance. It also means that market friction does not translate to firm performance if firms are self-sufficient. Meanwhile, the external view draws a link between market failure and firm performance, given that firms are more dependent on external finance to fund their businesses. However, in either view, a high dependence of growth on the availability of internal finance reflects the consequences of financial market contraction on business. The following part will review empirical studies on capturing financial constraint.

Studies have developed different indices to identify a financially constrained firm. Some of the most popular ones are investment-cash flow sensitivities (Fazzari *et al.*, 1988) and Kaplan and Zingales (Kaplan and Zingales, 1997). Fazzari *et al.* (1988) develop investment-cash flow sensitivities index to measure financial constraints. The index measures the sensitivities of investment to changes in cash flows, since investments of financially constrained firms are more sensitive to changes in cashflows. Kaplan and Zingales (KZ) index is based on an analysis of annual reports and public news to estimate the availability of internal and external funds. On this basis, all firms are grouped into five different categories in terms of their degree of financial constraint, namely: not financially constrained; likely not to be financially constrained; possibly financially constrained; likely to be financially constrained; and undoubtedly financially

constrained. After that, ordered logit models are used to estimate the probability that a firm belongs to one of five groups.

Following Kaplan and Zingales (1997) approach, Lamont *et al.* (2001) use the estimated coefficients from Kaplan and Zingales (1997) logit models to create an index of five accounting ratios: cash-flow to total capital; the market-to-book value; debt to total capital; dividends to total capital; and cash holdings to capital. All firms are then ranked according to their firm-year KZ index and categories into the constrained and unconstrained groups based on this index. Other indices are also proposed to indirectly measure the degree of financial constraints (Kaplan and Zingales, 1997; Whited and Wu, 2006; Hadlock and Pierce, 2010; Mulier *et al.*, 2016; Ferrando and Ruggieri, 2018). Hadlock and Pierce (2010) argue that using the traditional approach and KZ index to proxy financial constraints may be endogenous. For example, one popular proxy is cash holding. On the one hand, firms holding a large amount of cash may signal that firms are unconstrained. On the other hand, firms may hold a high level of cash due to precautionary reasons, thus level of cash holding may indicate that firms are in a constrained position.

Hadlock and Pierce (HP) index is calculated using firms' size and age – which are supposed to be exogenous. Similar to Kaplan and Zingales (1997), the information is collected from annual reports and management discussions, which are then used to assign firms into different categories of financial constraint. In contrast to the KZ index, the HP index records only qualitative information about the liquidity situation, rather than both qualitative and quantitative information. At the same time, Sufi (2009) uses the cash-flow sensitivity of cash as a measure of financial constraints and suggests that lack of access to a line of credit can be used as a powerful measurement of financial constraints. Criticizing the stability of the KZ index's parameters, Whited and Wu (WW) (2006) use GMM estimation of investment to derive an index of financial constraints that varies over time. More recently, Mulier *et al.* (2016) develop an age-size-cash flow-leverage index based on a sample of unquoted SMEs in six European countries.

Overall, the validity of these indices in measuring financial constraint is open for still discussion. For example, whether investment-cash flow sensitivity could still be a good measure of financial constraints is questioned (Chen and Chen, 2012; Mulier *et al.*, 2016). Farre-Mensa and Ljungqvist (2016) examine the validity of these indices by testing capital structure response to an increase in the tax rate. The argument is that an increase in the tax rate leverages the value of debt shields. Accordingly, the demand for debt will increase for all firms as they want to take advantage of tax

shields. However, the ability to raise debt capital is lower in constrained firms compared to unconstrained firms. They suggest that Fazzari *et al.*'s (1988) approach, the KZ, HP and WW indices all did not capture financially constrained firms, since firms that are identified as financially constrained based on these approaches did not behave in a constrained way as suggested by the literature. For example, constrained firms identified by these indices are able to raise debt in response to an increase in tax rate.

More importantly, the applicability of these indices to small business is also questioned. One of the main advantages of these indices is that they use financial information, which is supposed to be objective and legitimately comparable. However, this approach requires intensive information, which is difficult to gather or if it is even available in the context of small and/or unlisted firms.

In addition, one important element that needs to be controlled for is growth opportunities because it affects both financial constraints and growth outcome. Studies often cite Tobin's Q as an effective control for growth opportunities. Tobin's Q is calculated using both market value and book value and reflects the market's evaluation of a firm's growth in the future. As such, it acts as an unbiased measure of growth opportunity. Despite its prominence, it is not applicable to small and/or unquoted firms, since it requires market value for calculation and thus, not available for unlisted firms (Whited & Wu, 2006).

Recently, loan-level data allows researchers to detect changes in credit supply and use fixed effect at firm, bank, industry in order to control for demand changes as well as to examine the impact of supply change on a firm's activities (Acharya *et al.*, 2018; Ferrando *et al.*, 2019). Firm fixed effect is a popular approach to control for change in a firm's demand, but it raises an issue that firm having one relationship loan is cancelled out. Yet, it is found that a relationship with one main lender accounts for a vast majority of firms. As such, this method is only applicable to those who have multiple relationships – a small subset of the data set. Degryse *et al.* (2019) suggest using industry fixed effect to solve this issue and assume the same credit demand within the same industry. The main assumptions are: 1- if market friction affects firm performance, a change in the supply side will result in a change in a firm's activities; and 2- firms do not have varying credit demand. However, these two assumptions may not be valid. For example, a firm's demand for external finance may change from time to time.

Another approach that became more popular in recent years is a survey-based measurement. In particular, financially constrained firms are identified based on whether they claim that they do not have enough funding for their operations and investment activities. In other words, they are financially constrained if their needs for financial resources are not fulfilled. Firm-level survey-based studies are capable of directly measuring financial constraints (Schauer *et al.*, 2019). Campello *et al.* (2010) capture financially constrained firms by directly asking the entrepreneurs if their companies' real and financial policies have been affected by the cost or availability of credit. Using the World Bank Enterprise Survey, Beck *et al.* (2005) measure the extent of financial constraint based on firms' self-evaluation of financing problems as obstacles to their operation and growth. Based on the survey "VIII Indagine sulle Imprese Manifatturiere", Minetti and Zhu (2011) categorize Italian firms into a "strong credit rationing" sub-group if they answer "yes" to both "Would the firm have liked to obtain more credit at the market interest rate?" and "Did the firm demand more credit than it actually obtained?". A broader definition of credit-rationing is also used in their paper: "Weak credit rationing". This category includes those firms who are those answered "yes" to the first question, regardless the answer to the second question. Similarly, Schauer *et al.* (2019) classified firms into "constrained" and "unconstrained" groups based on the manager's self-perception on the firm's financing status. The information is generated from the "ifo Investment Survey" on German firms from 1989 to 2012. Managers are also asked to rate from one to five how their investments are impacted by sales, financing options, earnings expectations, and other factors.

However, this direct approach has some disadvantages. First, as it is based on respondents' answers, it is argued to be more subjective than the accounting-based proxies. Second, the measurement is a qualitative index rather than a quantitative measure.

Nevertheless, the direct approach overcomes the indirect indices in allowing to differentiate financial constraints led by discouraged borrowing or credit-rationing. While indirect approaches provide the degree of financial constraints, they do not allow for identifying whether the constraints come from credit-rationing or discouraged borrowing. The abovementioned survey-based data allows to identify discouraged borrowers and credit-rationed businesses. Therefore, it is important to employ these datasets to capture financial constraint issues in small businesses.

Overall, the availability of survey-based data helps partly address the issue of measuring financial constraint in the context of small business, since it allows to capture financial constraints directly. However, the convergence of these approaches

needs further examination. More importantly, these data sets also allow to distinguish funding gaps caused by discouraged borrowing and credit rationing. Identifying these two types of funding gaps and their respective consequences on growth will help policymakers design suitable programmes to resolve the issue of financial constraints.

2.5. Conclusion

The literature has been studying determinants and consequences of credit-rationing, but insufficient attention has been paid to discouraged borrowing. This type of self-rationing decision is caused by information asymmetry in the financial market. Thus, further understanding its determinants and its consequences on firm performance is important in solving this demand-driven funding gap and fully capturing the effects of market failure.

However, the literature has not examined application decisions as a dynamic process, to understand how credit-rationed firms make their application decisions in the future. This is an important omission as the impacts of market failure are further exacerbated if credit-rationed firms are discouraged from making further applications. As such, good borrowers who were rejected are further self-excluded from the financial market.

Moreover, in studying the impacts of discouraged borrowing on growth, firm perception is an important factor since growth expectation is critical in explaining small firm growth. Experience of discouraged borrowing and credit rationing worsen firms' perception on access to external finance. At the same time, growth perceptions are bounded by perceived financial constraints to growth. As such, discouraged borrowing and credit rationing further impedes growth because they hinder the financial constraints perception and impede growth expectation. Hence, the next three chapters will address these gaps and contribute to the literature of discouraged borrowing, financial constraints, and small business growth by proposing a theoretical model (Chapter III) and providing empirical evidence (Chapters IV and V)

CHAPTER III: THEORETICAL FRAMEWORK

3.1. Introduction

The literature on financial constraint and growth has long investigated the real effects of market friction on firm performance. While impacts of credit rationing and supply contraction have been extensively studied, the literature on the effects of discouraged borrowing is still in the early stages. One of the main issues is aggregating credit rationing and discouraged borrowing together in the funding gap. Although both types of funding gaps are caused by market failure, credit rationing shows informational asymmetry from the supply side whilst discouraged borrowing reflects firms' perception of asymmetric information issues. Discouragement's impact may be distinctive from credit rationing's impact since the decision makers are different and this may reflect different cognition processes (Dai *et al.*, 2017). It, thus, calls for more attention to be paid on determinants and consequences of discouraged borrowing – a self-rationing decision caused by asymmetric information.

The relationship lending literature studies the learning process of the supply side in relation to the information collected in a lending relationship. However, less is known about the learning process of the demand side although discouraged borrowing is caused by asymmetric information which may arise from both supply and demand sides (Kon and Storey, 2003). Existing literature examines the extent of firms' information collected by suppliers in a relationship lending as well as the extent of informational rent held by the suppliers. However, less is known about how the information is collected and used by firms in a lending relationship. Hence, examining firms' learning process, particularly in relation to banks' information, provides more insights into the discouraged borrowing decision.

On the consequences of discouraged borrowing on firm performance, studies often aggregate it with credit rationing in the funding gap. The aggregation assumes the impacts of both types of funding gap have the directions. It can be problematic if discouraged borrowing and credit-rationing have different directions in terms of their effects on growth. The availability of survey-based data allows for studying the individual impacts of discouraged borrowing and credit rationing. This study, thus, will examine the individual effects of these two types of funding gaps on growth.

Furthermore, accurately capturing growth opportunity in small businesses is still discussed. Studies have well acknowledged that it is critical to control for growth opportunities in order to isolate the impact of funding gap on growth. Tobin's Q is often employed as the control since Tobin's Q captures market's unbiased evaluation of

growth opportunities, but this measure is not available for small or unlisted firms, which accounts for a majority of firms in the economy. Carpenter and Guariglia (2008) suggest using firms' self-evaluation of growth opportunities – growth expectation – to control for growth opportunities. Indeed, growth intention is one of the main determinants of growth in small business (Douglas, 2013). As such, understanding growth expectation helps answer the question of financial constraints' impact on growth.

Additionally, the relationship between growth and perceived growth opportunities raises concerns that the effects of financial constraints on growth are more complex because perceived growth opportunities are constrained by perceived financial resources, which, in turn, are affected by the actual funding gap in the previous period. It means that the experience of financial constraint indirectly hinders perception of growth opportunities and consequently impedes growth. Hence, it calls for a complete framework for examining the direct and indirect roles of credit rationing and discouraged borrowing on small business growth.

Overall, this chapter makes two main contributions to the literature of financial constraints. Firstly, it contributes to the literature of credit rationing and discouraged borrowing by drawing a causal link between them. A Bayesian learning framework is employed to study entrepreneurs' learning process based on their credit rationing experience. The model shows that credit rationing provides valuable information that worsens entrepreneurs' perception of rejection, which in turn increases the likelihood of discouraged borrowing.

Secondly, it contributes to the literature on financial constraints and particularly on discouraged borrowing by drawing direct and indirect links between discouraged borrowing, credit rationing, and growth. Built on the framework of financial constraints and bricolage as well as a learning model, it shows that the impacts of discouraged borrowing and credit rationing on growth are more complex and prolonged because of its indirect impacts on the perception of funding gaps and perception of growth opportunities. In this manner, it shows that the impact of market failure on entrepreneurs' growth is underestimated in the literature.

The next section will develop the framework between credit rationing, discouraged borrowing and growth in more details. In the first part, learning models are applied to build the link between past experience and expectation formation, including: 1- a Bayesian model to establish the impact of credit rationing on perceived rejection and discouraged borrowing; 2- the relationship between financial constraints and

perceived funding gap; and 3- the feedback loop of realized growth and expected growth. In the second part, the impacts of funding gaps on growth will be discussed. It shows that financial constraints have positive and negative effects on firm. The last part will discuss the indirect channel through which financial constraints' impacts are intensified.

3.2. Theoretical framework

This chapter develops a theoretical framework for the relationship between credit rationing, discouraged borrowing and growth. The model includes two main parts as shown in [Figure 3](#). Firstly, learning models are applied to show that the revision of perception and/or expectation involves experience in the past. In particular, it seeks to explain the impact of a recent rejection on the perception of rejection probability, which in turn affects the likelihood of discouraged borrowing. Similarly, the impact of financial constraint experience on the perception financial constraint is also examined. Lastly, feedback from growth provides entrepreneurs with useful information to update their expected growth. In this manner, the indirect effects of discouraged borrowing and credit rationing through perceived financial constraint and growth expectation are also framed.

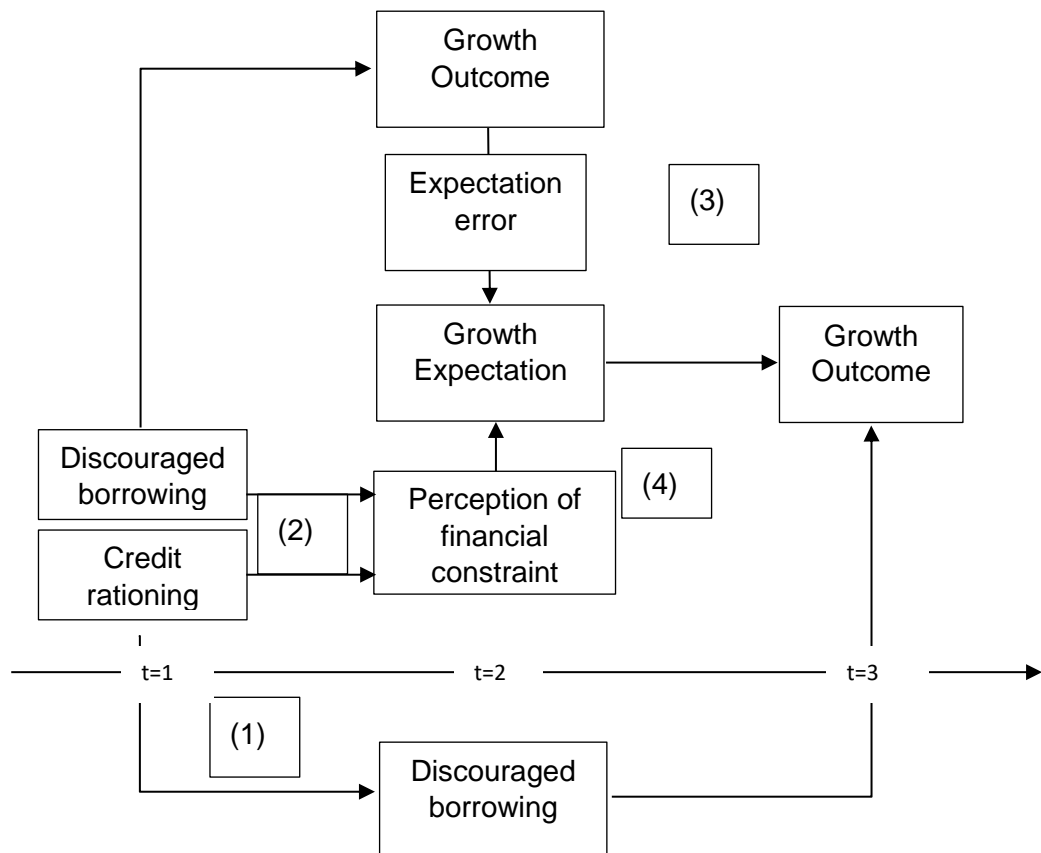


Figure 3: A theoretical framework of credit rationing, discouraged borrowing and growth

Secondly, the impacts of financial constraints on firm growth are illustrated based on the literature on financial constraints, bricolage and growth intention. While the literature on financial constraints often supports the inhibiting role of financial constraints, the literature on bricolage proposes that financial constraints can act as a motivator for growth. The model also disaggregates the funding gap caused by market failure into demand-driven funding gap (i.e., discouraged borrowing) and supply-driven funding gap (i.e., credit rationing) and proposes their individual impacts on growth. Furthermore, an indirect channel is formed based on perception of financial constraints and growth expectation. The literature on growth intention shows that growth intention is bounded by perception of financial constraint. From the learning model just mentioned above, perception of financial constraints is affected by experience of financial constraints – discouraged borrowing and credit-rationing. Thus, perception of financial constraints and growth expectation form an indirect channel which intensifies and prolongs the impacts of discouraged borrowing and credit-rationing on growth.

The next part will discuss each section in more detail.

3.2.1. Perception and past experience: A learning process or consistently biased perception

This section shows the learning models in which perception or expectation of an event is formed based on previous experience relating to that event. Three main relationships are studied in this section. Firstly, the impact of credit rationing on discouraged borrowing is investigated using a Bayesian learning model. Secondly, the learning model is also used to study the effect of actual funding gap on perceived funding gap. Thirdly, the feedback loop of actual growth on expected growth is further extended by considering the role expectation error in the learning process of forming growth expectation.

3.2.1.1. Credit rationing and discouraged borrowing: A Bayesian learning framework

Figure 4 depicts the borrowing decision tree based on the models of Cole and Sokolyk (2016) and Kon and Storey (2003).

As defined by Kon and Storey (2003), firms are called discouraged borrowers if they are good borrowers, but the fear of rejection discourages them from making applications. Cole and Sokolyk (2016) point out that those firms are considered as financially constrained only if they have a need for external finance. Thus, those firms who do not need external finance should not be considered as financially constrained.

This self-rationing behaviour is due to application costs and screening errors as well as a wedge in the funding costs between banks and money lenders. Firms bear the cost of application to reveal their information to their potential financial suppliers while the suppliers make screening errors if they are unable to screen out heterogeneous borrowers in the market. A low-risk entrepreneur (i.e., good project) has a risk of being rationed and losing their application cost due to banks' screening errors. However, the imperfect screening ability also means that a high-risk entrepreneur (i.e., bad project) may have a high chance of getting approval because banks misperceive the project as a good one, and thus, are more likely to apply.

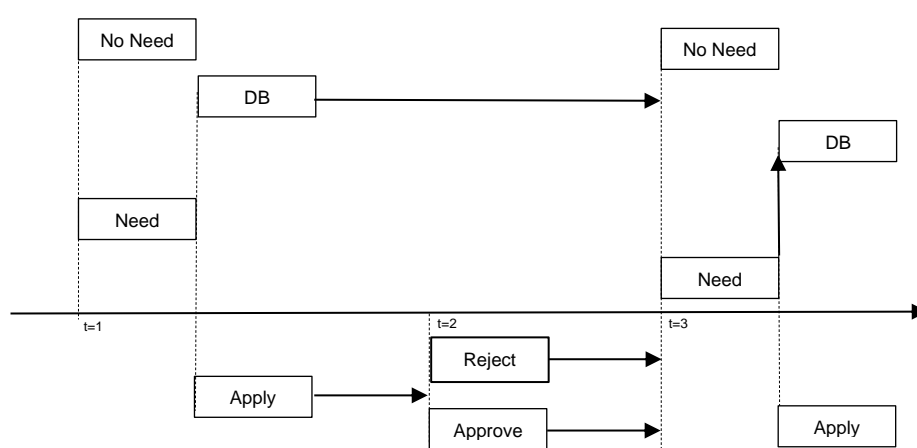


Figure 4: A borrowing decision tree

Kon and Storey's (2005) model first considers screening errors made by banks and suggests that the number of discouraged borrowers decreases with a lower level of screening errors. Because screening errors only start decreasing quickly after a significant amount of information is accumulated, whilst application cost goes up dramatically when there is some information, the relationship of discouraged borrowing and information is a reverse U-shape. The model then relaxes this assumption and considers other cases, in which screening errors come from the firm side when firms misperceive themselves as creditworthy although they are not or think they are not creditworthy when they are. They find a similar reverse U-shape result. However, the rate of decline of perceived screening errors is higher when there is some information in the market. As a result, the left side of the reverse U-shape is less steep.

The proposed model investigates the learning process that forms the perception of rejection likelihood by studying how discouraged borrowing decision is driven by previous application experience. In particular, it studies how previous successful/failed application experience helps explain perceived rejection likelihood. It will show that a successful application will encourage firms to apply for finance while

a failed application reduces the application likelihood. It implies that a good firm will be more likely to be discouraged following a rejection while a bad applicant will be encouraged by an approval. This result emphasizes the issue of market failure as its consequence is further exacerbated and the funding gap is widened. This study, thus, also explains the “perceived screening errors” in Kon and Storey (2003).

A Bayesian framework is employed to depict firms’ learning models and the role of banks’ decisions of granting or declining loans on firms’ future borrowing decision (Figure 5). In general, the subjective distribution of rejection probability will be revised when new information becomes available. A credit-rationing decision provides information regarding a bank’s evaluation of firms’ creditworthiness. This valuable information is incorporated into the learning process, which forms the basis for firms’ self-evaluation of rejection probability, which, in turn, affects their borrowing decision.

3.2.1.1.1. Bayesian framework

All uncertainties should be represented and measured by probabilities. Subjective probability represents beliefs and information of the decision-makers. Decision makers has their own information about an event and has their personal belief on the probability of the event occurrence (Berger, 1985). This probability can change as new information is gathered, rather than being a fixed value. The probability of the occurrence of the event before collecting new information is called *prior probability*. After receiving the information, the *posterior distribution* is a conditional distribution of the occurrence of that event, given the realization of the new data. By combining the prior beliefs with the collected information, the posterior distribution reflects the updated beliefs about the event after observing the information set. This posterior distribution will become a new prior distribution before the new information set is acquired to derive a new posterior distribution.

The posterior distribution is often calculated using the Bayes theorem as follows:

- (i) Consider a random variable θ on a parameter Θ with probability distribution $p_\theta(\cdot)$. Denote y as the new piece of information in an observation space \mathcal{Y} . In order to update the prior distribution using the new information, a conditional distribution is estimated.
- (ii) Denote the prior distribution of θ on Θ is $p_\theta(\cdot)$ and the random variable y have conditional distribution $p_{y|\theta}(\cdot|\cdot)$. Given the realized value of y , the posterior distribution of θ is:

$$p_{\theta|y}(\theta|y) = \frac{p_{y|\theta}(y|\theta) p_\theta(\theta)}{p_y(y)}$$

3.2.1.1.2. Bayesian framework and discouragement

Due to asymmetric information in the market, entrepreneurs have their subjective estimation of the probability of rejection as illustrated in Figure 5. At time $t=1$, the entrepreneurs have a need for external finance. They decide whether they would make an application or self-select themselves out of the market. Their prior subjective rejection probability at $t=1$ is ε_i . If the perceived rejection probability is sufficiently small, they will make the application.

At time $t=2$, given that some of them decided to apply for finance (which means that their prior perceived probability of rejection is sufficiently small), they may get rejected or approved. By observing the suppliers' decision, they acquire more information from the supply side and insert the information into the posterior distribution. The prior perceived probability of denial ε_i is revised based on the new information from the suppliers' decision.

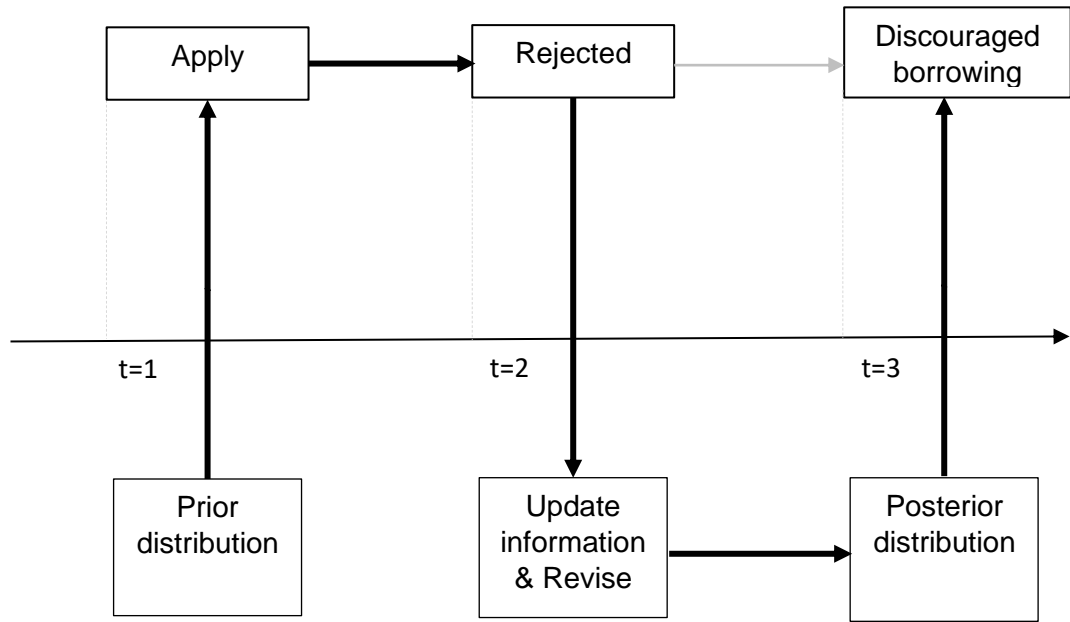


Figure 5: Updated Information and Discouragement

At time $t=3$, if the entrepreneurs need external finance, they will consider whether they should make new applications. Given the denials observed at time $t=2$, the posterior distribution of the probability of rejection is upward revised, which would then lead to a higher likelihood of discouragement. In other words, a negative borrowing experience is more likely to lead to a self-rationing decision in the future as shown below. The next section will explain how that happens.

i. Information and revised subjective probability of rejection

Denoting ε as the perceived probability of rejection, $\varepsilon \in [0,1]$.

At time t=1:

The prior distribution $f(\varepsilon_i)$ is assumed to follow a beta distribution with parameters α and β ($\alpha > 0$ and $\beta > 0$), which has the probability density function:

$$f(\varepsilon_i) = \begin{cases} \frac{1}{B(\alpha, \beta)} \varepsilon^{\alpha-1} (1-\varepsilon)^{\beta-1} & \text{if } 0 < \varepsilon < 1 \\ 0 & \text{otherwise} \end{cases}$$

Mean value of this prior distribution is:

$$E(\varepsilon) = \frac{\alpha}{\alpha + \beta} \quad (1)$$

At time t=2:

X is a random variable of the supplier's decision.

X can take only one of two values $\{0, 1\}$. In particular, $x_i = 1$ if firm is rejected and $x_i = 0$ if firm is approved. Thus, X follows a Bernoulli distribution of parameter ε :

$$P(x_i = 1) = 1 - P(x_i = 0)$$

The probability distribution of X is:

$$g(x|\varepsilon) = \varepsilon^x (1-\varepsilon)^{(1-x)}$$

At time t=3:

The posterior distribution of the rejection probability after having a borrowing experience will determine whether entrepreneurs will apply or self-ration themselves.

Following the Bayes' theorem, given the realized value of X , the posterior distribution also follows a beta distribution $B(\alpha+x, \beta+1-x)$ (DeGroot, 2004) as below:

$$f(\varepsilon|x_i) \propto g(x_i|\varepsilon)f(\varepsilon) = \varepsilon^x (1-\varepsilon)^{1-x} \varepsilon^{\alpha-1} (1-\varepsilon)^{\beta-1} = \varepsilon^{\alpha+x-1} (1-\varepsilon)^{(\beta+1-x)-1}$$

Thus, given the decision at time $t=2$, the mean of this posterior distribution is:

$$E(\varepsilon|x_i) = \frac{\alpha+x}{\alpha+\beta+1} \quad (2)$$

The value of (2) depends on the realized values of the decision at time $t=2$.

Posterior and prior mean values:

$$E(\varepsilon|x_i) - E(\varepsilon) = \begin{cases} \frac{\beta}{(\alpha+\beta+1)(\alpha+\beta)} > 0 & x_i = 1 \\ \frac{-\alpha}{(\alpha+\beta+1)(\alpha+\beta)} < 0 & x_i = 0 \end{cases} \quad (3)$$

Accordingly, a rejection decision increases the perceived probability of rejection and an approval decision decreases the perceived probability of rejection. Therefore,

following a credit-rationing event, the entrepreneurs upwardly revise their subjective probability of rejection.

This result also implies that information is symmetrically incorporated into agents' belief distribution, regardless of the type of the information. The agents do not favour confirmed news (i.e., an approval that confirmed her prior belief of low rejection probability) over disconfirmed news (i.e., a rejection that disconfirmed her prior belief). The entrepreneurs insert both approval-related and denial-related information into their learning process.

However, the literature on information-updating beliefs also discusses the role of confirmation bias in the process of updating beliefs. Confirmation bias refers to situations in which the entrepreneurs over-react to the information that confirms their prior belief of successful applications (i.e., an approval - confirmed information) and under-react to the information that disconfirms their prior belief (i.e., a denial - unconfirmed information). It means that the learning process is only responsive towards confirmed outcome and ignores unconfirmed outcome. If the outcome is more aligning to prior perception, the entrepreneurs place higher weight on it. Conversely, if the outcome is different with prior expectation, the entrepreneurs put less weight on it when forming expectation for the next period (Elfenbein *et al.*, 2017). It implies that although the entrepreneurs do learn from their experience, the posterior distribution is biased towards prior beliefs if confirmation bias exists in the learning process.

Thus, with the existence of confirmation bias, the entrepreneurs are biased toward "approval" information and ignore "rejection" information and their learning process is biased towards their initial beliefs. Applicants may put more weights on an approval decision because this event confirms their successful expectation, and thus, their perceived rejection likelihood is lower following an approval. Meanwhile, a rejection, which is an unconfirmed event, does not increase the perception of rejection likelihood since these applicants do not consider this unconfirmed information in their learning process. As a result, the entrepreneurs will be encouraged to apply in the future after an approval but will not be more likely to be discouraged following a rejection. It implies that if the entrepreneurs make application decision in the past, they will always make application in the future because their perceived likelihood of rejection will always be sufficiently small.

In other words, if the learning process has confirmation bias, information processing does not follow the Bayes rule, which suggests that both types of information are

equally incorporated into the revision of posterior beliefs. In this case, the prior belief decides which information will be incorporated into the revising process and this prior belief will eventually become persistent. Hence, the entrepreneurs do not increase their expected rejection likelihood after a denial, even though the learning process exists.

ii. Rejection and discouragement decision

The previous section has shown that following a rejection decision, the entrepreneurs revise up their expected rejection likelihood. This section will examine the link between their perceived rejection probability and discouragement decisions.

At time t=1:

The entrepreneur has an indivisible project 1 requiring investment of X and offering return R^s if successful and $R^f=0$ if the project fails. p is the probability of success and $(1-p)$ is the probability of failure. If the entrepreneur does not have enough internal capital, they will seek external finance by making an application to a bank with the perceived rejection probability ε and application cost K . If the application is approved, a contract (D, r) is set between two parties, in which D is the borrowed amount and r is the interest rate. If the entrepreneur does not apply, or the application is denied, the project is abandoned.

Expected return is:

$$E(\pi) = (1 - \varepsilon)p[R^s - (1 + r)D] - K$$

$$\frac{dE(\pi)}{d\varepsilon} = -p[R^s - (1 + r)D] < 0$$

$$\frac{dE(\pi)}{dK} < 0$$

They would consider making an application if and only if:

$$E(\pi) \geq 0$$

$$\Leftrightarrow (1 - \varepsilon)p[R^s - (1 + r)D] - K \geq 0$$

$$\Leftrightarrow R^s \geq (1 + r)D + \frac{K}{(1 - \varepsilon)p} \quad (4)$$

At time t=2:

The application is rejected. Hence, the perceived rejection rate is revised and increased as shown in (3)

$$\varepsilon' = \varepsilon + \Delta\varepsilon \quad (\Delta\varepsilon > 0)$$

At time $t=3$:

It is assumed that the entrepreneur has a similar project, which requires the same investment X and yields the same return in both cases of success (R^s) and failure ($R^f=0$). However, because of the rejection at time $t=2$, the perceived probability of denial increases to ε' , which leads to a rise in the LHS of (4), and consequently, lowers expected return of the entrepreneur. In other words, holding the expected successful probability constant, an entrepreneur with a higher expected probability of rejection is less likely to make an application again. Consequently, rejection leads to a higher likelihood of discouragement.

Overall, there are some observations to be made:

- 1- There is a threshold or marginal expected rejection rate ε^* , at which an entrepreneur is indifferent to either making an application or self-discouraging, as depicted by (4). Above that threshold, the entrepreneur will make a discouragement decision and vice versa.
- 2- An entrepreneur that had applied and was approved in the past has a lower expected rejection probability, as shown by (3).
- 3- A rejection following several acceptances will not be sufficient to deter a new application, since the mean value of posterior rejection distribution is still lower than the “threshold”. Meanwhile, several rejections after an approval will strongly increase the expected rejection probability, thus more likely to discourage a new application.
- 4- If confirmation bias is present, applicants in the past will apply again in the future, regardless of the results. Furthermore, if firms get more approval, the mean expected rejection probability is much lower than their prior beliefs. At the same time, if they get more rejections, the mean value of expected rejection likelihood does not change, compared to the prior value, and thus, they are still likely to make applications in the future.
- 5- A good entrepreneur who perceives a high probability of success, but also perceives a high probability of rejection as a result of a previous rejection, would self-perceive screening errors and discourage herself from the market.

Meanwhile, a bad entrepreneur who perceives a low probability of success, but also perceives a low probability of rejection as a result of a previous approval, would self-perceive screening errors and be more likely to apply.

In both cases, self-rationing is an inefficient mechanism, as market failure becomes more severe.

6- Two firms that have the same expected rejection likelihood, but different expected returns, may have different application decisions. A good firm that has a higher expected return will be more likely to make an application than a bad firm.

7- Two firms that have the same expected return, but different expected rejection likelihood, may also have different application decisions. A firm that has a lower rejection expectation will be more likely to make an application.

3.2.1.2. Financial constraint and perception of financial constraint

In the previous part, the Bayesian learning model presents how a firm revises its expectation based on its experience with the financial market by learning from banks' decisions on its application. In this vein, this Bayesian learning model takes a backwards-looking view where experience plays a key role in the formation of expectation in the next period. In other words, it assumes an extrapolation view, e.g., adaptive learning view, where an observed trend that happened in the past is more likely to happen again in the future. Therefore, in this part of the model, I will introduce the adaptive expectation hypothesis – an adaptive learning model – where the expectation is revised to incorporate the expectation error in the previous periods (Jacobs and Jones, 1977, Adam *et al.*, 2017). However, it is worth noting an opposite view on expectation – rational expectation hypothesis, which takes a forward-looking view. It means that entrepreneurs form their expectations using new information in the market. A rational expectation is the same as the prediction by the fundamental economic model, and a rational entrepreneur knows all the information related to an event as well as the fundamental processes related to it (Muth, 1961). As such, this REH provides a counterfactual explanation to the adaptive learning model, and specifically, the Bayesian learning model proposed in the previous section.

This section will establish the relationship between entrepreneurs' experience of funding gaps and their perception of funding gaps. It proposes that if they are constrained from accessing the financial market, they perceive access to external finance as a more serious obstacle to their business. As shown in the Bayesian model in previous section, a firm's perception is affected by their experience of the event. In a similar vein, this section seeks to explain the effect of actual funding gaps on perceived funding gaps.

The entrepreneurial learning literature suggests that firms learn from their experience, including both success and failure (Fraser and Greene, 2006; Cope, 2011). Failure acts as a trigger for a self-evaluation of uncertainty or incapability in realizing expectation. Failure can be seen as the difference between prior expectation and

realization. Thus, it raises a need for perception updates that reflect the information obtained from related to the failure. Revision of perception responds to the difference between the previous perception and one's real experience. In this study, a funding gap that is caused by either credit rationing or discouraged borrowing is considered as a failure in realizing prior expectation. It means that the perceived financial constraints depend on the actual financial constraint experience.

In *the adaptive expectation theory*, expectation in the future is formed based on the current realization and the expectation in the previous period (Lovell, 1986). In other words, expectation is partially adjusted for the expectation error, which is the difference between the actual value and expected value. Adaptive expectation hypothesis (AEH) suggests that posterior expectation adjusts for the expectation error, i.e., the difference between previous expectation and outcome. One of the simplest forms of AEH is as follows:

$$p_{t+1}^e = p_t^e + \gamma(p_t - p_t^e)$$

in which,

p_{t+1}^e : expected price for time t+1 formed at time t

p_t : actual price at time t

γ : coefficient of adjustment or adaptation and is bounded in (0,1).

The adjustment coefficient, or learning parameter, indicates the magnitude or speed of the adjustment to the error when making forecasts (Shepherd, 2012). According to AEH, if the learning process exists, the posterior perceived funding gap responds to the wedge between the actual funding gap and prior perception, which, in turn, depends on the experience and perception in the year before that. Eventually, the perceived funding gap solely depends on actual funding gaps they faced with in the previous periods.

In contrast, the rational expectation hypothesis (REH) suggests that expectation formation is rational, i.e., firms'/agents' expectation is formed as same as the prediction from the economic theory (Muth, 1961), and the expectation error should be uncorrelated with the future expectations. A rational expectation equals the expected price at the equilibrium of the market, as it is assumed that agents know all the information in the market as well as the market equilibrium function to form their expectation as the one formed by economists. In that case, rational expectation is unbiased and the expected value of expectation errors is zero in the long-term (Lovell, 1986). On average, expectation converges to its "rational" value even though in the

short term, expectation error may be different from zero. This is the fundamental difference between the rational expectation hypothesis and the adaptive expectation hypothesis.

The REH suggests that the perceived funding gap situation depends not only on the experience of funding gaps but also on the current conditions of the financial market (e.g., the availability of external funding). Individual expectation is affected by the financial market equilibrium, which, in turn, is also driven by the expectations of other market participants. However, an entrepreneur may not need to know others' expectations while forming their expected funding gaps (Cyert and DeGroot, 1974, DeCanio, 1979). The entrepreneur can learn expectations of other people in the market by observing the access to external funding that has been decided by the market, and then, derive current market conditions from that and form herself expected financial constraints according to the current market states. This REH view shows that the formation of financial constraints perception depends on understandings of market fundamentals as well as having information of other players in the market. Meanwhile, the AEH shows that the entrepreneur revises the perceived financial constraints depends solely on her prior perception and her experience, rather than knowing the market fundamentals.

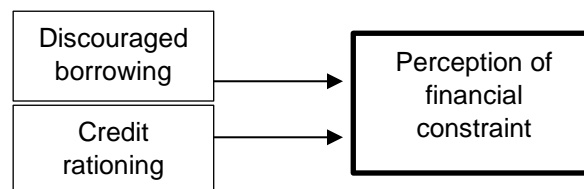


Figure 3.1: Direct impacts of discouraged borrowing and credit rationing on perception of financial constraints (Area 2 of Figure 3)

Therefore, in this part of the learning model, the adaptive expectation hypothesis is used as a more general view of the Bayesian learning model proposed in previous section. As such, the formation of perception of financial constraints responds to the experience of financial constraints and its prior perception of financial constraints.

Entrepreneurs that were financially constrained in the past hold a different information set compared to those who were not constrained (Canton *et al.*, 2013). The learning process depends upon the information that the entrepreneurs insert into the process and will result in different outcomes. Experience is transformed into knowledge through the learning process (Politis, 2005), and thus entrepreneurs will end up with a different perception.

Consider now a discouraged borrower, an unsuccessful applicant and a successful applicant with identical financial needs and consider their respective borrowing decisions. Due to asymmetric information in the financial market, the first two types of borrowers were unable to fulfil their financial capital need and face a funding gap and have to forgo growth opportunities. For discouraged borrowers, the application costs and screening errors (either by them or by their suppliers) are sufficiently high and offset the return from a promising plan, and, thus, they decided to self-ration themselves. For credit rationed firms, due to adverse selection and/or moral hazard, their applications were rationed, and they face an unfulfilled financing gap.

Initially, at the time of making applications, successful and unsuccessful applicants had a low perceived funding gap since they both expected that they can obtain the funding. Both rejected and approved applicants self-evaluated that their chances of getting a loan were sufficiently higher than the application cost. Discouraged entrepreneurs perceived a high rejection probability at the time of making application, and on this basis, they decided to self-select them out of the market. They actively unfulfilled their financial demand at the time they made applications.

Following a rejection, the unsuccessful applicants realize that there is a mismatch between their expectation of a bank's decision and the actual decision made by the bank. This unexpected event requires them to revise their expectation of approval for the next period. The rejection acts as a failure in predicting the chance of getting approval and should be reflected in the learning process. The extent of their financial constraint situation is now higher than their prior perception and that calls for an upward revision of posterior perceived financial constraints.

Moreover, a rejection may indicate that the firms were optimistic about its creditworthiness, i.e., they overestimated the probability of approval. On the one hand, the entrepreneurial learning literature suggests that optimism reduces with experience (Fraser and Greene, 2006). These rejected firms realized that they were initially optimistic about success likelihood and they need to adjust that. On the other hand, the literature on entrepreneurial optimism argues that suppliers may ration optimistic borrowers, since optimism may lead to unfavourable outcomes for the business, e.g., excessive borrowing, lower quality pool of applicants, or lower expected profits (Meza and Southey, 1996; Dai *et al.*, 2017). As such, the bank would scrutinize more carefully in the future, which may again lead to constrained funding decisions. Being aware of that possibility, rejected applicants revise their perception of financial constrain situation that they could face in the future.

Meanwhile, the discouraged firms did not encounter the supplier and their expectation does not improve. Following an approval, the successful applicants realize that they made a good decision and their self-evaluation matched with their supplier's decision. They are reassured that there is no significant gap between their perception and the market. As such, their posterior perception of funding gap is not necessarily changed. Accordingly, perceived financial constraints of the discouraged borrowers are still more significant than the successful applicants.

Overall, firms revise their expectation of financial constraint based on the learning process that incorporates their experience of financial constraint. The rejected applicants respond to the expectation error that has arisen from unsuccessful applications. According to AEH, a gap between actual funding gap and prior perceived funding gap leads to an upward revision of perception of funding gap in the next period. Meanwhile, the discouraged borrowers have a severe perceived funding gap because they expected rejection from suppliers at the beginning. Thus, these financially constrained firms are more likely to perceive financial constraints in the future, compared to those unconstrained ones.

3.2.1.3. Growth and growth expectation

This section will examine feedback loops of growth expectations and growth outcomes. While expectation of growth drives the growth direction, growth outcome itself provides feedback for prior growth expectation. The feedback role of growth outcome is considered from its relative relationship with prior expectation.

The relationship between expected growth and realized growth has been studied in the literature (Wiklund and Shepherd, 2003, Delmar and Wiklund, 2008). It has been shown that entrepreneurs that aimed at growth are more likely to achieve growth. Not all entrepreneurs are willing to grow their businesses, but only a small proportion of them have growth intention (Douglas, 2013). Growth intention has been cited as one of the most critical determinants of growth outcome (Davidsson, 1989).

Meanwhile, the feedback effect of growth outcome on growth intention refers to the reverse relationship between them. Delmar and Wiklund (2008) show that if the previous outcome is evaluated as positive, firm's growth motivation for the future will increase accordingly. By contrast, if the realized outcome is not as expected, growth motivation will decrease. However, in their model, the feedback loop is rather simplified. The effects of prior growth expectation and growth outcome on future growth expectation are considered separately.

The relative growth or expectation error, which is the difference between expectation and actual outcome, is not simultaneously considered in their model. Inaccuracy of expectation implies that there is a gap between expectation and realization which needs to be addressed. On the one hand, expectation error may reflect uncertainties in the market that firms were unable to respond to promptly. On the other hand, it may also imply that the entrepreneurs did not accurately evaluate their capabilities, i.e., they may be optimistic or pessimistic about their capabilities. If they misjudge growth opportunities, market potentials or firm capacities, they may not be able to achieve their expected growth in the future (Davidsson, 1991). The feedback simply based on growth does not reflect this gap, i.e., they did not take their expectation errors into account.

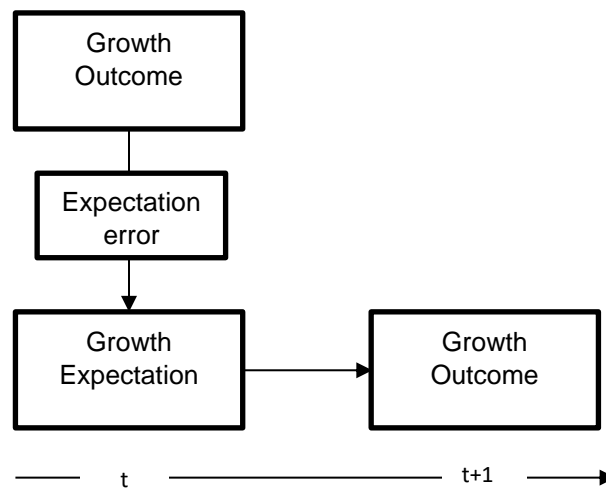


Figure 3.2: Expectation error, Growth expectation and Growth (Area 3 of Figure 3)

The adaptive expectation hypothesis and the Bayesian learning model suggest that expectation adjusts for prior expectation errors as the errors contain unique information. According to AEH, growth expectation in the future is formed based on realized growth and expected growth from the previous period. In other words, growth expectation reflects on prior growth expectation error, which is the difference between expected growth and actual growth. The adjustment coefficient, or learning parameter, indicates the magnitude or speed of the adjustment to the error when making forecasts (Shepherd, 2012).

Therefore, expectation error contains important information about a firm's ability to accurately predict future growth. From the learning perspective, the values of expectation error provide new information that serve to update prior expected growth (Fraser and Greene, 2006; Posen and Levinthal, 2012). A value of zero means that posterior expected growth does not need to be adjusted from previous expected

value, as entrepreneurs have accurately estimated the growth outcome. In other words, the process used to formulate expectation is accurate and adjustment is not required. In contrast, a non-zero value requires an adjustment to expectation formation because the current scheme does not predict the outcomes entirely accurately. Hence, in order to form an expectation for the next period, they should take this error into consideration and adjust their expectation formulation.

However, as discussed in Section 2.3.1. on growth intention, for those who aim to grow their business, growth expectation (or growth intention) is stable and persistent although it may fluctuate in response to a change in perceived control over growth. Growth expectation includes a stable and persistent component if firms have a strong desire to grow. The expectation also fluctuates at a specific time as the perceived feasibility is intermittently high. Growth ambition – which is used in this study to refer to the stable and persistent part of growth expectation, plays an important part in shaping the direction of growth expectation. As such, expectation errors may not be considered if growth expectation is strongly persistent and biased towards its growth ambition. In other words, even if growth expectation errors contain important information, firms do not incorporate the errors into their learning process. Instead, they consistently aim to grow. For example, considering those firms who have a strong desire for growth and aim to grow their business, they would expect to grow their business. If they are not able to achieve growth outcome, they may still expect to grow their businesses in the future. In such a case, the expectation errors do not change the course of their growth expectation. In other words, growth expectation persistence dominates the learning process. Hence, the learning process is biased towards their persistent part of expected growth.

Overall, the first part of the theoretical model studies the learning processes to form borrowing decision, perception of financial constraints and growth expectation. The Bayesian model suggests that an application denial increases the expected rejection likelihood and subsequently discourages firms from making an application. This learning process, however, may be biased towards initial beliefs of success if confirmation bias exists. The adaptive expectation hypothesis also suggests that expectation error – which is the difference between expectation and experience – should be considered in the process of forming expectation in the future. Thus, firms learn from their experience of financial constraints to form their perception of financial constraints. They will also reflect on their growth expectation error in order to form their growth expectation although growth expectation may be persistent towards their growth ambition.

3.2.2. Real effects of funding gap on growth

This section draws direct and indirect impacts of discouraged borrowing and credit rationing on growth outcome. As one of the main obstacles to growth, financial constraint has been studied extensively in the literature on financial constraints and growth. Due to the issue of asymmetric information, access to external finance is more limited for small firms than for large firms. Hence, performance of small firms is highly constrained by the availability of internal fund. After controlling for investment opportunities evaluated by outsiders (Carpenter and Petersen, 2002) and insiders (Carpenter and Guariglia, 2008), these studies find empirical evidence supporting this argument.

While inapplicability of these approaches to the context of unlisted small firms remains a main criticism, the literature often only considers the direct effect (using an indirect approach) of financial constraint on firm performance. This paper, instead, seeks to examine not only the direct but also indirect effects of financial constraints on growth outcomes. Section 3.2.2.1. discusses the role of financial constraints on growth and Section 3.2.2.2. discusses the indirect impacts through the perception of financial obstacles and growth expectations.

3.2.2.1. Direct impact of financial constraint on growth

The real effect of financial constraints on a firm's activities (e.g., R&D spending, investment, exporting, innovating) has long been studied but the results in the literature remain inconclusive, particularly in the context of small business. Research has aimed to detect the real effect of financial market friction on real activities of entrepreneurs and firms at both macro- and micro- economics levels.

On the one hand, the literature on financial constraints often suggests that financial constraints negatively affect firm performance (Carpenter and Peterson, 2002, Degryse *et al.*, 2019) while the literature on bricolage and financial slack shows that financial constraints help improve business capacity (Baker and Nelson, 2005). The first strand of literature argues that if firms are unable to access the financial market and cannot find substitute resources, their growth is limited by the availability of internal cash flow. Meanwhile, the literature on bricolage proposes that financially constrained firms are forced to optimally utilize their current resources and being more innovative in their businesses. Constraints now act as a push for firm improvement.

On the other hand, less is known on the individual impacts of credit rationing and discouraged borrowing on small business growth. These two types of funding gap are caused by asymmetric information in the financial market, but they may also reflect

different cognitive mechanism, as will be discussed later. As cognition plays a critical role in achieving growth in small business, their impacts of discouraged borrowing and discouraged borrowing on growth may be distinctive.

3.2.2.1.1. Financial constraint as an inhibitor for growth

Carpenter and Petersen (2002) and Rahaman (2011) developed theoretical frameworks for the negative impact of financial constraints on the growth of small firms. In their studies, a firm facing financial constraint (i.e., has limited access to external funding) has a more than one-to-one response of total assets to cash flow, since the volatility of internal cash flow decides the volatility of total assets. Similar arguments are found in the literature on investment-cash flow sensitivities to test for the presence and importance of financial constraints (Fazzari *et al.*, 1988)

Asymmetric information in the financial market results in a wedge of financing costs between internal and external finance. If a firm can access the financial market without incurring significantly additional costs, internal cash flow can be easily substituted by debt or equity finance and any shortage in internal finance will be replaced inexpensively with debt or equity finance. Accordingly, investment and assets are not sensitive to fluctuations in cash flow for unconstrained firms. When informational asymmetry is high, firms incur a significant cost in accessing external finance, and in the extreme scenario, they are unable to raise external finance (i.e., when credit rationing happens). In that case, financial constraint arises if firms' cash-flows are disrupted, and firm performance is responsive to cash flow volatility (Rahaman, 2011). As such, the availability of internal finance decides operation and investment spending. Overall, financially constrained firms rely more on internal finance to fund growth and this relationship is weaker for less constrained firms.

A significant funding gap or severe financial constraint may hinder firm performance due to several reasons. Firstly, financially constrained firms lack a financial buffer and face liquidity risk if cash flow is disrupted. Studies on the liability of volatility find that short-term revenue volatility can predict firms' survival likelihood (Lundmark *et al.*, 2019). Firms that have plenty of financial slack can hedge against cash flows volatility and against environmental uncertainties.

If firms have inexpensive or unlimited access to overdraft or lines of credit, they can use these funding sources as a financial buffer to avoid the liquidity risk that arises from cash flow volatility. In addition, it reduces cash reserves and releases these reserves for profitable operation activities. Firms that are unable to access external funding retain a significant portion of their cash flow to reduce the liquidity risk. This

buffering fund does not involve in the operating or investment activities, and thus, lower the profitability.

Secondly, a shortage of internal cash flow may cause disruption in operations and investments and as such may have severe consequences on the business. If a financially constrained firm faces volatile conditions (e.g., late payment from customers), it may have to constantly adjust their scale of operations, which will incur significant adjustment costs (e.g., delaying employee salary, cutting on employment). In the long term, a firm that faced an unfulfilled funding gap may have to change its business plan, such as reduce its investment level or even cancel indivisible investment projects.

Additionally, long-term investment activities involve both short-term and long-term risk, and a financially constrained firm may be unwilling to invest in these projects. Projects that require experimentation, e.g., innovation or R&D activities, or changes in strategy will take longer to complete. These projects have less cyclical return but higher liquidity risk in the short term and high uncertainties in the long term (Aghion *et al.*, 2010; Dolmans *et al.*, 2014; Vanacker *et al.*, 2017). Since financial slack helps protect firms from unsuccessful projects and provides flexibility to adapt to different strategies, being financially secure is necessary for innovative or R&D activities (Nohria and Gulati, 1996; Rosso, 2014). Relatedly, financially constrained firms are less willing to engage in long-term investment since they face a more significant interruption risk in long-term investment. Overall, this implies that market failure not only hinders firm growth but also increases its risk level due to the constrained access to external finance.

Many empirical studies find supporting evidence for the negative impact of financial constraint and growth, after controlling for growth opportunities. Carpenter and Petersen (2002) find that most firms in their sample of US small manufacturing firms, growth of assets is constrained by availability of internal finance, after controlling for growth opportunities by Tobin's Q. Carpenter and Guariglia (2008) complement Tobin's Q by using internal evaluation of growth opportunities and find similar result for small firms in the UK. Rahaman (2011) finds that the growth of a financially constrained firm is more dependent on internal cash flow, and that the strength of this relationship decreases with the degree of financial constraint. Moreover, in the absence of external financial constraint, firms use outside funding to fund growth. Compared to unconstrained ones, financially constrained firms cut their cash reserves and investment significantly after a financial crisis (Campello *et al.*, 2010). Krishnan *et al.* (2015) apply natural experiment and discontinuity design methods to solve the

reverse causality issue between financial constraint and firm performance and find that greater access to external finance allows financially constrained firms to increase productivity.

However, to the extent that a firm is “self-sufficient”, market friction does not have real impact on firm growth. A study of Chinese firms shows that the limited access to external finance does not constrain asset growth for those who have abundant internal cash flow, thanks to the high productivity (Guariglia *et al.*, 2011). This result supports the argument of reverse causality between growth expectation and external financial constraint. In particular, firms that expected growth are more likely to need external capital (Fraser *et al.*, 2015; Krishnan *et al.*, 2015). By contrast, firms that did not expect growth or that were self-sufficient would not have financial demand, and as such they would not face a funding gap (i.e., financially unconstrained). Overall, the causal relationship between financial constraint and growth is still questioned, particularly for small and unquoted businesses since capturing growth opportunities and financial constraints in those businesses is still challenging.

3.2.2.1.2. Financial constraint as an enabler for growth

The literature on “bricolage” and financial slack posits an opposite argument regarding the relationship between financial constraint and growth. Firms with fewer resources are more likely to leverage their existing resources more efficiently, compared to those that have slack (Paeleman and Vanacker, 2015). Bricolage suggests that financial constraints lead to an efficient use of currently available resources. Since firms have limited financial resources, it is necessary to spend them efficiently rather than experiment with them. Additionally, financial constraints also mean that firms are limited in acquiring tools that help them to solve current issues. They should be more creative in using available resources to find a new solution to the same puzzle (Hoegl *et al.*, 2008). Hence, financial constraint forces firms to utilize limited resources more efficiently.

Financial constraints leverage efficient usage of limited financial capital and force firms to optimize their capacity. Although financial slack allows firms to experiment with various strategies or projects, especially when firms aim to promote innovation in order to expand their market, financial slack also raises the risk of inefficient investment. Firms that have abundant slack may invest in doubtful projects and hesitate to terminate failed projects. This leads to the situation where actual output is lower than the optimal output for a given set of inputs. By contrast, financial constraint sets a boundary on firms’ investment activities. Firms have to selectively prioritise

those projects that are more feasible and promising. In addition, under financial pressure, firms would need to terminate failed or unprofitable projects to release committed funds in order to optimize the capacity of current resources. Financial constraints force firms to maximize value creation and minimize resource commitment. Relatedly, financial constraints can also act as a tool for corporate governance.

Moreover, financially constrained firms need to be more innovative in either using whatever is on hand for different objectives or finding different approaches or solutions that help them to achieve their growth (Baker and Nelson, 2005; Hoegl *et al.*, 2008). Financial slack allows firms to acquire necessary tools that fit with their current strategies, rather than having to search for more novel solutions (Rosso, 2014). Entrepreneurs with substantial slack may become risk averse and inward looking in order to protect current positions. Accordingly, abundant slack may hinder firm growth as it reduces risk-seeking behaviour (Natividad, 2013). In contrast, financially constrained firms search for other solutions that fit with their current resource levels. One prominent solution is combining current resources for new purposes that could be very different from their original goals (Bradley *et al.*, 2011). Looking beyond the limits of current resources to develop a new proposal stimulates those firms' innovative capabilities, as well as overcomes their current financial pressure. This creative search can result in a dramatic strategic change. These firms also become less risk averse and seek more experimental strategies. Financial constraints, thus, push firms to seek external opportunities or find a more novel approach rather than the standard method.

Overall, financial constraints enhance efficient management as well as foster innovation and creation in small businesses. Financially constrained businesses are forced to optimize their limited resources. They look beyond normal solutions and innovatively search for a novel pathway that helps to overcome the limitation.

Empirical studies find that the relationship between financial constraints and growth is non-linear, while some suggest that the impact may depend on the context. Some studies find a positive relationship between financial slack and firm performance, but this relationship decreases with a higher level of financial slack (Kim and Bettis, 2014; Vanacker *et al.*, 2017). Mishina *et al.* (2004) suggest that the impacts of financial slack impact on growth depend on firms' growth strategies. A market expansion strategy is supposed to be dependent on routines and previous trajectories, while a product expansion strategy requires product innovation and takes a longer period to be successful. The latter often involves higher levels of uncertainty than the former

strategy. Due to its liquidity, financial slack is easily redeployed to various uses and, thus, has different impacts on market expansion and product expansion strategies. Financial slack may signal an inefficient use of available resources for those firms pursuing market expansion. Meanwhile, for those firms pursuing product expansion, financial slack becomes an important resource to buffer against uncertainties as well as to redeploy to various projects if necessary. The empirical results from US manufacturing firms support this view. Importantly, Bradley *et al.* (2011) find that financial slack has a positive direct effect on growth, but also has a negative indirect effect via its negative impact on entrepreneurial management. However, they did not investigate which if either of the direct or indirect effect dominates this relationship.

3.2.2.1.3. Difference in the effects of credit rationing and discouraged borrowing

Both credit rationing and discouraged borrowing are caused by asymmetric information and lead to some unfulfilled financial needs. Empirical studies often aggregate discouraged borrowing and credit-rationing together to capture the impact of financial market failure, partially because of data limitation to differentiate these two types of funding gaps. However, it may raise a concern that they are distinctive in the way they affect growth of small businesses.

A rejection creates an unexpected funding gap, while discouragement indicates an expected funding gap. When applicants expected a high successful probability, a rejection is an unexpected outcome at the time of application. As a result, credit rationing decisions lead to a funding gap that firms did not anticipate in advance. In other words, the supply-driven funding gap happens at a later point. Due to unexpected shortage of funding, a business adjustment to the original plan is necessary in order to cope with the new situation. Therefore, even though, in the short term, credit-rationed firms have lower growth prospects, a change in internal management/operation is expected in the long term if they are unable to find other substitutes.

By contrast, self-rationing decision happens if a firm expected that the probability of success is sufficiently low. The funding gap is caused by their decision and is predicted by the time they made decisions. In other words, discouraged borrowing leads to an expected funding gap. Even though discouraged firms also face a constrained situation, the shortage of funds is realized more gradually than rejected firms. A dramatic change in business is less expected in these firms. Moreover, discouraged borrowing may also lower their growth expectation. Thus, credit rationing

and discouraged borrowing may have different effects on firm performance due to the differences in expectancy and timing.

Furthermore, credit-rationing and discouraged borrowing may reflect differences in firms' cognition processes. As shown in Section 3.2.1.2., credit-rationing may signify optimism. For these credit-rationed firms, they perceived that they were creditworthy and expected a high probability of success, but their suppliers evaluated the opposite and rejected their applications. By contrast, discouraged borrowing may indicate pessimism. If these firms are creditworthy, but self-ration themselves, they underestimate their chances of success. Hence, these two types of financially constrained firms may have different cognition. Entrepreneurs' cognition plays a critical role in driving firm performance (Fraser *et al.*, 2015).

For example, optimism is well documented in the financial market and the financial market chose to ration the demand side because these firms may be excessive risk-takers and over-borrowing (Meza and Southey, 1996). However, a mild form of optimism can push firm productivity and be beneficial for small business (Dai *et al.*, 2017). As such, if credit-rationing reflects optimism, it can push firms to be more productive, which may not be found in the case of discouragement.

The emergence of survey-based data enables researchers to directly capture externally financially constrained firms. Indirect measurements, such as liquidity ratio, age, size or investment-/asset-cash flow sensitivity, capture financial constraints by identifying the degree of asymmetric information between firms and financial institutions, and thus these measurements do not allow for the differentiation of the effects of credit-rationing and discouraged borrowing on firm performance.

Survey-based data allows for direct measurements of financial constraints, based on firms' answers to questions whether they face a funding gap due to market failure. This approach also allows for individually capturing two types of financial constraint, namely credit-rationing (i.e., supply-driven funding gap) and discouraged borrowing (i.e., demand-driven funding gap). This approach is more applicable to small businesses as they do not require exhaustive private information, such as detailed financial statements for calculating liquidity indices. It also allows for disaggregating the funding gap driven by the demand side and the supply side. While both types are aggregated in funding gaps, it remains unanswered whether supply side and demand side financial constraints have similar effects on performance.

3.2.2.2. Indirect effect of financial constraint on growth

The previous sections discussed the direct effect of discouraged borrowing and credit rationing on growth. This section will draw an indirect link between them, in which the way that the perception of funding gap and the expectation of growth act as mediators is shown in Figure 3.

As discussed in Section 3.2.1.2., an actual funding gap worsens the perceived funding gap. Entrepreneurs learn from their experiences of actual funding gaps to revise their perception of funding gaps, since the funding gaps show their ability to access external finance, particularly the rejection.

More importantly, the causal relationship between the perceived constraints and growth expectation has been discussed in Section 2.3.1. on growth intention. On the one hand, the causality supposedly runs from perception of obstacles to growth expectation. The theory of planned behaviour suggests that a high level of perceived feasibility of growth (i.e., a low level of perceived financial constraints) induces entrepreneurs to pursue growth, while a low level of perceived feasibility (i.e., a high level of financial constraints) discourages firms from expecting growth. Finance is a primary resource for firms and, thus, the perception of control over financial resources sets a boundary on how feasible growth is. As such, growth expectation is bounded by perceived financial constraint in the short term. Perceived financial constraints are affected by the experience of financial constraints. Thus, financial constraints hinder growth expectation by worsening the perception of financial constraints.

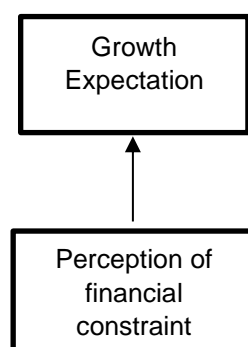


Figure 3.3: Perception of financial constraints and growth expectation. (Area 4 of Figure 3)

That growth outcome is bounded by prior growth expectation is well discussed in the literature of small firm growth. Growth intention is one of the most critical factors determining growth (Davidsson, 1989). Since growth expectation is directed by growth intention, firms that aim to grow their businesses are more likely to achieve

growth because they insert more effort and resources into realizing their growth intention. Firms that do not aim to grow are less likely to achieve growth, since they are less likely to invest effort and resources. Hence, growth outcome is affected by growth expectation formed in the previous periods.

Thus, this study suggests indirect impacts of credit rationing and discouraged borrowing on growth through funding gap perception and growth expectation. Perceived financial constraints and expected growth transmit the effect of financial constraints in the past to growth in the future. It implies that the effect of funding gaps on growth is amplified and prolonged through expectation/perception.

3.3. Conclusion

This chapter develops a theoretical framework between discouraged borrowing, credit rationing and growth. It shows that credit-rationing provides valuable information to the learning process to form expectation of rejection likelihood, which in turn affects the likelihood of discouraged borrowing decision. It also shows that discouraged borrowing and credit rationing have direct impacts on growth as well as indirect effects through financial constraint perception and growth expectation. It implies that the impacts of market failure on growth are amplified and prolonged in small businesses.

The theoretical framework makes two main contributions. Firstly, it extends the literature of discouraged borrowing by studying the borrowing decision in relation to borrowing experiences. It explains the expectation of rejection likelihood, and when this perception does not reflect firms' true rejection likelihood, it relates to the perceived screening error that is included in the model of Kon and Storey (2003). The Bayesian learning model shows that the entrepreneurs integrate information from the supply side in the financial market to revise their perception of access to the financial market. Information from rejection is an input into the process of updating rejection likelihood. The rejection increases the perceived rejection probability for the next period and subsequently discourages firms from making further applications if the revised perception is higher than a threshold. It implies that the consequence of asymmetric information in the financial market is exacerbated. The supply-driven funding gap amplifies market friction's effects by increasing the likelihood of discouragement. Hence, the funding gap caused by market failure is widened.

Secondly, this chapter also contributes to the literature on financial constraints and small business growth by presenting the direct and indirect effects of discouraged borrowing and credit rationing on growth. The literature on financial constraints and bricolage shows that financial constraints have direct effects on growth, even though

the former suggests an inhibit effect and the latter suggests an enabling effect. The direct effects of discouraged borrowing and credit rationing on growth may be distinctive. Moreover, the learning process of the perception of financial constraints and the dependence of growth expectation on perceived financial constraints form an indirect channel that transmits the impacts of discouraged borrowing and credit rationing on growth. It implies that entrepreneurial cognition plays a role in the relationship between finance and growth (Fraser *et al.*, 2015). Also, the feedback loop of growth outcome on growth intention is also extended by examining the impact of expectation error on the revision of growth expectations (Delmar and Wiklund, 2008). In the model of Delmar and Wiklund (2008), the feedback loop is considered as the impact of growth outcome on growth expectation, rather than how the difference between the outcome and prior expectation informs future expectation.

In its scope, this framework does not provide a theoretical foundation for the differences in effects between discouraged borrowing and credit rationing. One possible channel is the role of optimism and/or pessimism on firm growth. Credit-rationing may indicate optimism, while discouraged borrowing may signify pessimism. Further studies can investigate the impacts of optimism and pessimism on firm performance and, thus, provide a theoretical explanation for the differences between discouraged borrowing and credit rationing. Moreover, this study does not focus how growth expectation translates to growth outcome, as it has been well studied in the literature that growth intention plays a critical role in driving small business growth (Davidsson, 1989, Wiklund *et al.*, 2003).

CHAPTER IV: CREDIT RATIONING AND SELF-RATIONING BEHAVIOUR IN THE FINANCIAL MARKET

4.1. Introduction

An important strand of the small and medium-sized enterprise (SME) finance literature is about informational asymmetry issue in the credit market. This information issue causes credit rationing and discouraged borrowing decisions and subsequently leads to the funding gaps. Although considerable attention has been devoted to the causes and consequences of rejection decisions by the bank, less is known about discouraged borrowing decisions.

The scarce literature on discouraged borrowers mainly focuses on comparing them to successful and rejected applicants, in terms of their characteristics and their lending relationship with financial suppliers. Studies find that age and size are determinants of discouraged borrowing (Han *et al.*, 2009; Chakravarty and Xiang, 2013; Cowling *et al.*, 2016). Smaller and younger firms face a more severe asymmetric information situation and, thus, screening error and application cost are higher for these firms. The level of risk is also positively associated with the probability of discouragement. Hence, discouraged borrowing is an efficient self-rationing mechanism in the market (Han *et al.*, 2009; Cowling *et al.*, 2016). Owners' characteristics, including gender and ethnicity also affects this type of borrowing decisions (Moro *et al.*, 2017). Relationship lending also helps reduce the degree of discouragement, although the empirical evidence shows that the impacts of relationship lending on discouragement also depends on the market concentration (Han *et al.*, 2009). Overall, these studies examine the asymmetric information issue of discouragement from the supply side. The focus is on the reduction of discouragement likelihood when the suppliers are more informed about the firms' creditworthiness.

Since discouragement is caused by asymmetric information between firms and their suppliers, the more information is exchanged between the banks and the firms, the less severe the discouraged borrowing is. Empirical studies provide supporting evidence for the positive effect of a strong and long relationship on reducing discouraged borrowing likelihood (Han *et al.*, 2009). During the lending relationship, banks learn about firms' creditworthiness by accumulating information through their contacts with the firms and the firms' stakeholders.

Nevertheless, the asymmetric information issue may also arise from the demand side, which means that firms lack information about suppliers' evaluation and/or their own creditworthiness. Indeed, perceived screening error, which refers to a firm that self-

perceive itself as a risky firm when it is not, is considered as one of the main causes of discouragement in the model of Kon and Storey (2003). In a good relationship, firms may also learn about banks' perspectives on firms' creditworthiness, and accordingly revise their expectations. As the information changes over time, the more information the firms acquire from the market, and the more frequently they revise their perception of creditworthiness. Thus, the propensity of discouragement varies with information acquisition. Therefore, understanding firms' learning processes is important to understand their perception of credit-rationing likelihood. A study by Qi and Nguyen (2020) provides evidence on the role of information on firms' discouragement decision. They find that connections to governmental organizations reduce the discouragement likelihood in developing economies despite that these firms are not more likely to be approved. They argue that firms with governmental connections are more familiar about the lending process and have information related to available options in the financial market, and thus, they are more likely to approach financial suppliers if they are in need.

Therefore, this chapter aims to examine the asymmetric information issue from the demand side by studying the impacts of credit-rationing experiences on following borrowing decisions. In the Bayesian framework presented in the theoretical chapter, firms initially do not know their likelihood of rejection, which helps explain the screening errors by firms in Kon and Story model, and they learn about their success probability over time and eventually will form an unbiased rejection perception. The multi-period model of discouragement helps understand how previous borrowing experiences inform current borrowing decisions. This chapter will provide empirical evidence to this Bayesian learning model. Data from the UK Longitudinal Small Business Survey (LSBS) and the UK SME Finance Monitor Survey (FM) are employed. Multivariate probit models are applied to analyse how previous credit rationing affects the likelihood of subsequent discouragement, after controlling for firm characteristics and lending relationship. The results show that credit-rationing decisions by banks increase the likelihood of firms self-rationing in the next period.

Thus, this chapter contributes to the literature on discouraged borrowers by showing that discouragement behaviour depends not only on the current situation of firms but also on their previous borrowing experiences. Decisions made by the suppliers provide valuable information for the learning process in respect of borrowing decisions. Following a rejection, firms become more discouraged and following an approval, firms become less discouraged. Hence, it also contributes to the literature of relationship lending by showing that firms also learn in a relationship. Relationship

lending is not only beneficial for the financiers to accumulate information regarding firms' creditworthiness but also helps firm learn about their "true" probability of rejection by observing banks' decisions.

4.2. Hypothesis development

This chapter empirically examine the relationship between past rejection and discouragement decision. Hence, it provides empirical evidence to the Bayesian model developed in Section 3.2.1.1. by studying the impacts of credit-rationing on discouraged borrowing.

The Bayesian learning model presented on page 68 suggests that the entrepreneurs revise their perception of rejection likelihood by using the information they received from their supplier. The Bayesian learning model shows that a rejection brings up the perceived rejection probability and an approval brings down the perception of rejection probability.

According to the below formula, which is presented on page 66, a rejection (i.e., $x_i=1$) increases expected rejection likelihood.

$$E(\varepsilon|x_i) - E(\varepsilon) = \begin{cases} \frac{\beta}{(\alpha + \beta + 1)(\alpha + \beta)} > 0 & x_i = 1 \\ \frac{-\alpha}{(\alpha + \beta + 1)(\alpha + \beta)} < 0 & x_i = 0 \end{cases}$$

A higher perceived rejection probability decreases expected return from applying and investing in a project, and thus, it increases the likelihood of discouraged borrowing decisions, according to the below formula, which is presented on page 70.

Therefore, following a rejection decision by the bank, the entrepreneur is more likely to become a discouraged borrower. Using data from the UK Longitudinal Small Business Survey and the UK Small- and Medium- sized Enterprise Finance Monitor, this chapter will test the main hypothesis.

Hypothesis 1: Rejected firms are more likely to be discouraged in the next period.

4.3. Empirical model

4.3.1. Data

Due to the nature of discouraged borrowing phenomenon - a borrowing decision that is only observed from the demand side (*Fraser, 2019*) - data that represents businesses' perspectives is essential. Following previous studies on discouraged borrowing (a short review is provided in Section 4.3.2.1. Dependent variables as well as in Section 2.4 Financial constraint measurement, page 59), survey-based data is undoubtedly employed. For such reason, this thesis uses two main data sets that

survey owners/managers of small- and medium-sized businesses about their borrowing decisions – UK Longitudinal Small Business Survey and UK SME Finance Monitor.

As mentioned on page 59, using this type of data – survey data that measure directly discouraged borrowing and credit rationing - has several advantages and disadvantages. This approach comes with some disadvantages. Firstly, this type of data is derived from business' responses, and thus being more subjective than the accounting-based measurement (as reviewed in the Section 2.4). Secondly, it is often a qualitative measure, rather than a quantitative measure. It means that a firm is identified as a discouraged borrower and/or being credit-rationed, rather than the degree of discouragement or financially constrained. However, the use of survey-based data on perspectives of businesses' owners/directors allows capturing discouraged borrowing directly – which accounting-based or loan-level data is not possible to measure. As such, it allows capturing the funding gap caused by discouraged borrowing is identified and differentiated from the one caused by credit rationing. Hence, this type of data is critical in the discouraged borrowing study.

This chapter uses two datasets to test its hypothesis, namely the Longitudinal Small Business Survey (LSBS 2015 and 2016) and the SME Finance Monitor 2011-2017 (FM). The LSBS provides the information about self-rationing decisions in the last 12 months, while the FM surveys firms' intention to self-select themselves from the credit market in the next 3 months. A more detailed description of these two data sets is as follows.

4.3.1.1. Longitudinal Small Business Survey (LSBS)⁴

The LSBS is a large-scale telephone survey of small business owners and managers, commissioned by the Department for Business, Innovation and Skills (BIS). A large sample size of 15,002 firms were surveyed in 2015 to establish a panel of businesses. In 2016, 7279 businesses were re-interviewed to create a panel data set. During the phone interview, in addition to firms' profiles, they are also asked about their performance, obstacles to the business, innovation and exporting activities. They are also asked about their main banks and their borrowing decisions in the last 12 months. The interviews also cover other interests, such as their advice-taking behaviour, training activities, and growth intention in the next three years.

⁴ <https://beta.ukdataservice.ac.uk/datacatalogue/studies/study?id=7973>

The sample for the LSBS aims to represent UK business population, and the sample sources are taken from the Inter Departmental Business Register⁵ (IDBR) for registered business and from the Dun & Bradstreet's database⁶ for unregistered businesses with zero employees.

The sample was stratified by three dimensions: four UK nations, business size⁷, and sector. In 2015, the sample stratification contains fourteen sectors, multiplying by eight size-by-legal status, and then multiplying by four nations. The sample, however, overrepresents small- and medium-sized business significantly, compared to their proportion in the business population. The results can be weighted using the estimated weights from the business population estimates in 2015 for the LSBS 2015.

4.3.1.2. SME Finance Monitor (FM)⁸

The FM Survey commissioned by Business Finance Taskforce conducts 4,500-5,000 telephone interviews per quarter (wave) from 2011 to 2017. The dataset explores the

⁵ The IDBR is a record of all UK enterprises that pay VAT or PAYE, and compiled from these sources: HMRC traders registered for VAT purposes; HMRC employers operating a PAYE scheme; Incorporated businesses registered at Companies House; Department for Environment, Food and Rural Affairs registered farms; Department of Finance and Personnel, Northern Ireland registered businesses. It has around 2.3 million and 2.45 million entries in 2015 and 2016, respectively.

⁶ The difference between the IDBR record and the estimate of Business Population Estimates by BIS can be explained by unregistered enterprises that do not pay VAT or PAYE. Dun & Bradstreet is one of the best places for these unregistered enterprises. Accordingly, entries from Dun & Bradstreet that they had employees on their payroll or paid VAT were screened out of the sampling process.

⁷ In the LSBS 2015, the stratification by firm size contains legal status dimension. In particular, the micro firm up to 4 employees are categorized into unregistered zero employees, registered zero employee companies, registered zero employee other, 1-4 employees companies, and 1-4 employees other. Meanwhile, in the LSBS 2016, the size stratification for micro enterprises with up to 4 employees are unregistered zero employee, registered zero employee, 1-4 employees. The other size-band are the same between 2015 and 2016. A more detailed descriptions can be found here: [Longitudinal Small Business Survey Year 1 \(2015\): Technical Appendix \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/444444/Longitudinal_Small_Business_Survey_Year_1_(2015)_Technical_Appendix.pdf); [Longitudinal Small Business Survey Year 2 \(2016\): Technical Appendix \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/444444/Longitudinal_Small_Business_Survey_Year_2_(2016)_Technical_Appendix.pdf)

⁸ <https://beta.ukdataservice.ac.uk/datacatalogue/studies/study?id=6888>

information about firms' demand for external finance, application decisions and banks' decision to those applications in the last 12 months. It also surveys financial needs and application intentions in the next 3 months. They are also asked to assess their business confidence, growth, and barriers to growth. As well as identifying the proportion of SMEs that have approached a lender for external finance, the survey identified those who would have liked to apply, but have not, the barriers to such an application, and the impact of the decision not to seek funding on business performance. Using the survey waves up to Quarter 4, 2017, the FM survey creates a cross-sectional dataset of 131,332 firms.

The quotas for sampling process were set by employment size, by sector, and by region. Four categories of employment size are 0 employee, 1-9 employees, 10-49 employees, and 50-249 employees. The sampling method oversamples larger business, and under-samples self-employed business, compared to their actual representation in the business population estimates. Within each size band, 12 regions and devolved nations, and 9 sectors are set quotas for to ensure that SMEs of all sizes were included in each sector and nation. Weights are then used to get a more representative sample of the population.

However, this study uses data from wave 7 to wave 27 (i.e., from Quarter 4, 2012 to Quarter 4, 2017). Since some questions are removed and added into the Questionnaire across these waves, data from wave 1 to wave 6 (i.e., Quarter 1 and 2, 2011 to Quarter 3, 2012) is not used in order to keep a consistent comparison over the whole period.

4.3.2. Methodology

In this study, probability models are employed to capture the impact of credit-rationing on discouraged borrowing. In these models, credit-rationing is measured as a dummy variable for a rejection by the financial market, and discouraged borrowing is also measured as a dummy variable for a discourage borrowing decision. In order to test the hypothesis, a baseline model is used to estimate the impact of a rejection on discouragement in the next period as follows.

$$(1) \text{ Prob}(DB_i=1) = \beta_0 + \beta_1 \text{ Reject}_i + \beta_2 \text{ Bank}_i + \beta_3 \text{ Firm}_i + \beta_4 \text{ Owner}_i + u_i ,$$

In which: DB represents for discouraged borrowing; Reject represents for past rejection; Bank represents for relationship lending; Firms and Owners represent for various firms' profiles and owners' characteristics. The definition of these variables is provided in the next section on dependent and independent variables, as well as in Table 2 – Summary Statistics in the Appendix.

Following Cole and Sokolyk (2016) model, firms are categorized into different groups according to their financial needs, application decisions and application results. Based on their financial needs, firms are divided into “No need” – those who did not have an external financial need and “Need” groups – those who did have an external financial need. Conditional on the “Need” group, firms are categorized into one of two groups, depending on their application decisions: “Discouraged” – those who had a need but did not apply; and “Applied” – those who had a need and applied. Conditional on the “Applied” group, firms are formed into “Rejected” – those who applied but were rejected and “Approved” – those who applied and received approval from credit providers.

Thus, entrepreneurs are defined as discouraged if they had a need for finance ($N_i=1$) and they did not apply for finance ($DB_i=1$). DB_i is only observable when $N_i=1$ is observed. Because DB_i is conditional on $N_i=1$, the discouragement examination may have the problem of sample selection bias. In this case, the marginal effects of independent variables conflate both their ‘true’ direct effects on discouragement and indirect effects which relate to how these firms are selected into the sample of need. In other words, if there is a correlation between the errors in the need and discouragement equations (shown below), single equation estimators of the parameters of the discouragement equation will be biased and inconsistent.

To tackle the sample selection bias, a bivariate probit model with selection (Heckman, 1989) is used. The model includes two equations: 1- an outcome equation (1), in which the probability of being discouraged is the dependent variable, and 2- a selection equation (2), in which the probability that firms have an external financial need is the dependent variable. The model is shown below:

$$\begin{array}{llll} \text{Outcome equation:} & (1) & DB^* = \beta X + u & DB=1 \quad \text{if} \quad D^*>0 \\ \text{Selection equation:} & (2) & N^* = \alpha Y + v & N=1 \quad \text{if} \quad N^*>0 \end{array}$$

Note the outcome equation (1) is observed if and only if $N^*>0$ (i.e., $N=1$).

Moreover, endogeneity of rejection may cause biased coefficients in (1). The above model assumes exogeneity of rejection, which means that firms are randomly received the treatment, i.e., rejection. This assumption may be invalid as the credit-rationing decision may be determined by some factors that also affect the self-rationing decision. For example, risk level is arguably one of the main determinants of the credit granting decision. At the same time, riskier firms are more likely to be discouraged. Similarly, for some reasons, banks might want to discourage firms from

making application in the future, so they rejected firms to prevent their application in the next periods. Thus, a trivariate probit model will be estimated as follows:

$$\text{Outcome equation:} \quad (1) \quad DB^* = \beta X + u \quad DB=1 \quad \text{if} \quad D^*>0$$

$$\text{Selection equation:} \quad (2) \quad N^* = \alpha Y + v \quad N=1 \quad \text{if} \quad N^*>0$$

$$\text{Endogenous treatment:} \quad (3) \quad \text{Reject}^* = \theta Z + \omega$$

Firstly, regressions (1) and (2) are estimated simultaneously using heckprobit⁹ and cmp¹⁰ packages in Stata to tackle sample selection bias only. Secondly, three regions (1), (2) and (3) are estimated simultaneously using cmp and eprobit¹¹ packages in Stata to tackle both selection bias and endogeneity issues. These three regressions will take forms as follow.

$$(1) \quad \text{Prob} (DB_i=1 \mid N_i=1) = \beta_0 + \beta_1 \text{Reject}_i + \beta_2 \text{Bank}_i + \beta_3 \text{Firm}_i + \beta_4 \text{Owner}_i + u_i$$

$$(2) \quad \text{Prob} (N_i=1) = \alpha_0 + \alpha_2 \text{ExpGro}_i + \alpha_3 \text{Firm}_i + v_i$$

$$(3) \quad \text{Prob} (\text{Reject}_i=1) = \theta_0 + \theta_1 IV_i + \theta_2 \text{Bank}_i + \theta_3 \text{Firm}_i + \theta_4 \text{Owner}_i + \omega_i$$

$$\begin{pmatrix} u \\ v \\ w \end{pmatrix} \sim N \left[0, \begin{pmatrix} 1 & & \\ \rho_{12} & 1 & \\ \rho_{13} & \rho_{23} & 1 \end{pmatrix} \right]$$

If $\rho_{12}=0$, there is no correlation between disturbances of (1) and (2), which means that there is no selection bias in the discouragement regression. If $\rho_{12} \neq 0$, the disturbances of (1) and (2) are correlated, which means that there is a selection bias issue, and two regressions should be jointly estimated. Similarly, ρ_{13} value shows correlation between error terms of (1) and (3). A statistically significant value of ρ_{12} indicates that rejection is endogenous.

The next sections will describe each of these dependent and independent variables in more details for each data set.

4.3.2.1. Dependent variables:

Discouraged borrowers are identified differently across empirical studies. While the theory of Kon and Storey (2003) defined them as those “good” borrowers who do not apply for a bank loan because they feel they will be rejected. “Good borrowers” means

⁹ heckprobit is an official Stata package. It estimates maximum-likelihood probit model with sample selection.

¹⁰ cmp is a user-written package in Stata. A more detailed explanation of the cmp model is provided in Appendix A.

¹¹ eprobit is an official Stata package. It fits a probit model and allows combination of endogeneity, nonrandom treatment assignment, and endogenous sample selection. Binary endogenous variables are allowed.

that they would have been accepted if they had made the application. However, the empirical strategies used to identify them vary across different studies. Using the data from the UK Annual Small Business Survey 2007/08, Cowling *et al.* (2016) defined discouraged borrowers as “one with demand for but not applying for any finance ,either because the firm feared rejection or the owner thought the finance was too expensive”. Mac an Bhaird *et al.* (2016) classified firms into the discouraged group if firms answered that they did not apply for banks’ loans in the past 6 months because of possible rejection. Similarly, using the Surveys of Small Business Finance, Cole and Sokolyk (2016) recorded discouraged borrowers if firms answered that they did not apply because it feared its application would be rejected. Freel *et al.* (2012) categorised firms into discouraged borrowers if firms mentioned that in the past 2 years, the fear of rejection had stopped them from seeking a bank loan. Particularly, they excluded those who were partly discouraged (i.e., they had applied to meet some but not all of their needs and thus, they were discouraged for some need). In contrast, Chakravarty and Xiang (2013) grouped firms into the discouraged borrower group if they had a need for a loan and choose to not apply for because 1- the loan procedure as too complicated, 2- the interest rates were too high, 3- collateral requirements were too high, and 4- there was corruption in allocation. Encompassing both debt and equity discouragement, Xiang *et al.* (2015) grouped firms into the discouraged finance seekers if they were discouraged from applying for loans or venture capital. However, they do not have a clear definition of discouraged finance seekers based on the Australian Business longitudinal Database Expanded Confidentialised Unit Record File. Instead, in their main model, a dummy variable “Applied for finance” indicating whether the firm applied for additional finance is used as the dependent variable to examine the phenomenon of discouraged borrowers. Based on the definition of this dependent variable, discouragement is referred to those who did not apply for additional finance. As mentioned above, firms should not be considered as discouraged borrowers if they did not have a need for external finance. Moreover, even in the case that they had a need, they might decide not to apply because they did not want to lose control of the business. In such a case, they should not be considered as discouraged borrowers.

➤ **LSBS**

The dependent variable – “DB” – represents those who claimed they are discouraged borrowers. In particular, firms are asked if they had a need for finance in the last 12 months that they did not apply for. If they answer “Yes”, they are asked for which reasons, they did not apply for in the last 12 months.

Firms are called discouraged borrowers if they chose one of these reasons: 1- They thought they would be rejected, 2- They thought it would be too expensive; 3- Now is not the right time because of economic conditions; 4- They did not know where to find the appropriate finance they needed, 5- Poor credit history, and 6- The decision would have taken too long/too much hassle.

Firms are not classified as discouraged borrowers if the reason they did not apply is that they do not want to take on additional risk.

Additionally, a narrower definition of discouraged borrowers is used for robustness check. Firms are classified as discouraged borrowers (called as “Direct DB”) only if they chose the first reason, i.e., they thought they would be rejected.

➤ **FM**

Firms are defined as discouraged borrowers if they intend to not apply for finance in the next three months because of one of the following reasons: 1- They think the bank would say no, or 2- They mentioned it informally to the bank but it seemed reluctant to lend to the firm, or 3- They think it would be too expensive, or 4- They think the bank would want security, or 5- They think applying would be too much hassle, or 6- They do not find bank forms and literature easy to understand, or 7- They think lending facilities come with too many terms and conditions, or 8- They did not want to go through the application process, or 9- They think bank terms are unacceptable, or 10- They do not trust banks.

Firms are not classified as discouraged borrowers if they mention that 1- They do not need to borrow (more), or 2- They do not want to borrow (more) in the current climate, or 3- The predicted performance of the business means they do not want to borrow more, or 4- They already have the facilities they need, or 5- They do not want to lose control of the business, or 6- They can get finance from family and friends if needed, or 7- They can raise personal funds if needed, or 8- They prefer to use other forms of finance.

4.3.2.2. Explanatory variables:

4.3.2.2.1. Rejection

➤ **LSBS**

Reject – a dummy variable - showing whether firms’ applications for external finance were rejected in the last 12 months is the main interest of the model. External finance refers to all the types of finance, including bank overdraft, loans, commercial mortgage, credit cards, equity finance, factoring/invoice discounting, leasing/hire

purchase, mezzanine finance, peer-to-peer/crowd funding, public equity, charitable/trust/grant, government scheme, other loans (incl. personal finance).

➤ **FM**

A broader definition of “Reject” is also used. “Reject” is coded as 1 if firm was rejected for any application for external finance in the last 12 months. Similarly, external finance includes overdraft, loans, grants, loans from directors or friends and family, equity from directors or friends and family, loans from other third parties, leasing or hire purchase or vehicle finance, invoice finance, credit cards, export/import finance, or any other forms of external finance.

4.3.2.2.2. Bank relationship

The relationship lending literature shows that the information opacity can be improved by lending relationship, and thus, discouraged borrowing decreases in a good relationship. As one of the two main lending technologies used in the lending decision, relationship lending helps lenders collect ‘soft’ data which could not be acquired using transaction lending. The literature on relationship lending suggests that there are three dimensions in a lending relationship: 1- the length of the main relationship, 2- the breadth of the main relationship, and 3- the depth of the relationship lending, as discussed in Section 2.2.3.

➤ **LSBS**

Noticeably, information related to relationship depth and breadth can only be derived from the questions in 2015. For example, in 2015, firms were asked if the main loan they had come from their main banks or another provider. If firms answered that their main loan was from another provider, they were asked which bank or financial institution provided it. Based on their answers, relationship depth and breadth can be generated. However, these questions are removed from 2016. Thus, the information on the relationship lending is limited in this longitudinal survey.

Therefore, two indirect variables are used as proxies for relationship lending. Firstly, “changebank” variable takes a value of 1 if firm changed their main bank in 2016. Secondly, “Big5” takes a value of 1 if the main bank is one of Barclays, HSBC, Lloyds Group, Natwest/RBS, Santander.

The first relationship lending variable - changebank - is used because firms that changed their main banks may not suffer from the monopoly power information. According to hold-up theory (Sharpe, 1990), relationship lending brings temporary monopoly power of information to banks that are providing services to firms. Banks

may take advantages of their favourably informational position and charge a higher price. Firms may face difficulties in revealing firms' performance information to other providers in the market and face a switching cost. If the switching cost is high, good firms who were rejected by their insider bank may quit the market rather than apply to outsider providers (Vesala, 2007). Therefore, firms who did not change the main bank in the last 12 months are arguably more likely to be discouraged than firms who did change the main relationship.

Another indirect measurement - big5 - is also used. The relationship with large banks is argued to be weaker than the relationship with small banks. The literature on relationship lending also discusses correlation between bank size and lending technologies, including hard- and soft- information technologies, as discussed in Section 2.2.3. Due to the properties of soft information, relationship lending requires intensive monitoring within the organization (Berger and Udell, 2002). Thus, banks' complexity and size are associated with the lending technique. Large and hierarchical banking organizations face more serious agency problem while small banks are supposed to have few layers of management (Ferri and Murro, 2015). Small banks have a comparative advantage in relationship lending (Berger and Black, 2011) and loan officers at small banks produce more soft information than at large banks (Uchida *et al.*, 2012).

➤ **FM**

There are three variables representing for relationship lending in this dataset. First, "breadth" takes a value of 1 if the firm is doing business with more than one bank, and 0 otherwise. Second, "depth" takes a value of 1 if the firm is using more than one service with the same main bank, and 0 otherwise.

4.3.2.2.3. Growth expectation

Growth expectation is used in the "Need" regression but not in the "DB" regression (Cowling *et al.*, 2016). Firms that expect growth have higher demand for external finance as they are more likely to exhaust internal capital and require additional funding (Psillaki and Daskalakis, 2009). Moreover, cash flows of firms that expect shrinkage or no change are more predictable than those with growth opportunities (Psillaki and Daskalakis, 2009; Freel *et al.*, 2012). As mentioned above, this variable is used to control for growth opportunities.

➤ **LSBS**

"ExpGro" takes values of 1 if it expects shrinkage in the next 12 months, 2 if it expects no change in the next 12 months, and 3 if it expects growth in the next 12 months.

➤ **FM**

“ExpGro” takes values of 1 if it expects growth in the next 12 months, and 0 otherwise.

4.3.2.2.4. Control variables

The definition of control variables is provided in Table 2.

➤ **LSBS**

Control variables include size, age, sector, legal status, turnover growth, exporting, innovating, women-led and minority-led business.

➤ **FM**

Control variables include size, age, sector, region, legal status, turnover, turnover growth, exporting, innovating, women-led and minority-led business, owner’s age, education.

4.4. Data analysis

4.4.1. Results from LSBS 2015-16

4.4.1.1. Summary Statistics

Table 1 provides the information about the numbers of firms in each of these “Need”, “Applicant”, “Self-rationing” and “Credit-rationing” categories in 2016. One fifth of the firms mentioned that they had a need for external finance. Among those in need, two third did apply for finance and one third of them self-selected themselves for some or all of their needs. This group of discouraged borrowers accounted for 7.62% of total firms in the sample. Among these 555 discouraged borrowers, 227 firms (equivalent to 40%) are directly discouraged – those firms mentioned that one of the reasons of discouragement is they thought their application would be rejected.

[Insert Table 1 here]

Table 2 reports the summary statistics and variables definition. About 76% of SMEs use one of these banks i.e., Barclays, HSBC, Lloyds, RBS and Santander for their current account in 2016. Micro- and small- firm accounts for more than 80% firms in the sample. More than half of the firms in the sample have fewer than 10 employees and about 60% firms have been operating for more than 20 years. Regarding legal status, limited liability companies account for more than 75% of the sample and 24% of the sample firms are either sole proprietorship or partnership.

[Insert Table 2 here]

When firms were asked in 2016 about their realized growth, nearly half of the sample mentioned that their turnover stayed the same, while 20% experienced a decrease in sales and 36% grew in 2016. In 2016, 11% of them think they would shrink, but the number of firms thinking that their turnover would remain the same in 2017 is slightly higher than the number of firms expecting an increase in turnover, which are 47.6% and 41.33%, respectively.

Furthermore, 2.9% of firms exported more than 25% of sales in 2016, and 42% of them claimed that they had innovating activities, including introducing new or significantly improving good/services/processes in the last 3 years. In the sample, one in five firms is led by women, and 4.4% of firms led by ethnic minority.

4.4.1.2. Previous credit rationing impacts future borrowing behaviour

The impacts of rejection on discouraged borrowing

Table 3 shows the results for the regression of discouraged borrowing (1.1) using probit, logit and linear probability models. The first three columns present results from the probit model. In particular, column (1) includes only the main variable of interest –reject. Column (2) includes lending relationship variables, namely a dummy if firm is doing business with one of the big 5 banks and a dummy if it switched its main bank in the last twelve months. Columns (3) and (4) includes other control variables for firms' and owners' profiles. Columns (5), (6) and (7) show the results from the full model from the logistic and linear probability models, respectively. The marginal effects of probit and logit models are also reported in Table 3.

[Insert Table 3 here]

Across all models, the estimated coefficients of reject variable are positive and significant. A rejection in the last 12 months is positively related to the discouragement intention. The marginal effect from probit model suggests that compared to those whose applications were approved, the self-rationing likelihood of credit-rationed firms is 12.6 percentage points (p.p.) higher. The result from the logit model is similar, 12.5 p.p. higher, and the result from the linear probability model is slightly higher, 13.7 p.p. Overall, the impact of credit-rationing decision on self-rationing intention is statistically and economically significant.

The impacts of relationship lending on discouraged borrowing

In column (2), relationship lending variables, including “switch main bank” and “Big5”, are included in the discouragement regression. Due to unavailable information from the LSBS survey, this study uses two variables representing for whether firm switched

their main bank in the last 12 months, and whether the main bank is one of the five big banks in the UK. The negative coefficients suggest that firm that switched the main bank is less likely to be discouraged and doing business with one of the big banks reduces the likelihood of self-rationing. However, both variables are statistically insignificant, and their economic significance is also small. The literature on the relationship lending and costs of switching banks is controversial. Some found that the relationship lending is beneficial in lessening the asymmetric information between the borrower and the lender. Hence, firms receive more favourable contracts if they stay with their main banks. Meanwhile, some found evidence supporting the informational “lock-in” situation, in which the main lender has private information about firms and gradually charges higher interest rate.

The impacts of firms’ and owners’ characteristics on discouraged borrowing In Columns (3)-(7), all the control variables for firms’ profile are also included and probit, logit and linear probability models are. Larger firms are less likely to self-ration themselves. Compared to self-employed businesses, firms having employees are less likely to be discouraged, even though only medium firm has significant difference. Compared to businesses that do not have employee, the likelihood of discouragement in medium businesses increases by 17.1 p.p. Younger firms are more likely to self-ration. Compared to firms aged more than 15 years old, the discouragement propensity of firms operating for 6-0 years old are 14.4 p.p. higher. It means that older firms have a lower likelihood of self-rationing behaviour. The results support the argument of firms’ size and age on discouragement. This finding is consistent with other empirical studies on discouragement (Han *et al.*, 2009; Freel *et al.*, 2012; Cole and Sokolyk, 2016; Cowling *et al.*, 2016; Mac an Bhaird *et al.*, 2016). Larger and older firms are supposed to have less severe asymmetric information issue. The economic scale of larger firms helps them decrease the proportion of application costs over one unit of invested capital. The higher asset base of these firms means that they have more assets to pledge as collateral. In that case, they would perceive a lower rejection probability or less likely to self-ration themselves from the market. Older firms also have a longer track of record, which in turn results in a less severe asymmetric information issue.

It is also notable that firms in service sectors are more likely to be discouraged. Manufacturing firms are supposed to have larger asset bases, thus less likely to self-select themselves. Compared to shrank firms, firms grew in the last 12 months are 8.2 p.p. less likely to have self-rationing intention. Surprisingly, firms led by ethnic

minority are less likely to be discouraged borrowers. The marginal effect is 14.5 p.p. and statically significant at 5%. This result does not support the result of Stuart (2009).

4.4.1.3. Selection bias and endogeneity

As mentioned in the methodology section, the regression of “DB” may be biased by the sample selection issue. A firm is not a discouraged borrower if they simply do not have a need for outside funding. In other words, *DB* is observed only if firm has a need for external finance (i.e., when $N=1$). *DB* is not observed if firm does not need external funding (i.e., $N=0$). Thus, selection bias may arise if firm is considered as discouraged but were due to their need of outside funding, e.g., growth expectation. The model should consider the sample selection issue as it may bias the results. Hence, a simultaneous regression of Discouragement and Need should be conducted.

Moreover, the model may be biased due to endogeneity of rejection. Models in previous section assume exogeneity of rejection. This assumption may be invalid as the credit-rationing decision may be determined by some factors that also affect the self-rationing decision. For example, risk level is arguably one of the main determinants of the credit granting decision. At the same time, riskier firms are more likely to be discouraged. Similarly, for some reasons, banks might want to discourage firms from making application in the future, so that they rejected firms to prevent their application in the next periods.

This section will tackle the selection bias and endogeneity issues. Noticeably, all the dependent (*DB*) and independent (*Reject*) variables as well as the *Need* variable are binary variables. The maximum likelihood estimation will be applied. Hence, a tri-probit model is needed as follows:

- (1) $DB_{16} = 1$ ($Rejection_{15} + mainB_{16} + changebank_{16} + size_{16} + age_{16} + sector_{16} + legal_{16} + pastgrow_{16} + export_{16} + wled_{16} + mled_{16} + u_i \geq 0$)
- (2) $N_{16} = 1$ ($Rejection_{15} + expgrow_{16} + size_{16} + age_{16} + sector_{16} + legal_{16} + pastgrow_{16} + export_{16} + innov_{16} + v_i \geq 0$)
- (3) $Reject_{15} = 1$ ($mainB_{15} + depth_{15} + breadth_{15} + tracreprob_{15} + size_{15} + age_{15} + sector_{15} + legal_{15} + pastgrow_{15} + export_{15} + innov_{15} + wled_{15} + mled_{15} + w_i \geq 0$)

$$\begin{pmatrix} u \\ v \\ w \end{pmatrix} \sim N \left[0, \begin{pmatrix} 1 & & \\ \rho_{12} & 1 & \\ \rho_{13} & \rho_{23} & 1 \end{pmatrix} \right]$$

As mentioned in the methodology section, some questions related to relationship lending in the LSBS 2015 are not available in the LSBS 2016. Answers to these

questions are used to generate two relationship variables, namely breadth and depth, which will be included in the regression of past rejection (i.e., reject_{15}). Moreover, an additional dummy variable – *traccreprob* - taking a value of 1 if firms had a trade credit problem in 2015, is included in (2). Firms' ability to provide trade credit to their customers shows that firms did not have problems with their cash flow. However, a delay in payment may cause liquidity problems if firms do not have a strong cash position. Thus, if firms have serious problems in their operation due to late payments, they may have considerable liquidity risk. A higher risk level associates with a higher likelihood of credit rationing.

If $\rho_{12}=0$, there is no correlation between disturbances of (1) and (2), which means that there is no selection bias in the discouragement regression. If $\rho_{12} \neq 0$, the disturbances of (1) and (2) are correlated with each other, which shows that there is selection bias issue, and two regressions need to be jointly estimated. Similarly, ρ_{13} value shows correlation between error terms of (1) and (3). A statistically significant value of ρ_{13} indicates that rejection is endogenous. The results from Heckprobit, CMP and eprobit models are shown in Table 4.

[Insert Table 4 here]

Columns (1) and (2) report the results from Heckprobit and CMP for the bivariate probit model of DB and Need and columns (3) and (4) report and the results from CMP and eprobit for the trivariate probit model of DB, Need and Reject. Values of rho across four models provide the information about the correlation of the disturbances of "DB", "N" and "Reject" equations. Wald test of independent equations (not reported) shows that the rho value from Heckman technique is not significantly different from zero. The values of rho in CMP and eprobit models show the similar results.

Across four models, previous credit rationing experience leads to a higher likelihood of self-rationing decision. The significant and positive coefficients of the rejection variable mean that firms were rejected in previous year are more likely to self-select themselves out of the market, conditional on having a need for external finance. It indicates that a rejection by the supplier has a significant impact on future application decision. A rejection decision by the market in previous period (i.e., in 2015) provides the information to revise their perceived probability of rejection – which is more likely to be increased as a result of rejection. A higher expected probability of rejection, thus, leads to an increased likelihood of discouragement in the next period (i.e., in 2016).

As shown in Table 4, value of ρ_{12} is statistically insignificant, which means that the error terms of DB and Need regression are uncorrelated. Similarly, value of ρ_{13} is also insignificant and thus, the disturbances of DB and Reject regressions are not correlated. Overall, selection bias and endogeneity issues are not presented in this model. Across four models, the impact of past rejection on the likelihood of discouragement decision is significant.

Robustness check

This section will carry out several robustness tests. The results are reported in Table 5. Firstly, it checks whether firms were rejected by more than one type of external finance are more likely to be discouraged. The significant coefficients suggest that if rejection comes from different types of finance, firms are more likely to make self-ration decision. It implies that signal's strength matters for discouragement. Firms repeatedly got rejection from the market have a higher rejection expectation and thus, more likely to be discouraged.

[Insert Table 5 here]

Secondly, different definitions of discouragement and rejection are used. The above results are based on "overall" (i.e., both direct and indirect) discouraged borrowers – all those who did not apply for finance, even though they had a need, except for those who did not want to take on more risk. The result is robust using a stricter definition of discouraged borrowers – i.e., those thought that they would be rejected. The coefficient of Reject is also significantly positive, which means that firms that were rejected in the past are more likely to think that their future application would be rejected again. Because of that reason, they self-rationed themselves to avoid unnecessary application cost.

Next, "Reject" is considered in a stricter way. Only borrowing rejection (including application for bank overdraft, commercial mortgage, credit cards and loan from a bank or financial institution) is considered. This new "Reject" variable is used for both definitions of discouragement. The coefficients of rejection remain positively significant. More importantly, the impact of borrowing rejection on the new DB is larger than the previous definition of discouragement. This result implies that a direct rejection from banks or financial institutions leads to a higher perception of rejection.

Lastly, the model is run again using another rejection variable – rejection in the past ten years. The results show that the coefficient of this independent variable is positive but insignificant. Previous rejection in a longer term does not have a significant impact on firms' behaviour. This result suggests that firms use the most recent decision from

the market to update their posterior distribution to make future decision. It implies that the information relating to rejection in the longer term has already been used to update the firm's beliefs about the success probability.

In general, previous experiences will inform current decisions. Credit rationing decisions from the supply side in previous years will be more likely to lead to self-rationing decisions.

4.4.2. Results from FM 2011-17

4.4.2.1. Descriptive statistics

In addition to self-rationing decisions in the last 12 months, FM data set also provides information about firms' self-rationing intentions in the next three months. Thus, instead of studying the previous self-rationing decisions, this part examines the impact of past credit-rationing future self-rationing intentions.

Table 1 and Table 2 also summarize the descriptive statistics for variables from Wave 5 to Wave 27 (i.e., Quarter 2, 2012 to Quarter 4, 2017). In this period, firms that will be in need of external finance in the next 3 months account for 30.69% of the whole sample. Among this group, about half of the firms would apply for funding while 10% of them would self-select themselves out of the market due to one of the ten reasons mentioned in the methodology section.

[Insert Table 1 here]

Table 2 shows that firms that were rejected in the past 12 months account for 13.2% of the pool of applicants. Most firms are doing business with only one bank since only 6% of the firms have business with more than one bank. 1% of them use multiple services from their main bank. 6% of firms were required to pledge collateral.

[Insert Table 2 here]

The number of firms that have their owners/directors injected personal fund to help the business grow explains for 11.6% of the sample. The proportion of firms that have credit (overdraft, loan or credit card finance) under personal name of the owner is 17%.

Over the past 12 months, 48% of businesses grew. Meanwhile, in the next 12 months, more than half of firms expect a growth in turnover. Only 1.9% of firms exported for more than 50% of sales in the past 12 months. Almost half of the sample claimed that they developed a new product or service or have significantly improved an aspect of their business in the past 3 years.

One fifth of the firms were managed by women, while only 5% were led by ethnic minority. Most owners are from 31-65 years old. Owners aged between 18-30 years old managed 3% of the firms in the sample whilst this statistic is 8.7% for those who are aged more than 65 years old.

4.4.2.2. Econometric analysis

Table 6 reports results from the probit, logit and linear probability models using the FM data set. Similar to the previous section of LSBS, Column (1) shows the results from the regression of discouragement on rejection. The model in Column (2) adds relationship lending variables, namely breadth and depth. The next three models add other control variables.

[Insert Table 6 here]

The impacts of rejection on discouraged borrowing

The results on the rejection are similar to LSBS data set. Across all models, the estimated coefficients of Reject variable are positive and significant. It implies that a rejection in the last 12 months is positively related to the discouragement intention in the next three months. The marginal effect from the probit model suggests that the likelihood of self-rationing intention of credit-rationed firms is 10.2 p.p. higher than not-rejected firms. The logit model provides a similar result as the discouraged intention probability increased by 9.6 p.p. if firms were rejected in the last 12 months. The result from the linear probability model is higher, 13.9 p.p. The marginal effects from the FM data set are similar to those numbers from the LSBS data set, even though the FM numbers show the impact of credit-rationing on self-rationing intention in the near future, and the LSBS numbers show the impact on the self-rationing decision made in the last year. It may imply that the impact on application intention is similar to the impact on actual application decision. Overall, the impact of credit-rationing decision on self-rationing intention is statistically and economically significant.

The impacts of relationship lending on discouraged borrowing

The results on the impact of relationship lending on discouragement are similar to the results from the LSBS. The negative coefficient of *depth* variable indicates that firms using different services from their main bank are less likely to be discouraged. Having multiple relationships, however, increases the likelihood of discouragement since the coefficients of breadth are positive. Nevertheless, both variables are statically insignificant across all models. Hence, it suggests that relationship lending does not play an important role in the application decision, which is robust to findings from the LSBS data set, although it does not align with the literature, for example, this soft-

lending technologies lessens the self-rationing decision (Chakravarty and Yilmazer, 2009) and discouragement is an efficient mechanism (Han *et al.*, 2009; Cowling *et al.*, 2012).

The impacts of firms' and owners' characteristics on discouraged borrowing

Regarding control variables, some of the results agree with the results from the LSBS data set, but some do not. Older firms are less likely to self-ration themselves. Compared to firms less than 6 years old, firms operating for more than 15 years old are 2.3 p.p. less likely to have discouragement intention. Older firms have a longer track record, so that the asymmetric information between them and suppliers are less severe. Additionally, they may have more experience in the credit market. Experience in making applications help firms to save time and reduce the cost of preparing an application, thus lowering the application cost. Older firms are also less likely to make discouraged borrowing decision, as the coefficients on firms aged more than 15 years are negative across models. However, the coefficients are only significant at 10% in the probit and linear probability models.

Partnership and Limited liability companies are less likely to have self-rationing intention. There is no difference between sectors in this data set. Also, the data set does not show a significant relationship between owners' characteristics and discouragement intention.

4.4.2.3. Sample selection bias and Endogeneity:

As mentioned in the methodology as well as in the LSBS section, model (*) may be biased by sample selection bias and endogeneity. As three variables representing for discouragement, need and rejection are binary variables, a trivariate probit models are needed as following:

- (1) $DB = 1$ (Rejection + Breadth + Depth + Collateral + Risk + Size + Age + Turnover + Industry + Region + Legal + Exporting + Innovating + Pastgrow + Wled + Mled + Ownerage + Experience + Education + $u \geq 0$)
- (2) $N = 1$ (Rejection + Expgrow + Risk + Size + Age + Turnover + Industry + Region + Legal + Exporting + Innovating + Pastgrow + $v \geq 0$)
- (3) $Reject = 1$ (Breadth + Depth + Personalfund + Personalloan + Personalapplication + Collateral + Risk + Size + Age + Turnover + Industry + Region + Legal + Exporting + Innovating + Pastgrow + Wled + Mled + Ownerage + Experience + Education + $w \geq 0$)

$$\begin{pmatrix} u \\ v \\ w \end{pmatrix} \sim N \left[0, \begin{pmatrix} 1 & & \\ \rho_{12} & 1 & \\ \rho_{13} & \rho_{23} & 1 \end{pmatrix} \right]$$

Growth expectation is included in the N equation but not in the DB equation. As argued in the LSBS section, firms that expect growth in the next period are more likely to need more funding. These firms are more likely to have uncertain cash flows. Since their internal finance is harder to predict, they are more likely to need external finance.

Three dummy variables, namely “personalfund”, “personalloan” and “personalapplication” are included into the Reject equation but not in the DB equation. Firms were asked if their owners or directors put personal funds into the business. If firms answered yes, they were then asked whether the decision is made because (1) - “Something that you chose to do to help the business grow and develop” or (2) - “Something that you felt you had no choice about, you had to do”. “Personalfund” takes a value of 1 if firms answered “yes” to the first question and chose the first option for the second question. If firms answered “no” to the first question or answered “yes” for the first question and chose the second option for the second question (i.e., they had to put their personal fund into the firm), “personalfund” takes a value of 0. Moreover, firms were asked if any of overdraft, loan, or credit card is in personal name, rather than of business name. “Personalloan” takes a value of 1 if firms answered it was in personal name. In addition, firms were asked if their applications for overdraft or loan or credit card in the last 12 months were in personal name. “Personalapplication” takes a value of 1 if it was in personal name. The theoretical base of these three variables relates to the adverse selection and moral hazard issues in the credit market. The literature on adverse selection argues that personal collateral is considered as a signal for firms’ quality (Freel *et al.*, 2012). Thus, if firms’ owners or directors put personal fund into their firms, this action implies the confidence of firms’ owners in firms’ future and signals firms’ quality. Additionally, personal collateral is more effective in limiting borrowers’ risk-taking activities than business collateral due to the potentials of losing personal collateral (Steijvers and Voordeckers, 2009). Personal collateral is considered as additional guarantee in the debt contract (Brick and Palia, 2007). Therefore, firms’ owners injecting their personal fund or having credit contracts in their personal name indicates that they are less likely to be rejected.

If $\rho_{12} \neq 0$, there is correlation between disturbances of (1) and (2). Which means that the results from the probit model of DB is biased by the sample selection issue. Meanwhile, if $\rho_{13} \neq 0$, there is endogeneity problem as the error terms of (1) and (3) are correlated.

[Insert Table 7 here]

The first four columns of Table 7 estimate regression (1) and (2) simultaneously using Heckman and CMP, while the last six columns regress (1), (2) and (3) simultaneously using CMP and eprobit. The results from all four models show that the error terms of (1) and (2) are correlated. Thus, the estimated coefficients of model (1) will be biased by the sample selection if model (1) and (2) are estimated separately. In other words, the models of discouragement and need have to be estimated simultaneously. The value of arthrho of (1) and (3) shows that the error terms between (1) and (3) is statistically uncorrelated. Thus, the endogeneity problem is not prominent in the discouragement equation.

Across the bivariate and trivariate probit models, the results remain the same. After examining the sample selection and endogeneity issues, credit-rationed businesses are more likely to be self-ration themselves in the next three months.

Robustness check

In this section, different definitions of discouragement and different types of credit rationing are used to estimate the DB model.

Firstly, variables capturing different definitions of credit-rationing are used in the model. In the previous section, the rejection variable encompasses any types of rejection. Alternatively, two different rejection variables are now used: a dummy (credit rejection) if firms were rejected for their overdraft or loan applications; and a dummy (partial rejection) if firms were accepted for an overdraft or loan but offered less than the requested amount. The results with these two alternative measures of credit rationing show that the results remain qualitatively the same, providing further support for the core argument that previous credit rationing leads to self-rationing.

Secondly, a narrower definition of discouraged borrower (Direct DB) is used. Firms are defined as discouraged borrowers only if they thought the bank would say no, or they informally mentioned to the bank and the banks seem to be reluctant. The two new definitions of the rejection variables are used in these regressions.

[Insert Table 5 here]

Results are reported in Columns (6)-(10) in Table 5. The results show that across different types of rejection, firms are also more likely to be discouraged from making application because of these two reasons.

4.5. Discussion and Conclusion:

Increasing attention has been paid to discouraged borrowing, which originates from asymmetric information. Studies on discouraged borrowers consider characteristics of discouraged firms as well as impacts of relationship lending. This study, instead, examines the impacts of borrowing experience on the borrowing decision in the future and draws a link between supply-driven funding gap and demand-driven funding gap caused by market failure.

The Bayesian framework presented in Chapter III shows that a negative borrowing event discourages firms from borrowing again while a positive borrowing event decreases the discouragement intention. A credit-rationing decision implies that the banks' evaluation of firms' creditworthiness is different from firms' perception. This information is incorporated into firms' self-evaluation for the next period. The Bayesian model shows that a rejection increases firms' perceived rejection likelihood, which in turn reduces the expected return and application probability.

The LSBS and FM datasets provide empirical evidence for this model. The LSBS provides insights into the discouragement decision in the past while the FM illustrates the borrowing intention in the next three months. The results from the LSBS suggest that firms that had been rejected were more likely to be discouraged. Whilst the FM offers complementary results that credit-rationed firms also tend to have self-rationing intention in a near future. The estimated marginal effects from LSBS and FM are close which means that the impact of credit rationing on discouragement decision as well as on discouragement intention are similar. This result aligns with study of Xiang *et al.* (2015) on Australians' SMEs. Overall, credit-rationing worsens firms' perception of market failure and increases discouragement tendency and thus, the consequences of market failure is exacerbated in the future.

Moreover, firms unbiasedly update their beliefs using all the information they gather from the market, regardless of information types. Since firms are not fully informed about lenders' decisions, they have tendency to collect all the information provided by the lenders. An approval and/or a rejection is a valuable piece of information that explicitly represents lenders' evaluation. Thus, firms should learn from both types of information, which implies that the learning process is unbiased. Since the results show that a rejection increases the discouragement propensity, confirmation bias does not exist. It, thus, supports the unbiased learning model presented in Chapter III.

Furthermore, the results also contribute to the discussion of relationship lending. Firstly, having relationship with big banks does not have significant impact on borrowing decision. The literature suggests that organizational structure imposes a barrier to soft information transmission within the banks as well as between banks and borrowers (Liberti and Petersen, 2019). As such, a relation with a big bank increases discouragement likelihood. This study does not find supporting evidence for this argument.

Secondly, the result from the LSBS data set suggests that switching their main bank does not affect application decision. In addition, the result from the FM data set also indicates that having a broad banking relationship with various providers does not affect discouragement. The “lock-in” theory discusses the disadvantages of relationship lending. When firms are locked in the relationship with their main bank, their banks have informational advantages and can charge higher interest rates. A switching decision should reduce discouragement because firms are more beneficial from the new relationship. However, the results in this chapter do not support this view.

Thirdly, using various services from the same main provider does not directly affect the discouragement decision. The results on the relationship depth do not support the argument that relationship is strengthened with multiple services. A deep relationship allows banks to observe firms’ creditworthiness as well as operating behaviours and thus, reduce asymmetric information issue. As a result, discouraged borrowing behaviour should be alleviated by a strong relationship. However, this view is not supported by the evidence in this chapter.

In contrast, this study supports the literature on the impact of relationship lending on credit rationing. The results from both data sets show that a strong relationship decreases the likelihood of rejection. In particular, the depth of the lending relationship plays an important role in reducing the likelihood of rejection. The depth of the main relationship indicates that firms and their main banks have more channels to exchange the information. A frequent relationship facilitates information flow and thus, reduces asymmetric information. Accordingly, adverse selection and moral hazard issues are mitigated in a frequent relationship. Thus, a multi-dimensional relationship reduces credit-rationing.

Overall, this chapter contributes to the literature of discouraged borrowing. Firstly, it extends the literature of discouragement by confirming the Bayesian learning model developed in Chapter III. Accordingly, it explains firms’ borrowing decision in relation

to their borrowing experience, rather than in relation to firm characteristics. It, thus, draws a link between credit-rationing and discouraged borrowing.

Secondly, it also contributes to the relationship lending literature by examining the learning process from the firm side, rather than the supply side. The results also show that the learning process exists, and the confirmation bias does not seem to be present in the learning model. It supports the roles of entrepreneurial cognition and learning in the borrowing decisions and thus, supports the framework by Fraser *et al.* (2015). It suggests that perception of rejection plays a role in the borrowing process.

Moreover, the results imply that the consequences of credit-rationing on firm performance are currently under-estimated if discouragement worsens firm performance. In other words, the funding gap caused by a rejection is not yet fully captured. This topic will be examined in the next Chapter.

The results also suggest that information flows between firms and banks are crucial in lessening the funding-gap issue. A frequent and deep relationship facilitates information exchange between them and, thus, reduces the severity of the information asymmetry. Further research should examine firms' learning processes in relation to other sources of information.

This study has several implications for policymakers and practitioners. The results suggest that a policy targeting at reducing informational asymmetry will help alleviate both credit-rationing and self-rationing issues. Policies that help remove credit-rationing issue will also have an indirect impact on reducing discouragement. Guaranteed loan programmes managed by the British Business Bank support small businesses in securing loans, especially those without sufficient collateral. Initiatives that allow credit-reference agencies to share borrowers' information should be promoted to help reduce the application costs and provide support to improve credit and financial application (Fraser, 2014). Firms should be informed of the Appeal Process that may help them reverse the initial rejection decision, which in turn helps prevent discouragement decisions in the future. Initiatives that help firms find alternative sources for more suitable products, for example, the finance platform referrals programmes by British Business Bank, should be made available and easy to access.

Furthermore, the development of technologies in the financial market, for example, challenger banks such as Starling and Revolut, has advanced credit-scoring models as well as providing non-bank financing options for new firms (e.g., Syndicate room). Some studies show that fintech lenders serve more creditworthy borrowers and

process applications quicker (see Philippon, 2019 for a review of recent studies on fintech) and these models have also been employed for small business lending. Policy makers should aim to support and promote these new players as well as develop legal framework to protect borrowers against fraud and raise their awareness of new financing sources.

From firms' perspectives, they can facilitate information exchange with their financial suppliers as well as other sources, such as local growth hub or their social network. This helps collect information that can be used for their learning process. The richer the information, the quicker the learning process leads to the unbiased outcome that should approximate firms' truly probability of success.

CHAPTER V: GROWTH EXPECTATION, GROWTH AND FINANCIAL CONSTRAINTS

5.1. Introduction

The real effect of financial constraints on firms' activities is one of the main topics in the literature of finance and growth. Carpenter and Peterson (2002) provide a theoretical framework on the relationship between internal finance and growth in small financially constrained firms. It establishes an indirect link between market frictions and growth by showing that market failures lead to dependency of growth on internal finance. It also captures the funding gap caused by discouraged borrowing and credit rationing together. Empirical studies find supporting evidence for this relationship in various economies, e.g., Carpenter and Peterson (2002) find that asset growth of UK small business is sensitive to changes in cash-flow, and Mulier *et al.* (2016) also find this dependency of investment in six European countries.

While both types of funding gap are caused by market failure, the individual effects of supply side and demand side financial constraints (i.e., credit-rationing and discouraged borrowing) on growth have not been disentangled. The impact of credit-rationing is well studied, whilst the funding gap caused by discouraged borrowing behaviour is relatively less explored in the literature (Fraser *et al.*, 2015). Since the applicant expected a high probability of approval, rejection is an unexpected outcome. Credit-rationing leads to an unanticipated funding gap but also reflects firms' optimism. By contrast, self-rationing decision implies that entrepreneur expected that their likelihood of success is sufficiently low. The funding gap caused by discouraged borrowing is a predicted gap and may also reflect firms' pessimism. Thus, credit rationing and discouraged borrowing may have different effects on growth due to differences in expectation. Aggregating them into a funding gap becomes problematic if they have different effects on growth.

Furthermore, the effect of financial constraint on growth may be more complex in the context of small businesses. The literature on the impacts of financial constraints on small firm growth has been discussing the role of growth opportunities in this relationship. Tobin's Q is often used as an unbiased control for the growth opportunities since it reflects market evaluation of firms' growth prospects, but concern arises as it may not fully capture growth opportunities or even unavailable in the case of small or unquoted firms. Carpenter and Guariglia (2008) suggest using firms' self-evaluation of growth as it reflects firms' perception of growth opportunities. This aligns with study of Fraser *et al.* (2015)

which suggests that firms' cognition plays an important role in understanding the relationship between entrepreneurial finance and growth. This implies that an investigation of perceived growth opportunities (which is growth expectation in this study) is critical to understanding the relationship between entrepreneurial finance and growth.

Therefore, this chapter will investigate these two issues. Firstly, it aims to disentangle the individual impacts of discouraged borrowing and credit rationing on firm growth. Survey-based data allows direct measurements of these two types of funding gap, which has not been feasible using indirect indices, e.g., investment-cash flow sensitivities. This helps answer the question of whether self-rationing decision has consequences on firm performance and whether the funding gap caused by market failure is under-estimated in the literature.

Secondly, it examines an indirect channel that intensifies the impacts of discouraged borrowing and credit rationing on growth, as proposed in Chapter III. This channel is built on perception of financial constraints and growth expectation. It, thus, investigates the formation of growth perception in relation to the perception of financial constraints. An understanding of growth expectation will also help isolate the impact of financial constraints on growth. The role of entrepreneurial cognition in this relationship is thus highlighted in this part.

Building on the literature of financial constraints and bricolage, as well as the learning model as described in Chapter II, this chapter provides empirical evidence to the framework of direct and indirect effects of discouraged borrowing, credit rationing and growth, which is presented in Figure 3, Chapter III. The UK Longitudinal Small Business Survey 2015-2017 is employed to test the model. This panel data of small- and medium-sized firms allows for examining the lagged effect of funding gap on growth and studying the learning process of the entrepreneurs in forming expectations over this period. Moreover, it allows for using lagged dependent and independent variables to resolve endogeneity and reverse causality.

Overall, this study makes three main contributions to the literature of financial constraint and growth in small businesses. Firstly, it contributes to the literature of financial constraint by showing the individual effects of discouraged borrowing and credit rationing on growth in small firms. The results show that the impacts of discouraged borrowing and credit rationing are distinctive, thus suggesting that they should be studied individually. Further research can address their differences. Moreover, a significant effect of

discouraged borrowing means that the funding gap that has been extensively studied in the literature does not fully represent the actual gap faced by financially constrained firms. This result has important implications for policy makers since it suggests that solving the financial constraint issue from supply side will not address the whole story of financial obstacles.

Secondly, it extends the literature on financial constraints by providing empirical evidence to the framework of direct and indirect impacts of financial constraints on growth developed in Chapter III. In that framework, firms' perceptions of growth opportunities and financial resources are critical in transmitting the indirect impacts. Hence, it contributes to Fraser *et al.*'s (2015) study on the role of entrepreneurial cognition on the relationship between entrepreneurial finance and growth.

Lastly, its empirical evidence also contributes to the entrepreneurial-learning literature by showing that firms do learn from their experience. The perception of financial constraints responds to firms' experience of the funding gap while growth expectation adjusts to its prior expectation error although there is bias in the learning process.

5.2. Theoretical model

Carpenter and Petersen (2002) develop a theoretical model on the impact of financial constraints on growth in small businesses and show that in a financially constrained business, growth in assets is tightened to internal finance and this dependency is reduced with relaxation of access to external finance. Empirical studies find supporting evidence for this model. For example, after controlling for investment opportunities evaluated by outsiders (Carpenter and Petersen, 2002) and insiders (Carpenter and Guariglia, 2008), they find financially constrained firms experience a lower asset growth.

However, their models only take into account the direct effect (using an indirect approach) of financial constraints on firm performance. This paper, instead, seeks to examine both direct and indirect effects of financial constraints on growth outcomes through its impacts on future perception of financial obstacles and growth expectation as shown in Figure 3A (which is a subset of Figure 3 in Chapter III).

The literature on finance and small business growth posits two opposite views on the relationship, as discussed in Sections 2.4.1. and 2.4.2. and Section 3.2.2. Financial constraints refer to a shortage of financial capital due to finite internal capital and/or limited external finance. While the literature of "less is less" considers financial constraint

as an inhibitor, the literature of “less is more” finds financial constraints as an enabler. The first view suggests that a financially constrained firm relies more on internal finance to fund the growth (Rahaman, 2011) and a significant funding gap hinders firm performance for many reasons. Firstly, financially constrained firm lacks financial buffer and faces liquidity issue if there is a significant decrease in cash flow. Buffering fund does not involve in the operating or investing activities, which in turn lowers the profitability. Secondly, a shortage of internal cash flow may cause disruption in operation and/or cut in investment and hence, may lead to severe consequences on business. Krishnan *et al.* (2015) show that greater access to external finance allows financially constrained firms to increase productivity.

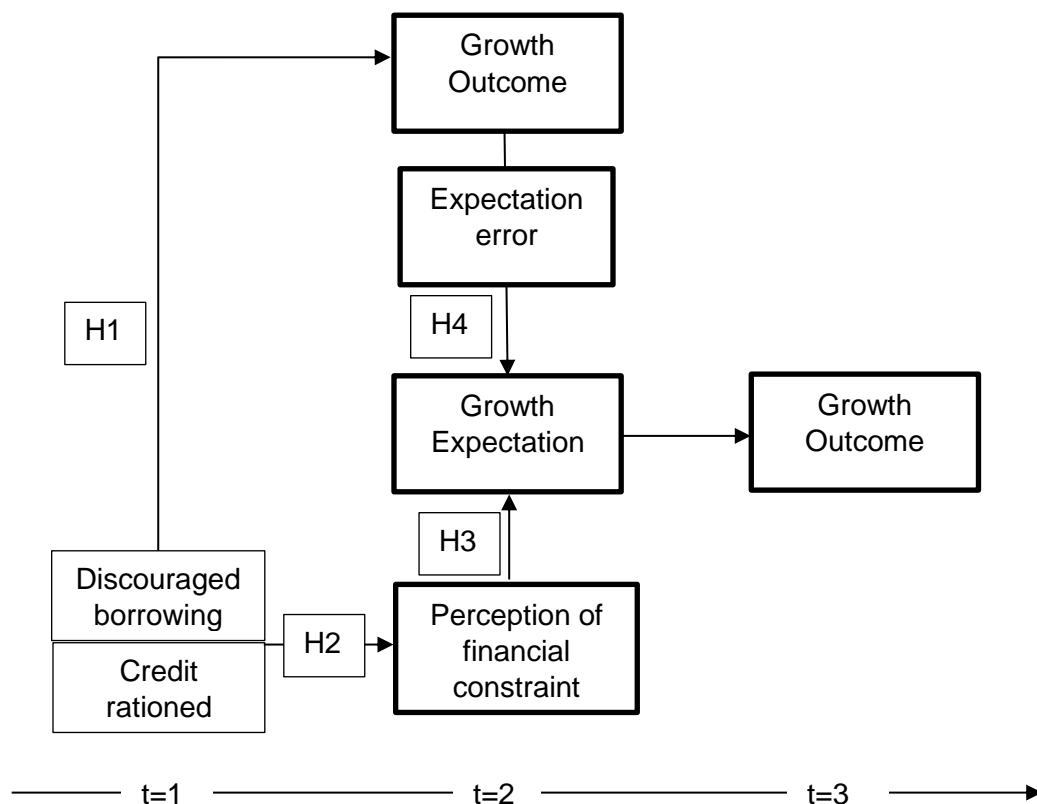


Figure 3A: Direct and Indirect effects of financial constraints on growth

Nevertheless, the second view proposes that firms with fewer resources leverage their limited resources more efficiently, compared to those who have slack (Paeleman and Vanacker, 2015). Financially constrained firms have to be selective on projects that are more feasible and promising instead of experimenting with abundant slack. Moreover, they need to be more innovative in either using their limited resources for different objectives or finding different approaches or solutions that help them achieve their growth (Baker and Nelson, 2005; Hoegl *et al.*, 2008). Equally, limited access to external finance

does not constrain growth for firms which are not expecting growth (Fraser *et al.*, 2015; Krishnan *et al.*, 2015) or which have abundant internal cash flow thanks to their high productivity (Guariglia *et al.*, 2011). Relatedly, controlling for growth opportunities remains of critical importance in identifying the impact of financial constraints on growth.

Hypothesis 1a: Discouraged-borrowers and/or credit-rationed businesses are less likely to achieve turnover growth and employment growth.

Hypothesis 1b: Discouraged-borrowers and/or credit-rationed businesses are more likely to grow turnover and employment.

Moreover, as shown in Section 3.2.1.2., Chapter III, the adaptive expectation view explains the roles of experience of discouraged borrowing and credit rationing on the perception of financial constraints. The formation of perceived financial constraints responds to experience of financial constraints by taking into account the difference between prior expectation of funding gap and actual funding gap. Credit rationing acts as an expectation error as the applicants unsuccessful secured external finance and faced an unexpected funding gap, and thus, these rejected firms revise their perception of financial constraints in the next period. A discouraged borrower who expected a low likelihood of obtaining a loan also faced a larger funding gap than those successful applicants. Thus, the funding gaps indicate that the firms have met obstacles in accessing external finance and this reduces their expectation of financial constraints in the next period.

Hypothesis 2: Firms facing financial constraints perceive a higher degree of financial constraint in the next period.

Furthermore, the theory of planned behaviour suggests that if firms perceive a funding gap, they are less likely to expect a higher growth for the next period because growth intention is bounded by the perceived feasibility of growth as discussed in Section 2.3.1 and Section 3.2.2. According to the TPB, growth intention is bounded by the perceived capability in funding growth opportunities. As such, perceived financial constraints impose a boundary on growth intention. These firms perceived that their firm's operation and investment plans are dependent on the volatility of cash flow, they find it more difficult to plan ahead (Lundmark *et al.*, 2019) and thus, they would have a lower growth expectation, compared to firms who perceive a low level of financial constraints. However, reverse causality is also of concern as the literature argues that small businesses only perceive a funding gap if they expect growth. Firms that do not aim to

grow find their business as self-sufficient and do not realize a need for external finance. As such, they are less likely to perceive a funding gap. Hence, reverse causality should be captured to understand the impacts of perceived financial constraints on growth expectation in the next period.

Hypothesis 3: Firms perceived financial constraints are less likely to expect growth in the next period.

Lastly, as discussed in Section 2.3., the adaptive expectation hypothesis is used to extend the feedbacks of growth experience on forming growth expectation in the next period. The entrepreneurial learning literature suggests that entrepreneurs learn from their experience in their decision-making process, as such growth outcome provides feedback to growth expectation. As suggested by the AEH, firms adjust growth expectation to reflect their expectation errors, which is the difference between prior growth expectation and actual growth outcome.

However, it is also discussed as shown in Section 2.3.1. on growth intention, growth intention is stable if the firms desire to pursue a growth opportunity, although growth intention can vary in response to changes in the perceived controls over growth. As such, growth expectation is biased toward its growth ambition (which is the growth expectation's component that persists over the long term) despite the expectation errors in previous period. Thus, this study will also examine two respective hypotheses regarding the relationship between growth-expectation errors and expected growth:

Hypothesis 4a: Businesses that expected growth but did not realize growth are less likely to expect growth in the next period.

Hypothesis 4b: Businesses that expected growth are more likely to expect growth, regardless of growth outcome in the next period.

5.3. Empirical model

5.3.1. Data

This study uses the Longitudinal Small Business Survey 2015-17¹² (LSBS). LSBS is held in the Secure Lab by the UK Data Service. LSBS is a large-scale telephone survey of

¹² Department for Business, Innovation and Skills. (2017). *Longitudinal Small Business Survey, 2015-2017: Secure Access*. [data collection]. UK Data Service. SN: 8261, <http://doi.org/10.5255/UKDA-SN-8261-2>

small business owners and managers, commissioned by the Department for Business, Innovation and Skills (BIS). A large sample size of 15,002 firms were surveyed in Year One 2015 to establish a panel of businesses. In 2016, 7279 businesses were re-interviewed to create a longitudinal data set. A wide variety of information is collected in LSBS 2015-17, including firms' and their owners' characteristics (e.g., age, size, industry, legal status, gender or ethnicity of owners), recent turnover and employment growth, capability (including exporting and innovating activities, business plan). Experience of accessing finance, turnover and employment growth expectation and major obstacles to achieve objectives are also surveyed. Overall, these data are collected over three years, which allows for a longitudinal track of firms' activities.

5.3.2. Methodology

The econometric framework begins by specifying probability models used to estimate the effects of actual funding gaps (including discouraged borrowing and credit rationing) on growth outcome, the relationship between experience of funding gap and the perception of financial constraints, the impacts of perceived financial constraints on expected growth of turnover and employment, as well as the role of growth expectation error on growth expectation formation in the next period

Hypothesis 1 on the impact of discouraged borrowing and credit-rationing on growth outcome is estimated by using regression (1), in which, lagged values of financial constraints and growth outcomes are included to account for reverse causality and endogeneity issues.

$$(1) \quad \text{Pr}(\text{Grow}_t=1) = \text{FinCon}_t + \text{FinCon}_{t-1} + \text{FinCon}_{t-2} + \text{ExpGrow}_{t-1} + \text{Grow}_{t-1} + \text{Ctrl}_t + u$$

Hypothesis 2 on the effect of financial constraints on perceived financial constraint is estimated using probit model (2). In this model, the probability of perceiving financial constraints depends on experience of financial constraints in the previous period (as captured by discouraged borrowing or credit rationing).

$$(2) \quad \text{Pr}(\text{PrdFC}_t=1) = \text{FinCon}_{t-1} + \text{ExpGro}_t + \text{Bank}_t + \text{Ctrl}_t + \gamma$$

Then, the impact of perception of financial constraint on growth expectation – Hypothesis 3 - is examined by probit model (3). In this model, probability of expecting growth is regressed against expectation error and perceived financial constraints.

$$(3) \quad \text{Pr}(\text{ExpGrow}_{t+1}=1) = \text{ExpErr}_t + \text{PrdFC}_t + \text{Ctrl}_t + v$$

Inferences made from regressions (1), (2) and (3) may be biased due to reverse causality and endogeneity issues.

Firstly, financial constraint is argued to be endogenous in the relationship with growth. For example, riskier firms might be more likely to be financially constrained and might also more likely to achieve growth. Even though both financial constraint and past growth variables are lagged in the regression of growth, endogenous financial constraint is still an issue. Moreover, since expected growth is used to control for growth expectation, one might argue that it is not sufficient to control for growth opportunities. Thus, a regression of financial constraint is regressed simultaneously with the regression of growth outcome as follows:

$$(1) \quad \text{Pr}(\text{Grow}_t=1) = \text{FinCon}_t + \text{FinCon}_{t-1} + \text{FinCon}_{t-2} + \text{ExpGrow}_{t-1} + \text{Grow}_{t-1} + \text{Ctrl} + u$$

$$(1') \quad \text{Pr}(\text{Fincon}_t=i) = \text{Bank}_t + \text{Tradecr}_t + \text{ExpGrowh}_t + \text{Grow}_{t-1} + \text{Ctrl} + v$$

As above, (1) is estimated using probit model and (1') is estimated using multinomial probit model. As such, conditional mixed-process is used to estimate them together. If the correlation of the error terms (u, v) is significant, the two regressions should be estimated together. Otherwise, they can be estimated separated.

Secondly, reverse causality issue between growth expectation and perception of financial obstacles are one of the main discussions in the literature. As such, (2) & (3) are estimated simultaneously to tackle this issue. These models are estimated using maximum likelihood estimation conducted by Conditional Mixed Process (CMP).

Dependent variables:

- **Grow:** Growth outcomes of turnover and employment. Firms were asked about growth outcome of turnover and employment in the last 12 months. Their answers are then coded into "Growth/Increase", "No change" or "Shrinkage/Decrease". Thus, "Grow" =1 if firm is coded into "Growth/Increase", and =0 otherwise.
- **PrdFC:** perceived financial obstacles. Firm was asked if obtaining finance is one of the major obstacles or difficulties that they might face in achieving business success. It is coded as 1 if firms said yes, and 0 otherwise.
- **ExpGrow_t:** Growth expectation of turnover and employment for year t made at year $t-1$. Firms were asked about their growth expectation of turnover and employment for the next 12 months. Their answers are then coded into "Growth/Increase", "No change" or

“Shrinkage/Decrease”. Thus, ExpGrow =1 if firm is coded into “Growth/Increase”; and =0 otherwise.

Independent variables:

- FinCon: financial constraint situation in the last 12 months. FinCon =1 if firms were self-sufficient; =2 if approved; =3 if rejected; and =4 if discouraged.
- ExpErr: growth expectation error. ExpErr=1 if under-estimated growth; =2 if no error; and =3 if over-estimated growth.
- Expadj: growth expectation adjustment. Expadj=1 if firm downwardly revise their growth expectation; =2 if firm does not change their growth expectation; and =3 if firm upwardly revise their growth expectation.
- Bank: relationship lending, including two variables. Changebank=1 if firm switched their main bank in the last 12 months; and =0 otherwise. Mainbank=1 if the main relationship is with Barclays, Lloyds, HSBC, Santander.
- Controls: firms’ age, size, turnover, industry, area, legal status, owner’s gender and ethnicity, growth expectation in the next 3 years, trade credit. Definitions of these variables are provided in Table 8.

5.4. Data analysis

5.4.1. Summary statistics

Table 8 reports the summary statistics of variables used in this chapter. One third of firms reported that their turnover increased in the previous 12 months. About the same proportion increased their labour force last year. On average, firms’ turnover growth rate is 27% while employment growth is lower, 22.9%. When asked about their turnover growth expectation in the next 12 months, about 40% of them expected an increase and only 10% expected a shrinkage. Employment growth expectation picture is different when two in three firms expected no change in their employment, and about 27.6% of firms expected hiring more employees.

[Insert Table 8 here]

In the sample, about 80% of firms do not have a need and 20% of them have needs for finance in the last 12 months. Among those who have needs (i.e., the variable fincon takes values of 1, 2 or 3), 40% were discouraged and 10% were rejected. These financially constrained firms accounted for about 9.56% of the sample, while 18.9% of

firms thought obtaining finance is a major obstacle to their business. 31% of firms thought late payment would be a major constraint to their firm. Meanwhile, 60% of them have growth intention in the next 3 years. Among those who aim to grow, 20% of them aim for high growth of more than 25%.

5.4.2. Financial constraint impact on growth

At first, the probit models of growth are regressed to examine the first hypothesis on the impacts of discouraged borrowing and credit rationing on growth. Columns (2) and (6) of Table 9 present the marginal effects of financial constraints from the probit models of turnover and employment growth. As mentioned earlier on the current issues of controlling for growth opportunity, this study uses growth expectation as a control for growth opportunity. The literature captures growth opportunities using various measures, e.g., Tobin's Q or internal evaluation of investment (Carpenter and Guariglia, 2008). Tobin's Q measures growth/investment opportunities by using firms' market values. In an efficient market, market value should appropriately discount for opportunities. Nevertheless, in an informationally asymmetric market, market values reflect outsiders' evaluation while growth and funding gap are correlated with insiders' self-evaluation of growth opportunities. Thus, an additional measure of growth opportunities from firms' perspectives is needed to further extract the correlations between growth/investment opportunities with funding gap and growth. For example, Carpenter and Guariglia (2008) measure firms' expectation of investment opportunities by using contracted capital expenditure, i.e., contractual obligations for future investment opportunities. This measure partially explains firms' expectation for future investment.

The results reported in Columns (2) and (6) show that discouragement has a negative effect on turnover growth in the same year and a lagged negative effect on employment growth. The difference in the probability of turnover growth between discouraged and successful applicants is 43 p.p., on average. Discouragement also causes a lagged impact on employment growth since the likelihood of scaling up their labour force in two years is 7.1 p.p. lower in discouraged firms, compared to successful firms. It means that discouraged firms are less likely to grow their turnover and employment, compared to successful applicants. The results presented in Columns (2) and (6) provides supporting evidences for Carpenter and Peterson (2002) model. It suggests that financially constrained firms are less likely to grow their turnover and employment. In this case, the

demand-driven funding gap caused by market failure causes a severe impact on firm growth.

[Insert Table 9 here]

Furthermore, the supply-driven funding gaps (i.e., credit rationing) do not have the same effects on growth of turnover and employment. Compared to successful applicants, rejected firms are less likely to increase number of employees, after two years of rejection. Surprisingly, these firms are more likely to grow their turnover. In the same year of rejection, the impacts of rejection on turnover and employment growth are negative but statistically insignificant, but two years after the rejection, the differences in the probability of growth between rejected and successful firms are 13.1 p.p. higher for turnover and 16.7 p.p. lower for employment. It implies that rejected firms tend not to hire more employees but still achieve turnover growth, compared to approved ones. This suggests that rejected firms are able to increase their productivity in two years after the rejection events. Different from the results of discouragement, this result does not fully support the model of Carpenter and Peterson (2002). Instead, it aligns with the view of bricolage, in which financially constrained firms are forced to operate at the optimal capacity. The lagged effects also imply that it takes time to alter their business in order to optimize their capacity.

In order to further examine endogeneity, this chapter regress growth and financial constraint's equations simultaneously using a bivariate probit model. The model is estimated by maximum likelihood estimation and growth expectation is included in both regressions of growth and financial constraint. Simultaneous regressions allow for checking correlation of the error terms of two models. If two error terms are significantly correlated, two models should be estimated together to account for endogeneity.

Results from bivariate probit models on financial constraints and growth

Columns (4) and (8) present the marginal effects of financial constraints - including discouraged borrowing and rejection - and growth expectations on growth from the bivariate probit models. Notably, the results of discouragement are changed, but the results of credit rationing remain the same. In particular, the impact of self-rationing on growth in the same year becomes insignificant, which means that discouraged firms are indifferent from successful ones. However, its delayed effect on employment growth remains significant after two years of self-rationing. Column (8) shows that after two years of self-rationing, the difference in employment growth between discouraged and

successful applicants is 7.3 p.p., which is slightly higher than the single regression. It suggests that after controlling for growth opportunities and other unobservable factors, discouragement does not significantly affect turnover growth but still hinders employment growth in the long term.

By contrast, the lagged effects of credit-rationing on turnover and employment growth remain significant. The coefficients of two-period lagged credit-rationing variable are positive in the regression of turnover growth and negative in the regression of employment growth. After controlling for endogeneity, this result confirms previous findings that credit-rationed firms are more likely to grow turnover but not likely to increase number of employees.

Figure 6: A summary of the impacts of discouraged borrowing, credit rationing, and expected growth on growth outcome				
	Turnover growth		Employment growth	
	Probit model (Baseline model)	Bivariate probit model (Endogeneity model)	Probit model (Baseline model)	Bivariate probit model (Endogeneity model)
Discouraged borrowing	Negative effect at t-2	Insignificant effect at t-2	Negative effect at t-2	
Credit-rationing	Positive effect at t-2		Negative effect at t-2	
Expected growth	Positive effect at t-1		Positive effect at t-1	

Furthermore, firms that expected growth are more likely to achieve growth in the next period as the coefficients on growth expectation are significant in all models of turnover and employment. This result validates the argument that growth expectation increases growth.

In general, the findings suggest that the impacts of self-rationing and credit-rationing on growth are different in both magnitude and timing. Accordingly, studies on the real effects of financial constraints on growth should distinguish the differences between these two

types of funding gap, rather than aggregate them. In particular, both credit-rationed and discouraged borrowed firms are less likely to grow employment, compared to successful borrowers. However, while discouraged borrowing does not affect turnover growth, credit rationing is positively associated with turnover growth. Thus, the results on discouraged borrowing support the literature on financial constraint whilst the results on credit rationing are in line with the view of “less is more” or “financial constraint as an enabler”.

5.4.2.1. Robustness check

A new definition of growth is used for both turnover and employment. Instead of examining growing and non-growing firms, absolute values of turnover growth were used. This leads to a smaller sub-sample since many firms did not provide their sales number or a range of turnover. Ordinary Least Square (OLS) models are used to estimate the impacts of discouraged borrowing and credit rationing. In order to solve endogeneity, maximum likelihood estimation is used to estimate a simultaneous model of linear and multinomial probit regressions. In Table 9, the results are shown in Columns (1) and (3) for turnover and Columns (5) and (7) for employment.

The results hold for the lagged effect of credit rationing on turnover growth in both single regression and simultaneous regression. Meanwhile, the negative coefficients of rejection in the employment regression change to positive but insignificant. It suggests that compared to unsuccessful applicants, approved firms have a lower turnover growth but indifferent employment growth. Moreover, the impacts of discouragement do not hold in the model of ordinal growth. The coefficients of discouragement on employment growth rate are positive and significant. It is worth noting that the sample size is reduced significantly in both case of turnover and employment due to unreported answers. As such, the results may be not comparable between the linear models and the probit models.

Furthermore, the impacts of financial constraints are arguably heterogeneous across size, which are presented in Table 10. Columns (1) and (4) show that the coefficients of rejected variables at time $t-2$ are significantly positive in the regression of turnover and significantly negative in the regression of employment. This means that in two years of rejection, micro firms saw an increase in turnover growth but a significant decrease in employment growth. These significant effects, however, are not found in small and medium firms. In the meantime, Column (2) shows that small firms experienced turnover shrinkage in the year of rejection and Column (6) shows that medium firms also face a

negative employment growth in the same year. However, all these effects are insignificant in the next two years. To sum up, the impacts of rejection vary across firms' size.

[Insert Table 10 here]

The results imply that rejection disrupted small and medium businesses in the year of rejection, but its impact becomes insignificant in the following years. The situation is different in micro firms. Even though the negative consequences are insignificant in the year of rejection, rejected firms are more likely to achieve turnover growth after two years, compared to successful firms. In the meantime, these firms are also less likely to grow their employment after two years. This shows that micro firms are able to grow their sales with the same labour force. Hence, it implies that micro firms become more efficient in utilizing firms' constrained resources.

In addition, the impacts are also heterogeneous across sectors. Financially constrained firms in basic industries, i.e., manufacturing businesses, are less likely to scale up their labour force after two years. The coefficients of two-period-lagged rejection and discouragement are significantly negative in the sub-sample of manufacturing industries but insignificant in other sub-samples. It suggests that manufacturing firms suffer more from financial constraints. Their employment size is constrained while the turnover growth is indifferent compared to unconstrained businesses.

5.4.3. Growth expectation revision

This section studies formation of growth expectation in small businesses. As shown above, growth expectation is used to measure growth opportunities from firms' perspectives since it shows managers' self-evaluation on their growth opportunities. Firms' perceived growth opportunities impact the financing and investing decisions, and thus affect the funding gap's size as well as the realized growth. In the meantime, it is well acknowledged in the literature that the formation of growth expectation is affected by past growth outcome and bounded by the perceived funding gap. Thus, the formation of growth expectation is tested in relation to past growth, prior growth expectation and perception of the funding gap.

Two main models are examined to understand this relationship. The first one is a bivariate probit model of growth expectation and financial constraint perception, in which both growth expectation and financial constraint perception are binary variables. The second model is a simultaneous model of growth expectation adjustment and financial constraint

perception regressions, in which the first regression is an ordered probit model and the second regression is a probit model. The results of these two models are presented in Table 11 and Table 12, respectively.

In the first model where growth expectation is examined, it is shown from Table 11 that firms that realized growth or aimed to grow are more likely to expect growth in future. The coefficients of past growth are significant across all models for both turnover and employment. The impacts of past growth are higher in the case of turnover, compared to the case of employment. The likelihoods of growth expectation in growing firms are 15.1 p.p. higher than in non-growing firms in the regression of turnover, and this number is 6.8 p.p. in the regression of employment.

[Insert Table 11 here]

The expectation trajectory helps explain subsequent growth expectation, which means that firms expected growth in the past are more likely to expect growth. It is shown that the coefficients of previous expectation are significant in both models of turnover and employment. The marginal effects in the regression of turnover and employment are relatively similar, 13.3 p.p. in the case of turnover, and 15.8 p.p. in the case of employment. Overall, these findings point to the argument that for turnover, both past performance and previous expectation equally affect growth expectation in the next year, while for employment, the prior expectation plays a more important role than the past performance in forming subsequent growth expectation. This implies that compared to employment, turnover is more responsive to its previous performance. It also supports the argument that turnover is less sticky than employment.

Furthermore, the results also illustrate significant impacts of expectation error (i.e., underestimate and overestimate) on growth expectation, but the directions are contrasted to the hypothesized signs. Indeed, firms that overestimated their growth prospects (i.e., expected turnover growth in previous year but unable to grow turnover) are more likely to expect turnover growth in the next period. Meanwhile, firms that underestimated their growth outcome (i.e., did not expect turnover growth but managed to grow turnover) are less likely to expect growth, but the coefficients are insignificant across all models of turnover. This suggests turnover growth expectation has positive momentum. It means that compared to those firms who do not have expectation errors, over-expected firms are more likely to expect turnover growth, but under-expected firms are not less likely to expect growth. A similar result is found for employment growth, apart from the coefficients

of under-estimate is significant and negative across all models. The results, thus, confirm the role of persistence in growth expectation. As such, firms aiming to grow their business are more likely to persist in scaling up their businesses, regardless of expectation error.

Next, results of the regression of growth expectation adjustment on expectation errors, perceived constraints and other controls are reported in Table 12. Growth expectation adjustment is defined as whether growth expectation is different from prior growth expectation. Both coefficients and marginal effects for this regression are reported in Table 12. Across all three models for both turnover and employment, the coefficients of expectation error (i.e., underestimate and overestimate) are statistically and economically significant. Panel A of Table 12 indicates that firms that under-estimated their growth are more likely to upwardly adjust their posterior expectation while firms that over-estimated their growth are less likely to upwardly revise their expectation. The impacts of expectation error on expectation revision are stronger for turnover than for employment. It is shown that compared to no-error firms, underestimated firms are about 45.0 p.p. and 33.0 p.p. more likely to upwardly revise their expectation of turnover and employment, respectively. When comparing between over-estimated firms and no-error firms, this difference is much smaller, namely 21.9 p.p. and 24.7 p.p. for turnover and employment, respectively. It suggests that error by under-expectation has a stronger impact on expectation revision, compared to over-expected error. This result, in general, supports the hypothesis of learning model of expectation, in which expectation adjustment responds to prior expectation error.

[Insert Table 12 here]

Overall, the results from Panels A of Table 11 and Table 12 support not only the importance of persistence of growth expectation but also the role of expectation error in the learning process of forming growth expectation. Firstly, growth expectation has a strong momentum, particularly for employment. It means that firms that expected growth in the past are more likely to expect growth in the next period. It implies that growth expectation is persistent, and it drives the direction of growth expectation in the future. Secondly, growth expectation revision adjusts for its previous error. Firms that underestimated growth are more likely to increase their expectation. It indicates that firms learn from their errors to form expectation in the future. As such, the empirical results imply that both learning process and growth expectation persistence existing in the process of forming growth expectation.

5.4.4. Revision of perceived financial constraint

In this section, determinants of perceived financial constraint as well as its impacts on growth expectation are examined. The reverse causality issue is one of the main discussions in research on the relationship between expected growth and perceived constraint. On the one hand, the argument relating to the causal role of perceived constraint on expected growth suggests that firms that perceive constraints to achieving their objectives are less likely to expect growth. On the other hand, the literature also considers the causal relationship going from expected growth to perceived constraints. In other words, firms only realize constraints if they aim to grow. Hence, this chapter will consider the reverse causality issue in the relationship between growth expectation and perception of financial constraint by using a bivariate probit model.

As shown in Table 11, one-year lagged values of both variables of growth expectation and financial constraint perception are included in the simultaneous probit model. The results in Panel A confirm the proposed hypothesis 3. Firms that perceived financial constraints in the past are less likely to expect growth in the next year, shown by the significantly negative coefficients of perceived financial constraints at time $t-1$. The results are consistent across models of both turnover and employment.

Additionally, hypothesis 2 on the relationship between actual constraint and perceived constraint is confirmed by the results in panel B of Table 11. It is shown that compared to successful borrowers, rejected and discouraged firms have a higher likelihood of perceiving financial constraints. The coefficients of these two types are significantly positive. Noticeably, the coefficients of rejected firms are higher than discouraged firms. This implies that compared to those that self-rationed themselves, firms that applied and received a rejection perceive that they are more financially constrained. While discouraged businesses perceive a high financial constraint barrier, their perception is less likely to change if they do not receive more feedback and/or information from the market. Meanwhile, rejected businesses initially perceive a lower financial constraint probability, but a turn down has informed them that their perception is not the same as the supplier side. In other words, there is an error in their expectation of successful likelihood. As a result, firms need to adjust their expectation to take the errors into account. Accordingly, new information requires firms to revise their perception of financial constraint and thus, leads to a lower probability of approval, i.e., a higher perception of a funding gap. Since the information is just provided in the last year, their updating process

can be more recent than those of discouraged firms. Thus, their perceived financial constraints are more severe than those of discouraged firms.

5.4.5. Summary of all findings

In general, this section presents the results from the LSBS in testing the proposed hypotheses. A summary of these results is shown in Figures 7A and 7B. The first hypotheses on the impacts of discouraged borrowing and credit rationing on growth are confirmed. Both types of funding gap significantly affect realized growth, but in different ways. Figure 7A summarizes the negative impacts of discouraged borrowers and credit rationing on employment growth. Compared to successful applicants, self-rationed and rejected businesses have a lower chance of scaling up their labour force.

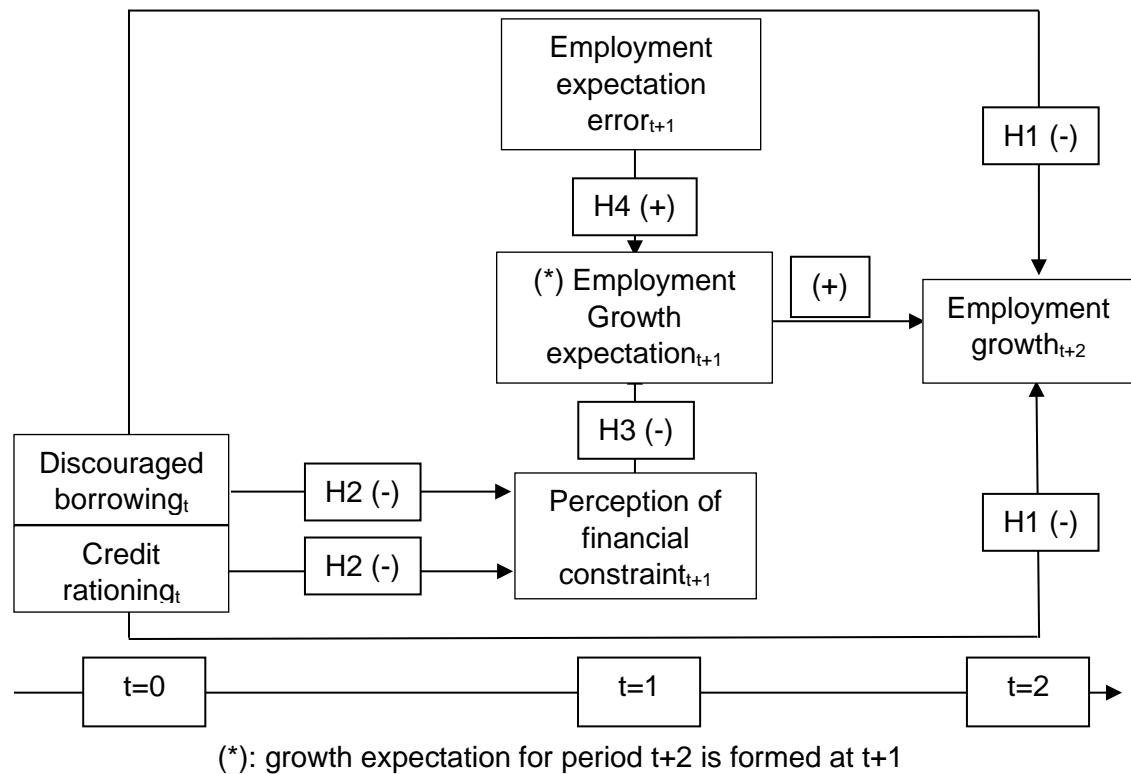
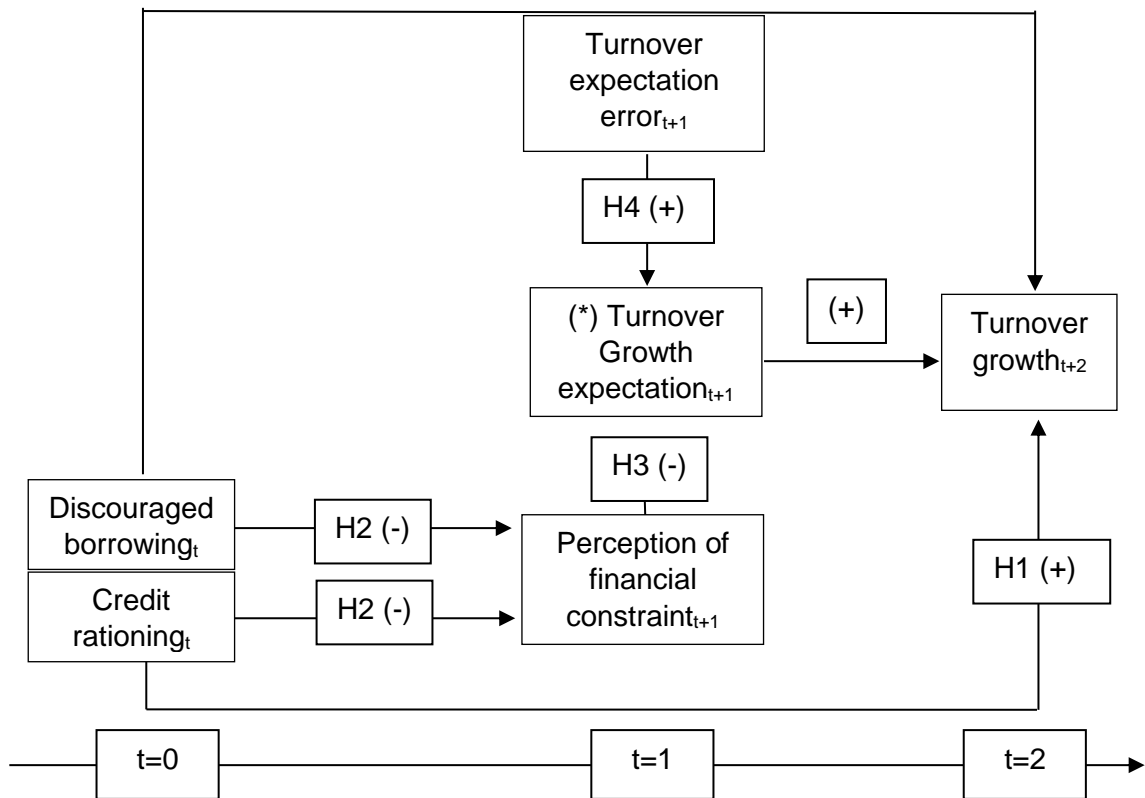


Figure 7A: Employment - Financial constraints, growth and growth expectation

Regarding turnover growth, discouraged firms are no different than successful firms but rejected firms manage to grow sales two years after the funding gap relative to successful firms, as depicted in Figure 7B. This result suggests that credit-rationing significantly increases turnover, regardless of a smaller labour force. It implies that credit-rationed firms became more productive, but this effect was not found in self-rationed firms.

The second hypothesis predicts that financial constraint perception reflects past experience on discouraged borrowing and rejection in the previous year. The results confirm this hypothesis, as shown in Figures 7A and 7B. Discouraged borrowing and credit rationing worsen the perception of financial constraints. In addition, the impact of credit rationing is stronger than that of discouraged borrowing.

The third and fourth hypotheses focus on the formation of growth expectation. Hypothesis 3 illustrates the role on perception of financial constraints on growth expectation, as illustrated in Figures 7A and 7B. The results support this hypothesis because firms that perceived financial constraints in the previous period have a lower growth expectation in the following period.



(*): growth expectation for period t+2 is formed at t+1

Figure 7B: Turnover - Financial constraints, growth and growth expectation

Hypothesis 4 proposes that growth outcome provides useful information for revising growth expectation for the next period. Although the results from the growth expectation do not show the role of learning, the results from the growth expectation adjustment show

that upwardly (downwardly) revise their expectation if they under-estimate (over-estimate) it. Thus, the results support the learning process, but it is also shown that growth expectation is persistent. Figures 7A and 7B show that growth expectation is persistent since firms expected growth in the past and/or over-estimated growth are still more likely to expect growth. However, Figure 8 shows that firms under-estimated growth are more likely to upwardly adjust their expectation, hence growth expectation revision adjusts for its previous expectation error.

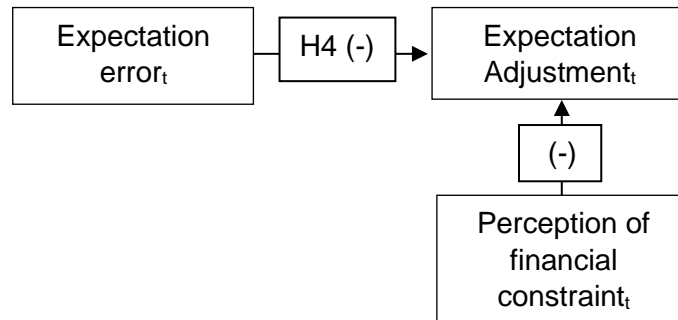


Figure 8: Growth expectation adjustment & expectation error

Moreover, the confirmation of hypotheses two and three suggests an indirect channel of firms' perception through which the impacts of discouraged borrowing and credit rationing on growth are intensified and prolonged. As seen from Figures 7A and 7B, discouraged borrowing and credit rationing increase the perceived financial constraints, which in turn impede growth expectation. As growth expectation is positively associated with growth outcome, a reduction in growth expectation subsequently hinder growth outcome in the future. As such, growth expectation and perception of financial constraints transmit the indirect impact of discouraged borrowing and credit rationing on growth in the future.

5.5. Discussion

This chapter provides empirical evidence to the model of direct and indirect impacts of financial constraints on firm growth, which is developed in Chapter III. The indirect impacts are mediated by perception of funding gap and growth expectation. While both discouraged borrowing and credit rationing constrain employment growth, the self-rationing decision does not have significant impact on turnover growth but the supply-side rationing decision increases turnover growth probability after two years. It thus suggests that bricolage exists in rejected firms but not in discouraged firms.

Furthermore, firms' perceptions intensify and prolong the impacts of these two types of financial constraints on growth. The empirical evidence shows that discouraged borrowing and credit rationing have negative impacts of perception of financial constraints. Firms that perceived financial constraints are less likely to expect growth, which in turn reduce growth probability. Hence, the results support the indirect channel through which the impacts of discouraged borrowing and credit rationing on growth are prolonged and intensified. It also implies that firms' perception is important in understanding the impacts of finance on small business growth.

Discouraged borrowing and credit-rationing funding gap as inhibitors or enablers for growth?

The findings in this chapter extend the literature on financial constraint by disentangling the effects of the funding gaps caused by supply-side market failure (i.e., credit-rationing) and demand-side market failure (i.e., discouraged borrowing). Discouraged borrowing has been the subject of increased attention recently in the literature on financial constraints. However, often in the literature, the funding gap caused by discouraged borrowing is aggregated with the credit-rationing-driven funding gap. This assumes that two types of funding gap cause similar consequences on firm growth. This chapter challenges this assumption by showing that discouraged borrowing and credit-rationing have different impacts on turnover and employment growth. It shows that both discouraged borrowing and credit rationing have lagged negative effects employment growth, but credit rationing improves turnover performance. As such, it suggests that self-rationing due to asymmetric information inhibits performance whilst supply-driven funding gap enables performance.

The negative effect of discouragement supports Carpenter and Peterson (2002)'s model on the inhibiting impacts of financial constraints on small firm growth (Carpenter and Guariglia, 2008; Carpenter and Petersen, 2002; Rahaman, 2011). In addition, it also contributes the literature on discouraged borrowing by presenting its severe consequences on firm growth. Empirical evidence shows that discouraged borrowing leads to a funding gap that constrains firms from scaling up their labour force. Because of this funding gap, financially constrained businesses may choose to reduce fixed costs by avoiding hiring more employees. As a result, discouraged firms have lower employment growth, compared to unconstrained firms.

Furthermore, this result also contributes to studies on the transmissions of a shock in the financial market on the real economy (Chodorow-Reich, 2014; Acharya *et al.*, 2018; Popov and Rocholl, 2018; Degryse *et al.*, 2019). Balance sheets are the main channel that transmits a credit shock in the financial market (e.g., a change in the regulation that increases bank's capital requirement) to a capital shock in the economy. Banks that were affected by the change may choose to ration their lending to reduce risky assets in their balance sheet (Gropp *et al.*, 2019). Accordingly, a negative shock in the financial market transmits to firms' activities because a reduction of firms' external finance widens the funding gap if firms are unable to find alternative sources. Chodorow-Reich (2014) found that following the collapse of Lehman Brothers, firms that borrowed from less healthy lenders saw employment shortfalls, and this effect is stronger in small firms. By showing the severe consequences of discouragement on firm growth, this chapter proposes that discouraged borrowing is an additional channel that amplifies the effect of financial shocks on firms' real activities.

Following a negative shock in the financial market, firms' perceived rejection likelihood increases. This leads to a higher degree of self-rationing behaviour. Popov (2016) shows that an increase in interest rate leads to higher degrees of credit rationing and discouraged borrowing in the financial market. As found in this chapter, discouraged borrowing reduces employment growth. As such, a negative shock in the financial market or a reduction in financial supply leads to further reduction in the labour market. Hence, this chapter suggests discouragement as an additional channel that transmits a reduction in financial supply to employment growth.

In contrast, the results on credit rationing provide evidence for the enabling role of financial constraints. It is shown that even though rejected firms achieve higher turnover growth, they have a lower employment growth, compared to successful applicants. It suggests that rejected firms become more efficient in utilizing their current capacity of employees. This may imply that they were over-invested in their labour force, and the financially constrained situation pushed them to optimize their capacity. This result can be explained by bricolage and financial slack. Firstly, the literature on bricolage argues that financial constraints require firms to use available resources in a creative way (Baker and Nelson, 2005). Firms are pushed to find new use of existing resources. Bricoleurs have to look beyond the constrained plans and adapt their business to the current level of financial capital. In addition to find new use of current resource, they may adjust their

business model in order to leverage current capacity and free more resources. As such, financial constraint fosters creativity and innovation and improves performance eventually.

Secondly, it supports the negative view of slack resources on firm growth. Slack can be seen as inefficient resource, and financial constraints force firms to optimally employ their current level of resource (Tan and Peng, 2003; Mishina *et al.*, 2004). They may previously invest in inefficient projects and operate at sub-optimal productivity level. Lemmon and Roberts (2010) found that a reduction in the supply of external finance results in improvements in the performance of below-investment-grade firms. They suggested that firms may be over-invested into unprofitable projects, and thus, financial constraints increase firm performance by improving efficiency. This study supports this argument by showing that rejected firms become more productive after the rejection. The lagged effect of credit-rationing strengthens this argument as the effect does not occur immediately, but instead, involves a process of the business adjustment in order to cut their inefficient investments.

This study uses a direct measurement to measure financial constraints by using survey-based data. It provides empirical evidence to the literature on financial constraints by establishing a link between market failure in the financial market and firm performance using direct measurement (Moscalu *et al.*, 2020). Studies on this topic often use indirect methods to capture the impact of market failure on firm performance, but the validity and applicability of these indirect measurements are still discussed. In addition, these indices fail to separate the individual effects of supply-driven and demand-driven funding gaps due to market failure. Hence, this study offers a direct method to capture these two types of funding gap that disentangles the effects of discouragement and rejection on firm growth.

Overall, the results show that discouraged borrowing and credit rationing have different effects on turnover and employment growth. While the self-rationing supports the literature on financial constraint in the small business context, the credit-rationing supports the role of bricolage and the negative view on. Although both types of funding gaps lead to a reduction in employment growth, they have different impacts in turnover growth. Relatedly, by aggregating these two types of funding gap, research may fail to realize significant consequences of market failure on growth.

Indirect effects of financial constraints on growth

As shown in the data analysis section, both credit-rationing and discouraged borrowing worsen the perception of financial constraints. Also, the effect of rejection is stronger than of discouragement. This result supports that firms learn from their experience to form their perceptions in the context of access to financial markets.

Importantly, the empirical results demonstrate the impacts of perceived constraints on growth expectations. Both the theory of planned behaviour (TPB) and the entrepreneurial-event perspective (EE) argue that the perception of control over resources positively affects growth intention. In other words, growth expectation is bounded by the perception of financial resources, which is confirmed by the evidence in this chapter. Hence, this chapter supports the role of perceived feasibility on growth expectation as proposed by the TPB and the EE.

Therefore, this chapter provides empirical evidence to the indirect channel proposed in Chapter III by showing that growth expectation and perception of financial constraints form the indirect channel through which the impacts of discouraged borrowing and credit rationing on growth are prolonged and intensified. These two types of funding gaps worsen the perception of financial constraints, which in turn reduces the growth expectation. The results also show that growth expectation is positively associated with growth outcome, reduction in growth expectation subsequently lowers the outcome likelihood. As such, this study highlights that the effects of discouraged borrowing and credit rationing on growth are prolonged and intensified in the future. Hence, it contributes to the literature on small business growth by providing empirical evidence for this indirect channel.

This chapter also extends the model of Wiklund and Shepherd (2003) by introducing the perception of financial constraints into their model of growth intention, financial constraints and growth outcome. In their paper, actual control over resources (i.e., experience of financial constraints) moderates the relationship between growth expectation and growth realization, but perceived control over resources was not considered in their model. This chapter completes their model by introducing perception of financial constraints into their model and showing its impact on growth expectation.

Growth expectation formation learns from its prior errors or being persistent?

The discussion about the interrelated relationship between expected growth and realized growth suggests that growth expectation underlies firms' efforts to realize growth outcomes which in turn reinforces subsequent growth expectation. This study contributes

to the conversation on the relationship between growth and growth expectation as well as the conversation on entrepreneurial learning by making following points.

Firstly, this chapter contributes the literature on small business growth by showing that growth expectation formation does reflect on prior expectation error, i.e., the gap between prior expectation and realized outcome, after controlling for prior growth expectation and growth outcome (Wiklund and Shepherd, 2003; Delmar and Wiklund, 2008). Delmar and Wiklund (2008) and Wiklund and Shepherd (2003) also examine the interrelated relationship between growth intention and growth outcome. They show that intended growth sets a path for realized growth and growth provides feedbacks to prior intentions. In this study, the feedback role of growth experience is considered as the difference between growth and prior growth expectation (i.e., expectation error), rather than the growth outcome itself.

The expectation error contains valuable information. A significant difference between expectation and outcome may reveal firms' cognition error or their abilities to respond to uncertainties. The results depicted in Figure 7 show that firms that under-estimated growth are more likely to upwardly revise their expectation, compared to those have an accurate expectation, and firms that over-estimated are less likely to upwardly revise their expectation, compared to those have an accurate expectation. As such, prior expectation errors have significant impacts on expectation revision, after controlling for realized growth and previous expectation. As such, it extends the theoretical framework of Wiklund and Shepherd (2003) by considering the feedback loop as the relative difference between expected growth and realized growth.

Importantly, the findings support the role of entrepreneurial learning from experience in the process of forming expectations. Evidence from this study shows that although growth expectation is persistent and biased towards prior belief of growth intention, experiential learning also exists. Growth expectation adjustment responds to their experience of realized growth. Perception of financial constraints is also revised based on experience of financial constraints. The literature on learning from failure emphasizes the positive role of failure as a trigger for reassessment and expansion of opportunity search (Minniti and Bygrave, 2001; Cope, 2011). Politis (2005) model suggests that outcome of an event is a factor affecting the transformation of experience into knowledge. A failure provides an opportunity to learn about what did not work and why, and eventually reduce uncertainties. A failure counters the path-dependent trajectory and facilitates the search

for new opportunities. By challenging those approaches that were successful in the past but now failed, the error provides new information to entrepreneurs' knowledge. In this study, expectation error acts as a critical event that firms can learn from because realized outcome did not confirm entrepreneurs' prior expectation. The results reported in Section 5.4.3. suggest that although firms that aimed to grow are still expecting growth, they downwardly revise their growth expectation if they realized that they over-estimated in the previous period. As such, expectation error provides valuable information in updating firms' perception. This supports Fraser and Greene (2006) who proposed that optimism diminishes with experience because of the existence of the learning process.

Moreover, it suggests that growth is not a random walk (Coad *et al.*, 2013; 2016). Some studies argue that if entrepreneurial learning takes place, it should be reflected in improved performance. However, the learning process may not become effective if the context does not repeat itself. They argue that growth is stochastic, i.e., its outcome is not explained by firms' characteristics, and thus learning does not play a significant role in predicting growth. In addition, the situation where learning takes place is changing quickly, and thus, knowledge generated from learning does not apply to the new context. As such, they suggest that entrepreneurial learning may not happen, and even if it exists, it does not lead to performance improvement. In this study, the learning process is looked at from the angle of expectation adjustment in relation to prior expectation and outcome. By showing that firms look at the actual performance and reflect on their prior expectation errors, it confirms that firms learn from their errors and revise their expectations. It implies that the learning process takes place and transforms experience into knowledge that will be used to improve business performance.

The results also suggests that growth is predictable, rather than being an unpredictable process. Indeed, the results also show that firms that expected growth are more likely to grow. As shown in the data analysis section of this chapter, growth expectations increase the likelihood of growth. A lack of financial resources also impacts firm performance, implying that resources and management play important roles in explaining growth in small business.

5.6. Conclusion

Overall, this chapter provides empirical evidence to the framework on the direct and indirect impacts of financial constraints on growth. Regarding the direct impacts, both credit-rationing and discouraged borrowing result in lower employment growth, but they

have different effects on turnover growth. After two years following a rejection and/or discouragement event, both types of financial constraint cause a funding gap that hinders firms from scaling their labour force. It means that financial-market failure causes a negative adjustment in employment in the long term. This implies a critical consequence of financial friction on the economy because market failure in the financial market causes a reduction in the labour market in the long term.

However, the direct impacts on turnover growth are different. Rejected firms manage to increase sales growth in the two years following rejection although employment does not change. In contrast, discouraged firms experience the same growth outcome as successful firms. Hence, the direct impacts of credit rationing and discouraged borrowing on growth are distinctive. This result supports the role of bricolage in credit-rationed firms when these firms manage to overcome the issues of financial shortage and obtain financial gains. However, bricolage does not play an important role in discouraged firms.

Moreover, firms' perception plays an important role in channelling the indirect effects of actual financial constraints on growth. Growth expectation and perception of constraints act as mediators in channelling the indirect effects of funding gaps on growth. This study provides insights into the process of forming entrepreneurs' growth expectations. It shows that growth expectations are bounded by perceived funding gaps, which in turn are affected by actual funding gaps. Also, growth expectations drive growth outcomes. Accordingly, the impacts of credit rationing and discouraged borrowing are prolonged and intensified because of their impacts on the perception of funding gaps and growth expectations.

Last but not least, this model also highlights the importance of entrepreneurial perception in the relationship between small business finance and growth. This study thus extends the literature on the role of entrepreneurial cognition on finance and growth (Fraser *et al.*, 2015). The growth of small businesses depends not only on growth intentions but also on the perceptions of constraints. Firstly, perceived funding gaps impose a limit on growth expectations, which subsequently set a limit on growth outcomes. Hence, a severe perception of funding gaps indirectly reduces growth prospects. Secondly, discouraged borrowing, which is caused by asymmetric information, reflects firms' perception of market friction. This borrowing decision directly leads to a reduction in employment growth as well as indirectly reduce growth in the future. These two points emphasize the consequence of firms' perceptions of funding gap on their growth in the future.

This study has two main drawbacks. Firstly, it does not provide a theoretical foundation for the differences between discouraged borrowing and credit rationing in their impacts on growth. While bricolage exists in rejected firms, it does not appear to be important in discouraged firms. It may suggest that there are differences in the mechanisms that are needed for bricolage. It may also be due to differences in the cognition of discouraged firms and credit-rationed firms. Even though discouragement is rooted in asymmetric information, it also reflects firms' perception about market friction. Accordingly, firms' cognition may prevent them from practicing bricolage. Another potential explanation for the differences between them is studying the impacts of optimism and pessimism on firm performance. Credit-rationing can be seen as firms' optimistic behaviour rather than market failure whilst discouraged borrowing can be seen as firms' pessimistic behaviour. As such, these two types of funding gaps highlight the cognition mechanism underlining their behaviour rather than purely presenting market failure.

Secondly, it only uses survey-based data to measure the funding gap, growth expectation and growth outcome, and it may be biased by firms' perspectives. Thus, future research can examine the mechanisms leading to differences between discouraged borrowers and rejected businesses. Further studies are also needed to compare results from survey-based data and other indices from financial constraints and growth opportunities.

The results have important implications for practitioners. Firstly, rejected firms may consider adjusting their business plan to reflect the size of the funding gap. The results from this study show that credit-rationed firms, on average, manage to grow their turnover in the future without increasing labour costs. Hence, it may imply that firms that are financially rationed by the market can overcome their constraints by not only saving costs but also, for example, by changing their business model. Secondly, cognition bias may impose a limit on long-term growth. That is to say firms that misperceive a funding gap but actually do not have a funding gap may unnecessarily have a low-growth expectation which results in a low-growth perspective. Thus, firms should often collect more information and revise their perception to reduce the bias.

Policy making which aims to boost growth and remove barriers to growth should pay attention not only to improving market efficiency in the financial market, but also to promote firms' growth intention and their perception of market friction. Both types of funding gap reduce the labour force in the long term, and thus, policy targeting improved efficiency in financial markets is necessary for promoting growth in those businesses with

growth intention. Advice and business support is critical in leveraging growth intention, as a proportion of small businesses do not have growth intention. Promoting business intention in these businesses will also improve small firm growth prospects. For example, regional Local enterprise partnerships can reach out to businesses in their regions and provide support to leverage growth intention.

CHAPTER VI: CONCLUSION

This thesis addresses the funding gap caused by discouraged borrowing by looking into its relationship with credit-rationing and its consequences on growth. The literature on informational asymmetry in financial market has focused on the supply-side market failure, particularly regarding the determinants and consequences of credit rationing. This study, instead, examines the demand side of market failure, i.e., self-rationing decisions due to asymmetric information. Firstly, the Bayesian learning model suggests that self-rationing decisions are dependent on firms' perception of rejection which in turn is affected by their experience of credit-rationing. Banks' decisions on firms' creditworthiness contain valuable information for the learning process and thus, are incorporated into the process of revising perceptions. Secondly, the consequences of self-rationing and credit-rationing decisions on small-firm growth are examined. These two types of funding gap may reflect different cognition processes and affect firm growth differently. Also, as not all small businesses have growth intentions, growth intention is an important predictor of growth in small firms. Growth expectation (i.e., growth intention) is rationed by firms' perceived resources, which in turn is affected by experience of prior actual resources. As such, in addition to the direct impacts of financial constraints on growth, the impact of financial constraints on growth may be intensified through its indirect effect on growth expectations.

The theoretical model presented in Chapter III includes two main parts: 1- Learning models that explain the effect of experience on the formation of perceptions; and 2- the direct impacts of financial constraints on growth and the indirect impacts through the impacts of financial constraints on perceptions of financial constraints and growth expectation. Chapters IV and V examines the theoretical model developed in Chapter III using data on UK small and medium-sized businesses. Chapter IV provides empirical evidence on the impacts of credit rationing on discouraged borrowing behaviour and Chapter V shows the results supporting the direct and indirect impacts of discouraged borrowing and credit rationing on growth.

The learning models include three learning processes. The first learning process is the Bayesian learning model. The Bayesian model is developed to demonstrate the role of banks' lending decisions on the formation of firms' perceptions and subsequent application decisions. Discouraged borrowing decisions depend on the perceived rejection likelihood. If firms perceive a high probability of rejection, they are more likely to

self-ration themselves. Also, firms' perceptions of the rejection likelihood are updated according to the bank's lending decision. Previous rejection worsens the perception of rejection likelihood in the future while an approval relaxes the perception of credit-rationing. In addition, this Bayesian learning model proposes that firms unbiasedly revise their perception based on the outcomes of previous applications, i.e., a rejection or an approval is symmetrically incorporated into the revision process. However, this chapter also acknowledges that if confirmation bias may be present in this process, an approval (i.e., a confirmed event) is incorporated into the revision process and a rejection is ignored, which leads to a biased learning process.

Chapter IV provides support for this Bayesian learning model by testing the main hypothesis - rejected firms are more likely to become discouraged borrowers. Using the UK Longitudinal Small Business Survey 2015-2016 and the UK SME Finance Monitor 2012-2017, probit, logit and linear probability models are used to test this hypothesis and bivariate and trivariate probit models are also employed to tackle selection bias and endogeneity. The results from the LSBS suggest that credit-rationed firms are more likely to make self-rationing decisions while the FM dataset provides complementary results that rejected firms also tend to make self-rationing decisions shortly following rejection. These results imply that firms use information provided directly by their financiers in the process of making a future application decision. However, the results from both data sets show that relationship lending does not have a direct effect on discouraged borrowing behaviour. Instead, a deep banking relationship, i.e., firms using various services from their main banks, reduces the likelihood of credit rationing.

In the subsequent parts of the learning processes that are developed in the theoretical model in Chapter III, the process of forming expectations or perceptions responds to misjudgement, i.e., expectation error, in the past. The perception of funding gaps is formed based on firms' experience of actual funding gaps which is caused by discouraged borrowing or credit-rationing. Growth expectation formation takes feedback from expectation error (i.e., the gap between expectation and outcome) into account. Empirical results from the LSBS presented in Chapter V support this framework. Firstly, this chapter shows that the perception of financial constraints is worsened following experience of discouraged-borrowing or credit-rationing events and the latter type of experience has a stronger effect than the former. Secondly, growth expectation adjustments respond to the expectation error, i.e., an underestimation of growth in

previous period leads to an upward adjustment to growth expectation in the next period. However, it also shows that this learning process is dominated by the long-term component of growth expectation. The results demonstrate that firms that expected growth in the past are more likely to expect growth in the future. It means that growth expectation is persistent.

The second part of the theoretical model studies the direct and indirect consequences of discouraged borrowing and credit rationing on small business growth. The model suggests that growth can be constrained by the availability of financial resources but can also be promoted by financial shortages. The literature on financial slack and bricolage suggest that shortage of resources requires a shift in management to optimize capacity of limited resources, which leads to an improvement of growth performance in the long term (Baker and Nelson, 2005). However, the literature of financial constraints argue that financial constraints disrupt business operations and investment plans and thus, hinder growth prospects.

Empirical evidence from Chapter V supports both arguments on the impacts of financial constraints. Compared to credit rationing, the funding gap caused by discouraged borrowing has distinctive impacts, in terms of magnitude and timing. Discouraged borrowing hinders both turnover and employment growth but this effect happens only in the short term and disappears in the long term. In contrast, credit rationing inhibits employment growth but leverages turnover growth after two years of rejection. Productivity is improved after a period of time as firms manage to increase their turnover without incurring labour costs. This implies that firms may adjust their business model to adapt to the limited level of financial resources.

Finally, the model develops an indirect channel that transmits the effects of credit rationing and discouraged borrowing on growth through two mediators, namely perceived funding gaps and growth expectations. The theoretical model also explains the impact of perceived financial constraints on growth expectations. The entrepreneurial-event model and the theory of planned behaviour propose that the perceived feasibility of growth imposes a boundary on growth intentions. The severity of a perceived funding gap implies that perception of growth feasibility is relatively low and thus, imposes a cap on growth intentions. However, the model also acknowledges that reverse causality is present in the relationship between perceived constraints and growth intention, which implies that firms aim to grow their business perceive possible constraints on their objectives. Chapter

V provides empirical evidence supporting the impacts of perception of financial constraints on growth expectation. It is shown that firms that perceive financial constraints are less likely to expect growth. Therefore, the indirect channel is developed based on this effect. The evidence shows that discouraged borrowing and credit rationing worsen the perception of funding gap, which in turn reduces growth expectation in the next period and subsequently, reduces the growth outcome. Overall, both types of funding gaps have direct effects on employment and turnover growth and they also have indirect effects through their impacts on the perception of financial constraints and growth expectations.

Contributions

This thesis makes several contributions to the literatures relating to discouraged-borrowing, financial constraints, and small business growth. Firstly, the Bayesian model extends the literature on discouraged borrowing by studying firms' perceived rejection likelihood in a dynamic relationship between credit rationing and discouraged borrowing. Kon and Storey (2003) suggest that screening error is one of the main causes of this self-rationing behaviour and this screening error may come from both financiers and borrowers. This model seeks to study discouraged borrowing from the firm side. The Bayesian model explains the learning process, in terms of the perceived rejection likelihood, in borrowing decisions. It is shown in both theoretical and empirical models that credit rationing leads to a higher discouragement propensity. As such, it implies that if credit-rationing is a "correct" decision on the supply side, discouragement is an efficient mechanism in the financial market. Otherwise, the issue of market failure is exacerbated because credit-rationing decisions discourage good firms in the future.

Secondly, it contributes to the relationship-lending literature by showing that both firms and banks learn from a lending relationship (Berger and Udell, 1995; 2002). The existing literature on relationship lending has been focused on the supply side of banking relationships. Studies have shown banks accumulate information about firms' creditworthiness during the relationship as well as learn from their competitors in the market and thus, learn to differentiate good firms in a pool of borrowers. This study, instead, looks at the firm-side of relationship. It shows that firms gather information about their creditworthiness from their lenders to self-evaluate their credit-rationing propensity. The information is included in the process of revising firms' perceptions. It means that firms also learn from their lending relationship. However, the empirical evidence shows that relationship lending does not directly affect the likelihood of discouraged borrowing.

It implies that firms only gather official information from their financiers rather than accumulating all information from their lenders. Furthermore, the results support the literature on the positive role of relationship lending on credit rationing (Kysucky and Norden, 2016). The depth of the relationship reduces the likelihood of rejection, and thus, the results support the argument that banks gather information about borrowers over time.

Thirdly, it extends the literature on financial constraints by differentiating the consequences of supply-driven and demand-driven funding gaps on growth. Empirical evidence from UK small businesses shows that discouraged firms do not grow employment. Thus, it supports the literature on financial constraints which suggests that constrained firms reduce/postpone their operation and investment plans. The empirical results also demonstrate that two types of funding gap – discouraged borrowing and credit rationing – have different impacts on growth. In the longer term, credit-rationed firms see an expansion in turnover but a reduction in employment. This result supports the literature on the role of bricolage and the negative role of financial slack (Baker and Nelson, 2005). Financially constrained firms are forced to optimize their capacity and thus, improve their productivity. Creativity in utilizing and bundling limited resources is necessary to achieve growth objectives (Wright & Stigliani, 2013).

Fourthly, by showing that the impacts of funding gaps are amplified and prolonged through two mediators, namely perceived financial constraints and expected growth, this study presents the indirect effects of discouraged borrowing and credit-rationing on growth. Thus, it contributes to the literature on the consequences of financial constraints on small business growth (Carpenter and Peterson, 2002) by introducing this indirect channel. It implies that the impacts of financial constraints on small business growth are prolonged and intensified, and thus, the relationship between them are more complex.

Lastly, this study supports the critical role of entrepreneurial cognition in the relationship between finance and growth (Fraser *et al.*, 2015). Fraser *et al.* (2015) show that entrepreneurial cognition decides the needs for finance and their borrowing decisions. This study supports their framework by showing how the perception affects discouragement decisions and how it intensifies the impacts of financial constraints on growth. This study also demonstrates that firms do learn from their experience to form their expectations, and thus, this study also contributes to the literature on entrepreneurial learning (Fraser and Green, 2006; Cope, 2011; Coad *et al.*, 2013).

Limitations

The theoretical framework proposed in Chapter III has not fully addressed several issues. Firstly, differences in the consequences of discouraged borrowing and credit rationing have not been theorized. The empirical results have shown that their impacts on growth are distinctive. The decision-makers are different, even though both suffer from asymmetric information. Credit-rationing decisions reflect financiers' evaluation of their borrowers' prospects while discouraged borrowing behaviour represents firms' self-evaluation of their creditworthiness. The funding gap caused by discouragement may not only reflect firms' perception of the severity of the informational asymmetry but also act as a signal of pessimism (Dai *et al.*, 2017). As a result, its impact on firm performance may capture the impact of pessimism on growth. Credit-rationing can be seen as optimism if banks' decisions are "correct" and firms have over-estimated their chance of success. In this case, credit-rationing acts as a signal of optimism rather than purely a signal of market failure. Hence, cognition differences underlie the behaviour of discouraged borrowers and credit-rationed borrowers, and thus, may explain different impacts on firm performance of these two types of funding gaps.

Empirically, this study uses survey-based measurement which has some drawbacks. Firstly, the main measures are binary rather than showing the degree of the objects. For example, the degree of financial constraints is informative because it represents the severity of financial constraints affecting the business. Similarly, the degree of perceived constraints may affect growth expectations differently. Secondly, self-evaluating measures are possibly subjective and biased towards interviewees' views, particularly if they intentionally avoid revealing the firm's true situation. However, this study aims to understand the perception of financial constraints and growth from firm's side. Such measures provide more direct insights into their expectation than indirect measures.

Moreover, due to the limitation of the data sets used in this study, traditional measurements for relationship lending, such as length of the relationship, are not used. Instead, Chapter 4 employs two variables that represent for a switch of main bank and for relationship with big banks in the analysis of the LSBS. Hence, the conclusion on the impacts of relationship lending on discouragement is restricted to these variables. As length of relationship lending is the most commonly used proxy in the literature, the results from the LSBS dataset should be explain with caution.

Implications for practitioners

Firms should make frequent contact with their financial suppliers. Since such a strong relationship allows firms to consult their banks about firms' prospects and to gather official information to revise their perception, the learning process will converge toward an unbiased expectation. The more frequent the information collection process occurs, the quicker the convergence to an unbiased expectation. Furthermore, through a strong lending relationship, firms' financial providers accumulate information about their creditworthiness and, thus, make accurate lending decisions. As shown in Kon and Storey's (2003) model, a decrease in screening error will lower the chance of discouragement. As such, approvals from financiers encourage creditworthy firms to make applications in the future.

Firms should also consider more carefully the consequences of self-rationing decisions on performance. They should consider the impacts of their decisions on long term growth because discouragement hinders growth expectations and subsequent growth outcomes in the long term.

Following a rejection, firms should consider the size of the funding gap to plan their operation and investment activities. On average, credit-rationed firms adjust their business to optimize limited capacity and achieve turnover growth in two years. However, credit-rationed firms are less likely to grow their workforce, which would impact in the long term since any adjustments to human resources are costly due to the stickiness of human resources. Hence, changes in business plans due to rejection should consider the size of the funding gap. For example, they can overcome a moderate funding gap by reducing costs through changes in the production or management process. However, a significant funding gap may call for a change of long-term vision, e.g., a change in firm structure or reduction of growth expectations.

Implications for policymakers

Job creation is an important part in the policymaking agenda, and SMEs account for a vast majority of the economy. Thus, policy makers have been focused on boosting employment growth of small business. Discouraged borrowing and credit rationing directly impede employment growth in the short and long term. Therefore, easing financial constraints help promote the employment growth of the economy. Evidence from this study also shows that policymaking should pay attention to both the supply side and the demand side, e.g., the introduction of an information agency.

From the supply side, programmes that aim to improve access to finance are needed. The Enterprise Finance Guarantee programme managed by the British Business Bank has helped businesses secure loans from their participating lenders. Cowling and Siepel (2013) find that firms backed by this programme achieved higher sales and employment growth, and thus, justify the cost of these programmes. The British Business Bank and partner banks should further promote these schemes to raise awareness among micro, small, and medium-sized businesses (Fraser, 2014).

From the demand side, improvement of financial health improves firm performance, and thus, increases their creditworthiness from their banks' perspective. Storing and gathering creditworthy-related information in the early days of the businesses also help reduce banks' screening error. Hence, programmes that provide advice and support for making loan applications may reduce the application cost and banks' screening error. Regional Local Enterprise Partnership Growth Hubs may provide support and advice to local businesses regarding improving their financial health and collecting necessary information for credit evaluation as well as preparation of financial applications.

Importantly, policymakers should act on facilitating information exchange between suppliers and borrowers and help reduce the cost of transferring information. Information aggregation allows lenders to learn about borrowers' behaviour and differentiate firms' creditworthiness. Some studies show that sharing credit information between financiers reduce adverse selection and moral hazard (Dierkes *et al.*, 2013). Sharing information may lower the profitability of current lenders because it reduces their bargaining power in a position of informational advantage. However, information transfer can act as a monitoring tool to incentivize borrowers to perform better (Padilla and Pagano, 2000), and thus, lenders' profitability is leveraged. Moreover, information transfer may improve discouragement by reducing screening errors and application costs (although studies have not examined the effects of information sharing on discouragement). Credit-reference agencies (e.g., Dun & Bradstreet, Equifax) can play a role in facilitating smoother and less costly information transfer between firms and banks. They can share credit information between existing lenders and potential lenders, subject to the agreement of borrowers, and hence, reduce application costs and switching costs. Another initiative, for example, Open Banking, that gathers and stores credit and transaction information of micro, small business would be beneficial for firms since it can

reduce the financial costs of an application and banks can request access to these records if agreed by firms.

Nevertheless, improving small business growth also requires intervention targeted at the demand side. Because a small proportion of small firms have growth intention, and discouragement behaviour also reflects firms' perception of financial markets. Thus, initiatives that aim to develop the small business community, such as Local Growth Hub, should be further supported and promoted in order to have a wider reach to local communities of small business. A strong ecosystem combined with a centralized hub as a one-stop advice centre would be convenient and cost-saving for small business. For example, there are some concerns over the closure of bank branches and its impact on the access of local community to financial services and development. It raises the opinion that the government should maintain a supportive ecosystem, particularly in less developed neighbourhoods. Bank closure leads to an increase in physical distance and information distance between firms and banks and thus, increase application costs for micro and small firms significantly and decrease the information flow between banks and firms. This may result in a decline in the use of small-business finance, particularly due to increased discouragement behaviour.

Besides alleviating financial constraints for small business, government initiatives that directly support the demand side are critical in pushing firms to overcome shortages of financial resources and promote growth intention. Government agencies can provide necessary support to help firms adjust their business to fit the current level of resources, e.g., advice for process improvement. Small business may have unused capacity that can be transformed for efficient use and thus, they may need support to unlock their capacity, e.g., improving management skills.

Implications for future research

As mentioned in the Limitation section above, the differences in the consequences between discouragement and credit rationing have not been studied in detail. Future studies could develop a theoretical model to understand the differences in the impact on growth. One possible direction could be the difference in the cognition behind these decisions. Moreover, even though the results support the positive role of credit-rationing on productivity, this study does not examine the mechanism behind this. For example, the process of improving productivity or changing the business model or process should be further studied.

Future research can also study discouraged borrowing in a different context and compare the difference between developed and developing economies since they may have different ecosystems supporting entrepreneurs and small-business finance. Heterogeneity in the learning process across various factors, e.g., size, age, the macroeconomic environment may also be of interest. This study also shows how banks' decisions involve in the learning process of perceived rejection likelihood and subsequent borrowing decision. Future studies should examine how the information from other stakeholders involves in the learning process. For example, how the information gathered from other banks or financial market players incorporated into the learning process of perception of creditworthiness. Another example is how the advice and business support on access to external finance helps inform the expectation of rejection likelihood.

Future research should also look into heterogeneity of financial constraints. For example, a moderate funding gap might not constrain firms from increasing labour force, but a severe funding gap might hinder firms from hiring more employees. Since this study uses qualitative data, it is unable to examine heterogeneity in the effects of financial constraints on growth. Further research can compare the results from survey-based data with objective data, e.g., financial statement-based data or propensity matching techniques in order to validate survey-based measures of financial constraints.

REFERENCES

- Acharya, V.V., Eisert, T., Eufinger, C. and Hirsch, C., 2018. Real effects of the sovereign debt crisis in Europe: Evidence from syndicated loans. *The Review of Financial Studies*, 31(8), pp.2855-2896.
- Acharya, V. and Xu, Z., 2017. Financial dependence and innovation: The case of public versus private firms. *Journal of Financial Economics*, 124(2), pp.223-243.
- Adam, K., Marcet, A. and Beutel, J., 2017. Stock price booms and expected capital gains. *American Economic Review*, 107(8), pp.2352-2408.
- Aghion, P., Angeletos, G.M., Banerjee, A. and Manova, K., 2010. Volatility and growth: Credit constraints and the composition of investment. *Journal of Monetary Economics*, 57(3), pp.246-265.
- Aghion, P., Fally, T. and Scarpetta, S., 2007. Credit constraints as a barrier to the entry and post-entry growth of firms. *Economic policy*, 22(52), pp.732-779.
- Ajzen, I., 1991. The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), pp.179-211.
- Allen, L., DeLong, G. and Saunders, A., 2004. Issues in the credit risk modeling of retail markets. *Journal of Banking & Finance*, 28(4), pp.727-752.
- Baker, T., 2007. Resources in play: Bricolage in the Toy Store (y). *Journal of business venturing*, 22(5), pp.694-711.
- Baker, T. and Nelson, R.E., 2005. Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative science quarterly*, 50(3), pp.329-366.
- Bank of England, 2020. Credit conditions survey – 2019 Q4.
- Bank of England, 2020. Open data for SME Finance: What we proposed and what we have learnt.
- Bartoli, F., Ferri, G., Murro, P. and Rotondi, Z., 2013. SME financing and the choice of lending technology in Italy: Complementarity or substitutability?. *Journal of Banking & Finance*, 37(12), pp.5476-5485.
- Beck, T., Demirgüç-Kunt, A. and Levine, R., 2003. Law, endowments, and finance. *Journal of financial Economics*, 70(2), pp.137-181.

- Beck, T., Demirgüç-Kunt, A. and Maksimovic, V., 2005. Financial and legal constraints to growth: does firm size matter?. *The journal of finance*, 60(1), pp.137-177.
- Beck, T., Demirgüç-Kunt, A. and Maksimovic, V., 2008. Financing patterns around the world: Are small firms different?. *Journal of financial economics*, 89(3), pp.467-487.
- Behr, P., Norden, L. and Noth, F., 2013. Financial constraints of private firms and bank lending behavior. *Journal of banking & finance*, 37(9), pp.3472-3485.
- Berger, A.N. and Black, L.K., 2011. Bank size, lending technologies, and small business finance. *Journal of Banking & Finance*, 35(3), pp.724-735.
- Berger, A.N., Cowan, A.M. and Frame, W.S., 2011. The surprising use of credit scoring in small business lending by community banks and the attendant effects on credit availability, risk, and profitability. *Journal of Financial Services Research*, 39(1-2), pp.1-17.
- Berger, A.N., Molyneux, P. and Wilson, J.O., 2020. Banks and the real economy: An assessment of the research. *Journal of Corporate Finance*, 62, p.101513.
- Berger, A.N. and Udell, G.F., 2002. Small business credit availability and relationship lending: The importance of bank organisational structure. *The economic journal*, 112(477), pp.F32-F53.
- Berger, J.O., 1985. Prior information and subjective probability. In *Statistical Decision Theory and Bayesian Analysis*, pp. 74-117. Springer, New York, NY.
- Bharath, S.T., Dahiya, S., Saunders, A. and Srinivasan, A., 2011. Lending relationships and loan contract terms. *The Review of Financial Studies*, 24(4), pp.1141-1203.
- Bradley, S.W., Wiklund, J. and Shepherd, D.A., 2011. Swinging a double-edged sword: The effect of slack on entrepreneurial management and growth. *Journal of business venturing*, 26(5), pp.537-554.
- Brick, I.E. and Palia, D., 2007. Evidence of jointness in the terms of relationship lending. *Journal of Financial Intermediation*, 16(3), pp.452-476.
- British Business Bank, 2020. Small Business Finance Markets 2019/2020.
- Ziegler, T., Shneor, R., Wenzlaff, K., Suresh, K., Paes, F.F.D.C., Mammadova, L., Wanga, C., Kekre, N., Mutinda, S., Wang, B. and Closs, C.L., 2021. The 2nd Global Alternative Finance Market Benchmarking Report.

Campello, M., Graham, J.R. and Harvey, C.R., 2010. The real effects of financial constraints: Evidence from a financial crisis. *Journal of financial Economics*, 97(3), pp.470-487.

Canton, E., Grilo, I., Monteagudo, J. and Van der Zwan, P., 2013. Perceived credit constraints in the European Union. *Small Business Economics*, 41(3), pp.701-715.

Carpenter, R.E. and Guariglia, A., 2008. Cash flow, investment, and investment opportunities: New tests using UK panel data. *Journal of Banking & Finance*, 32(9), pp.1894-1906.

Carpenter, R.E. and Petersen, B.C., 2002. Is the growth of small firms constrained by internal finance?. *Review of Economics and statistics*, 84(2), pp.298-309.

Carter, S., Shaw, E., Lam, W. and Wilson, F., 2007. Gender, entrepreneurship, and bank lending: The criteria and processes used by bank loan officers in assessing applications. *Entrepreneurship theory and practice*, 31(3), pp.427-444.

Cassar, G., 2007. Money, money, money? A longitudinal investigation of entrepreneur career reasons, growth preferences and achieved growth. *Entrepreneurship and regional development*, 19(1), pp.89-107.

Chakravarty, S. and Xiang, M., 2013. The international evidence on discouraged small businesses. *Journal of Empirical Finance*.

Chakravarty, S. and Yilmazer, T., 2009. A multistage model of loans and the role of relationships. *Financial Management*, 38(4), pp.781-816.

Chen, H.J. and Chen, S.J., 2012. Investment-cash flow sensitivity cannot be a good measure of financial constraints: Evidence from the time series. *Journal of Financial Economics*, 103(2), pp.393-410.

Chen, J.S., Croson, D.C., Elfenbein, D.W. and Posen, H.E., 2018. The impact of learning and overconfidence on entrepreneurial entry and exit. *Organization Science*, 29(6), pp.989-1009.

Chodorow-Reich, G., 2014. The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. *The Quarterly Journal of Economics*, 129(1), pp.1-59.

- Chong, T.T.L., Lu, L. and Ongena, S., 2013. Does banking competition alleviate or worsen credit constraints faced by small-and medium-sized enterprises? Evidence from China. *Journal of Banking & Finance*, 37(9), pp.3412-3424.
- Claessens, S. and Laeven, L., 2003. Financial development, property rights, and growth. *the Journal of Finance*, 58(6), pp.2401-2436.
- Cleary, S., Povel, P. and Raith, M., 2007. The U-shaped investment curve: Theory and evidence. *Journal of financial and quantitative analysis*, pp.1-39.
- Coad, A., Frankish, J., Roberts, R.G. and Storey, D.J., 2013. Growth paths and survival chances: An application of Gambler's Ruin theory. *Journal of business venturing*, 28(5), pp.615-632.
- Coad, A., Segarra, A. and Teruel, M., 2016. Innovation and firm growth: does firm age play a role?. *Research policy*, 45(2), pp.387-400.
- Cole, R. and Sokolyk, T., 2016. Who needs credit and who gets credit? Evidence from the surveys of small business finances. *Journal of Financial Stability*, 24, pp.40-60.
- Cope, J., 2011. Entrepreneurial learning from failure: An interpretative phenomenological analysis. *Journal of business venturing*, 26(6), pp.604-623.
- Cowling, M., Liu, W. and Ledger, A., 2012. Small business financing in the UK before and during the current financial crisis. *International Small Business Journal*, 30(7), pp.778-800.
- Cowling, M., Liu, W., Minniti, M. and Zhang, N., 2016. UK credit and discouragement during the GFC. *Small Business Economics*, 47(4), pp.1049-1074.
- Cowling, M. and Mitchell, P., 2003. Is the small firms loan guarantee scheme hazardous for banks or helpful to small business?. *Small Business Economics*, 21(1), pp.63-71.
- Cowling, M. and Siepel, J., 2013. Public intervention in UK small firm credit markets: Value-for-money or waste of scarce resources?. *Technovation*, 33(8-9), pp.265-275.
- Cyert, R.M. and DeGroot, M.H., 1974. Rational expectations and Bayesian analysis. *Journal of Political Economy*, 82(3), pp.521-536.
- Dai, N., Ivanov, V. and Cole, R.A., 2017. Entrepreneurial optimism, credit availability, and cost of financing: Evidence from US small businesses. *Journal of Corporate Finance*, 44, pp.289-307.

- Davidsson, P., 1989. Entrepreneurship—and after? A study of growth willingness in small firms. *Journal of business venturing*, 4(3), pp.211-226.
- DeCanio, S.J., 1979. Rational expectations and learning from experience. *The quarterly journal of economics*, 93(1), pp.47-57.
- DeGroot, M.H., 2005. *Optimal statistical decisions* (Vol. 82). John Wiley & Sons.
- Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K. and Schepens, G., 2019. Identifying credit supply shocks with bank-firm data: Methods and applications. *Journal of Financial Intermediation*, 40, p.100813.
- Degryse, H. and Ongena, S., 2007. The impact of competition on bank orientation. *Journal of Financial Intermediation*, 16(3), pp.399-424.
- Degryse, H. and Van Cayseele, P., 2000. Relationship lending within a bank-based system: Evidence from European small business data. *Journal of financial Intermediation*, 9(1), pp.90-109.
- Delmar, F. and Wiklund, J., 2008. The effect of small business managers' growth motivation on firm growth: A longitudinal study. *Entrepreneurship theory and practice*, 32(3), pp.437-457.
- Denrell, J., Fang, C. and Liu, C., 2015. Perspective—Chance explanations in the management sciences. *Organization Science*, 26(3), pp.923-940.
- Desa, G., 2012. Resource mobilization in international social entrepreneurship: Bricolage as a mechanism of institutional transformation. *Entrepreneurship theory and practice*, 36(4), pp.727-751.
- Dierkes, M., Erner, C., Langer, T. and Norden, L., 2013. Business credit information sharing and default risk of private firms. *Journal of Banking & Finance*, 37(8), pp.2867-2878.
- Dolmans, S.A., van Burg, E., Reymen, I.M. and Romme, A.G.L., 2014. Dynamics of resource slack and constraints: Resource positions in action. *Organization Studies*, 35(4), pp.511-549.
- Douglas, E.J., 2013. Reconstructing entrepreneurial intentions to identify predisposition for growth. *Journal of Business Venturing*, 28(5), pp.633-651.

- Dwenger, N., Fossen, F.M. and Simmler, M., 2020. Firms' financial and real responses to credit supply shocks: Evidence from firm-bank relationships in Germany. *Journal of Financial Intermediation*, 41, p.100773.
- Elfenbein, D.W., Knott, A.M. and Croson, R., 2017. Equity stakes and exit: An experimental approach to decomposing exit delay. *Strategic Management Journal*, 38(2), pp.278-299.
- Elsas, R., 2005. Empirical determinants of relationship lending. *Journal of Financial Intermediation*, 14(1), pp.32-57.
- Farre-Mensa, J. and Ljungqvist, A., 2016. Do measures of financial constraints measure financial constraints?. *The Review of Financial Studies*, 29(2), pp.271-308.
- Fazzari, S., Hubbard, R., Petersen, B., Blinder, A., & Poterba, J. 1988. Financing Constraints and Corporate Investment. *Brookings Papers on Economic Activity*, 1988(1), pp. 141-206.
- Ferrando, A. and Ruggieri, A., 2018. Financial constraints and productivity: Evidence from euro area companies. *International Journal of Finance & Economics*, 23(3), pp.257-282.
- Fisher, G., 2012. Effectuation, causation, and bricolage: A behavioral comparison of emerging theories in entrepreneurship research. *Entrepreneurship theory and practice*, 36(5), pp.1019-1051.
- Frankish, J.S., Roberts, R.G., Coad, A., Spears, T.C. and Storey, D.J., 2013. Do entrepreneurs really learn? Or do they just tell us that they do?. *Industrial and Corporate Change*, 22(1), pp.73-106.
- Fraser, S., 2009. Is there ethnic discrimination in the UK market for small business credit?. *International Small Business Journal*, 27(5), pp.583-607.
- Fraser, S., 2014. Back to borrowing? perspectives on the 'Arc of Discouragement'. *Enterprise Research Centre, White Paper*, 8.
- Fraser, S., Bhaumik, S.K. and Wright, M., 2015. What do we know about entrepreneurial finance and its relationship with growth?. *International Small Business Journal*, 33(1), pp.70-88.
- Fraser, S. and Greene, F.J., 2006. The effects of experience on entrepreneurial optimism and uncertainty. *Economica*, 73(290), pp.169-192.

- Freel, M., Carter, S., Tagg, S. and Mason, C., 2012. The latent demand for bank debt: characterizing “discouraged borrowers”. *Small business economics*, 38(4), pp.399-418.
- Ferrando, A., Popov, A. and Udell, G.F., 2019. Do SMEs benefit from unconventional monetary policy and how? Microevidence from the Eurozone. *Journal of Money, Credit and Banking*, 51(4), pp.895-928.
- Ferri, G. and Murro, P., 2015. Do firm–bank ‘odd couples’ exacerbate credit rationing?. *Journal of Financial Intermediation*, 24(2), pp.231-251.
- Fitzsimmons, J.R. and Douglas, E.J., 2011. Interaction between feasibility and desirability in the formation of entrepreneurial intentions. *Journal of business venturing*, 26(4), pp.431-440.
- Guariglia, A., 2008. Internal financial constraints, external financial constraints, and investment choice: Evidence from a panel of UK firms. *Journal of banking & finance*, 32(9), pp.1795-1809.
- Guariglia, A., Liu, X. and Song, L., 2011. Internal finance and growth: Microeconomic evidence on Chinese firms. *Journal of Development Economics*, 96(1), pp.79-94.
- Gennaioli, N., Ma, Y. and Shleifer, A., 2016. Expectations and investment. *NBER Macroeconomics Annual*, 30(1), pp.379-431.
- George, G., 2005. Slack resources and the performance of privately held firms. *Academy of management Journal*, 48(4), pp.661-676.
- Gropp, R., Mosk, T., Ongena, S. and Wix, C., 2019. Banks response to higher capital requirements: Evidence from a quasi-natural experiment. *The Review of Financial Studies*, 32(1), pp.266-299.
- Hadlock, C.J. and Pierce, J.R., 2010. New evidence on measuring financial constraints: Moving beyond the KZ index. *The Review of Financial Studies*, 23(5), pp.1909-1940.
- Han, L., Fraser, S. and Storey, D.J., 2009. Are good or bad borrowers discouraged from applying for loans? Evidence from US small business credit markets. *Journal of Banking & Finance*, 33(2), pp.415-424.
- Haynes, G.W. and Brown, J.R., 2009. How Strong is the Link between Internal Finance & Small Firm Growth? Evidence from Survey of Small Business Finances. *Finance Publication*. 7.

- Hessels, J., Van Gelderen, M. and Thurik, R., 2008. Entrepreneurial aspirations, motivations, and their drivers. *Small business economics*, 31(3), pp.323-339.
- Hillier, B. and Ibrahimo, M.V., 1993. Asymmetric information and models of credit rationing. *Bulletin of Economic Research*, 45(4), pp.271-304.
- Hoegl, M., Gibbert, M. and Mazursky, D., 2008. Financial constraints in innovation projects: When is less more?. *Research Policy*, 37(8), pp.1382-1391.
- Ioannidou, V. and Ongena, S., 2010. "Time for a change": loan conditions and bank behavior when firms switch banks. *The Journal of Finance*, 65(5), pp.1847-1877.
- Jacobs, R.L. and Jones, R.A., 1977. A Bayesian Approach to Adaptive Expectations. *disc. paper*, (93).
- Kano, M., Uchida, H., Udell, G.F. and Watanabe, W., 2011. Information verifiability, bank organization, bank competition and bank-borrower relationships. *Journal of Banking & Finance*, 35(4), pp.935-954.
- Kaplan, S.N. and Zingales, L., 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints?. *The quarterly journal of economics*, 112(1), pp.169-215.
- Kim, C. and Bettis, R.A., 2014. Cash is surprisingly valuable as a strategic asset. *Strategic Management Journal*, 35(13), pp.2053-2063.
- Kon, Y. and Storey, D.J., 2003. A theory of discouraged borrowers. *Small Business Economics*, 21(1), pp.37-49.
- Krishnan, K., Nandy, D.K. and Puri, M., 2015. Does financing spur small business productivity? Evidence from a natural experiment. *The Review of Financial Studies*, 28(6), pp.1768-1809.
- Krueger Jr, N.F., Reilly, M.D. and Carsrud, A.L., 2000. Competing models of entrepreneurial intentions. *Journal of business venturing*, 15(5-6), pp.411-432.
- Lamont, O., Polk, C. and Saá-Requejo, J., 2001. New evidence on measuring financial constraints: moving beyond the KZ index. *The RAND Journal of Economics*, 32(1), pp.101-128.

- Levenson, A. R., & Willard, K. L. (2000). Do Firms Get the Financing They Want? Measuring Credit Rationing Experienced by Small Businesses in the U.S. *Small Business Economics*, 14(2), 83–94.
- Levinthal, D.A., 1991. Random walks and organizational mortality. *Administrative Science Quarterly*, pp.397-420.
- Liberti, J.M. and Petersen, M.A., 2019. Information: Hard and soft. *Review of Corporate Finance Studies*, 8(1), pp.1-41.
- Lotti, F., Santarelli, E. and Vivarelli, M., 2009. Defending Gibrat's Law as a long-run regularity. *Small Business Economics*, 32(1), pp.31-44.
- Lovell, M.C., 1986. Tests of the rational expectations hypothesis. *The American Economic Review*, 76(1), pp.110-124.
- Lundmark, E., Coad, A., Frankish, J.S. and Storey, D.J., 2020. The liability of volatility and how it changes over time among new ventures. *Entrepreneurship Theory and Practice*, 44(5), pp.933-963.
- Mac an Bhaird, C., Vidal, J. S., & Lucey, B. (2016). Discouraged borrowers: Evidence for Eurozone SMEs. *Journal of International Financial Markets, Institutions and Money*, 44, 46–55.
- Mancusi, M.L. and Vezzulli, A., 2014. R&D and credit rationing in SMEs. *Economic Inquiry*, 52(3), pp.1153-1172.
- Manova, K., Wei, S.J. and Zhang, Z., 2015. Firm exports and multinational activity under credit constraints. *Review of Economics and Statistics*, 97(3), pp.574-588.
- Marlow, S. and Patton, D., 2005. All credit to men? Entrepreneurship, finance, and gender. *Entrepreneurship theory and practice*, 29(6), pp.717-735.
- Meza, D.D. and Southey, C., 1996. The borrower's curse: optimism, finance and entrepreneurship. *The Economic Journal*, 106(435), pp.375-386.
- Minetti, R. and Zhu, S.C., 2011. Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics*, 83(2), pp.109-125.
- Minniti, M. and Bygrave, W., 2001. A dynamic model of entrepreneurial learning. *Entrepreneurship theory and practice*, 25(3), pp.5-16.

Mishina, Y., Pollock, T.G. and Porac, J.F., 2004. Are more resources always better for growth? Resource stickiness in market and product expansion. *Strategic management journal*, 25(12), pp.1179-1197.

Mol-Gómez-Vázquez, A., Hernández-Cánovas, G. and Koëter-Kant, J., 2019. Bank market power and the intensity of borrower discouragement: analysis of SMEs across developed and developing European countries. *Small Business Economics*, 53(1), pp.211-225.

Moro, A., Wisniewski, T.P. and Mantovani, G.M., 2017. Does a manager's gender matter when accessing credit? Evidence from European data. *Journal of banking & finance*, 80, pp.119-134.

Moscalu, M., Girardone, C. and Calabrese, R., 2020. SMEs' growth under financing constraints and banking markets integration in the euro area. *Journal of Small Business Management*, 58(4), pp.707-746.

Mulier, K., Schoors, K. and Merlevede, B., 2016. Investment-cash flow sensitivity and financial constraints: Evidence from unquoted European SMEs. *Journal of Banking & Finance*, 73, pp.182-197

Musso, P. and Schiavo, S., 2008. The impact of financial constraints on firm survival and growth. *Journal of Evolutionary Economics*, 18(2), pp.135-149.

Muth, J.F., 1961. Rational expectations and the theory of price movements. *Econometrica: Journal of the Econometric Society*, pp.315-335.

Myers, S.C., 1984. The capital structure puzzle. *The Journal of Finance*, 39(3), pp.574-592.

Myers, S.C., and Majluf, N.S., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), pp.187-221.

Natividad, G., 2013. Financial slack, strategy, and competition in movie distribution. *Organization Science*, 24(3), pp.846-864.

Newman, A., Obschonka, M., Schwarz, S., Cohen, M. and Nielsen, I., 2019. Entrepreneurial self-efficacy: A systematic review of the literature on its theoretical foundations, measurement, antecedents, and outcomes, and an agenda for future research. *Journal of Vocational Behavior*, 110, pp.403-419.

- Nickell, S. and Nicolitsas, D., 1999. How does financial pressure affect firms?. *European Economic Review*, 43(8), pp.1435-1456.
- Nohria, N. and Gulati, R., 1996. Is slack good or bad for innovation?. *Academy of management Journal*, 39(5), pp.1245-1264.
- Padilla, A.J. and Pagano, M., 2000. Sharing default information as a borrower discipline device. *European Economic Review*, 44(10), pp.1951-1980.
- Paeleman, I. and Vanacker, T., 2015. Less is more, or not? On the interplay between bundles of slack resources, firm performance and firm survival. *Journal of Management Studies*, 52(6), pp.819-848.
- Parker, S.C., 2002. Do banks ration credit to new enterprises? And should governments intervene?. *Scottish Journal of Political Economy*, 49(2), pp.162-195.
- Parker, S.C., 2003. Asymmetric information, occupational choice and government policy. *The Economic Journal*, 113(490), pp.861-882.
- Peric, M. and Vitezic, V., 2016. Impact of global economic crisis on firm growth. *Small business economics*, 46(1), pp.1-12.
- Petersen, M.A. and Rajan, R.G., 1994. The benefits of lending relationships: Evidence from small business data. *The journal of finance*, 49(1), pp.3-37.
- Petersen, M.A. and Rajan, R.G., 1995. The effect of credit market competition on lending relationships. *The Quarterly Journal of Economics*, 110(2), pp.407-443.
- Philippon, T., 2019. *On fintech and financial inclusion* (No. w26330). National Bureau of Economic Research.
- Politis, D., 2005. The process of entrepreneurial learning: A conceptual framework. *Entrepreneurship theory and practice*, 29(4), pp.399-424.
- Popov, A. (2016). Monetary policy, bank capital, and credit supply: A role for discouraged and informally rejected firms. *International Journal of Central Banking*, 12(1), 95–141.
- Popov, A. and Rocholl, J., 2018. Do credit shocks affect labor demand? Evidence for employment and wages during the financial crisis. *Journal of Financial Intermediation*, 36, pp.16-27.
- Posen, H.E. and Levinthal, D.A., 2012. Chasing a moving target: Exploitation and exploration in dynamic environments. *Management science*, 58(3), pp.587-601.

- Prilmeier, R., 2017. Why do loans contain covenants? Evidence from lending relationships. *Journal of Financial Economics*, 123(3), pp.558-579.
- Psillaki, M. and Daskalakis, N., 2009. Are the determinants of capital structure country or firm specific?. *Small business economics*, 33(3), pp.319-333.
- Qi, S. and Nguyen, D.D., 2021. Government connections and credit access around the world: Evidence from discouraged borrowers. *Journal of International Business Studies*, 52(2), pp.321-333.
- Rahaman, M.M., 2011. Access to financing and firm growth. *Journal of Banking & Finance*, 35(3), pp.709-723.
- Rajan, R.G., 1992. Insiders and outsiders: The choice between informed and arm's-length debt. *The Journal of finance*, 47(4), pp.1367-1400.
- Rajan, R. and Zingales, L., 1998. Financial development and growth. *American Economic Review*, 88(3), pp.559-586.
- Roodman, D., 2011. Fitting fully observed recursive mixed-process models with cmp. *The Stata Journal*, 11(2), pp.159-206.
- Rosso, B.D., 2014. Creativity and constraints: Exploring the role of constraints in the creative processes of research and development teams. *Organization Studies*, 35(4), pp.551-585.
- Schauer, C., Elsas, R. and Breitzkopf, N., 2019. A new measure of financial constraints applicable to private and public firms. *Journal of Banking & Finance*, 101, pp.270-295.
- Schlaegel, C. and Koenig, M., 2014. Determinants of entrepreneurial intent: A meta-analytic test and integration of competing models. *Entrepreneurship Theory and Practice*, 38(2), pp.291-332.
- Senyard, J., Baker, T., Steffens, P. and Davidsson, P., 2014. Bricolage as a path to innovativeness for resource-constrained new firms. *Journal of Product Innovation Management*, 31(2), pp.211-230.
- Serrasqueiro, Z., Nunes, P.M., Leitão, J. and Armada, M., 2010. Are there non-linearities between SME growth and its determinants? A quantile approach. *Industrial and Corporate Change*, 19(4), pp.1071-1108.

- Sharpe, S.A., 1990. Asymmetric information, bank lending, and implicit contracts: A stylized model of customer relationships. *The journal of finance*, 45(4), pp.1069-1087.
- Sharpe, S.A., 1994. Financial market imperfections, firm leverage, and the cyclicity of employment. *The American Economic Review*, 84(4), pp.1060-1074.
- Shepherd, B., 2012. When are adaptive expectations rational? A generalization. *Economics Letters*, 115(1), pp.4-6.
- Steel, P. and König, C.J., 2006. Integrating theories of motivation. *Academy of management review*, 31(4), pp.889-913.
- Steijvers, T. and Voordeckers, W., 2009. Collateral and credit rationing: a review of recent empirical studies as a guide for future research. *Journal of Economic Surveys*, 23(5), pp.924-946.
- Stenholm, P. and Renko, M., 2016. Passionate bricoleurs and new venture survival. *Journal of Business Venturing*, 31(5), pp.595-611.
- Stiglitz, J.E. and Weiss, A., 1981. Credit rationing in markets with imperfect information. *The American economic review*, 71(3), pp.393-410.
- Storey, D.J., 2004. Racial and gender discrimination in the micro firms credit market? Evidence from Trinidad and Tobago. *Small Business Economics*, 23(5), pp.401-422.
- Sufi, A., 2009. Bank lines of credit in corporate finance: An empirical analysis. *The Review of Financial Studies*, 22(3), pp.1057-1088.
- Tan, J. and Peng, M.W., 2003. Organizational slack and firm performance during economic transitions: Two studies from an emerging economy. *Strategic management journal*, 24(13), pp.1249-1263.
- Tang, Y., Deng, C. and Moro, A., 2017. Firm-bank trusting relationship and discouraged borrowers. *Review of Managerial Science*, 11(3), pp.519-541.
- Uchida, H., Udell, G.F. and Yamori, N., 2012. Loan officers and relationship lending to SMEs. *Journal of Financial Intermediation*, 21(1), pp.97-122.
- UK Finance, 2018. SME Finance: Where are we now?
- Vanacker, T., Collewaert, V. and Zahra, S.A., 2017. Slack resources, firm performance, and the institutional context: evidence from privately held European firms. *Strategic management journal*, 38(6), pp.1305-1326.

- Vesala, T., 2007. Switching costs and relationship profits in bank lending. *Journal of Banking & Finance*, 31(2), pp.477-493.
- Vos, E., Yeh, A.J.Y., Carter, S. and Tagg, S., 2007. The happy story of small business financing. *Journal of Banking & finance*, 31(9), pp.2648-2672.
- Whited, T.M. and Wu, G., 2006. Financial constraints risk. *The Review of Financial Studies*, 19(2), pp.531-559.
- Wiklund, J., Davidsson, P. and Delmar, F., 2003. What do they think and feel about growth? An expectancy–value approach to small business managers' attitudes toward growth. *Entrepreneurship theory and practice*, 27(3), pp.247-270.
- Wiklund, J., Patzelt, H. and Shepherd, D.A., 2009. Building an integrative model of small business growth. *Small Business Economics*, 32(4), pp.351-374.
- Wiklund, J. and Shepherd, D., 2003. Aspiring for, and achieving growth: The moderating role of resources and opportunities. *Journal of management studies*, 40(8), pp.1919-1941.
- Williamson, S.D., 1987. Costly monitoring, loan contracts, and equilibrium credit rationing. *The Quarterly Journal of Economics*, 102(1), pp.135-145.
- Wright, M. and Stigliani, I., 2013. Entrepreneurship and growth. *International Small Business Journal*, 31(1), pp.3-22.
- Ylhäinen, I., 2017. Life-cycle effects in small business finance. *Journal of Banking & Finance*, 77, pp.176-196.

APPENDIX

A- Conditional Mixed-Process (CMP) Model:

Conditional Mixed-Process (CMP) (Roodman, 2011) implements an estimator for a large family of model types and allows mixing of these models in multi-equation, multi-level and conditional mixed-process systems that have two properties, namely Recursivity and Full observability.

1. *Recursivity* means that the equations can be arranged so that the matrix of coefficients of the endogenous variables in one another's equations is triangular. For example, if A, B, C and D are all binary dependent variables, modelled as probits, then A and B could be determinants of C and C could be a determinant of D, but D could not then be a modelled determinant of A, B or C.
2. *Full observability (or Simultaneous)* means that endogenous variables appear on the right sides of equation only as observed. A dummy endogenous variable can be included in an equation but the hypothesized continuous variable that is latent within it cannot. For example, if A*, B*, C*, and D* are the hypothesized, unobserved linear functionals behind the observed A, B, C, and D, then D* can appear in any of the equations even though D cannot.
3. *Multi-equation* means that *cmp* can fit seemingly unrelated regression (*sur*), instrumental variables estimation (*iv*), and some simultaneous-equation systems.
4. *Multi-level* means that random coefficients and effects can be modelled at various levels in hierarchical fashion.
5. *Mixed-process* means that different equations can have different types of dependent variables. A dependent variable in one equation can appear on the right side of another equation.
6. *Conditional* means that the model can vary by observation. In other words, the model is conditional on the data. For example, an equation can be dropped for unavailable observations or the type of a dependent variable can vary by observation.

cmp is appropriate for two types of models: 1- those in which all the models are in structural forms, and 2- those in which some equations are structural while others are reduced. In the first case, *cmp* is a full-information maximum likelihood estimator, and all estimated parameters are structural. In the second case, *cmp* is a limited-information

estimator, and only the final stage's coefficients are structural. Thus, *cmp* as a Maximum Likelihood estimator and built on *ml* process in Stata. *cmp* can imitate many different commands, e.g., *probit*, *ivprobit*, *treatreg*, *biprobit*, *oprobit*, *mprobit*, *tobit*, *ivprobit*, *truncreg*, *heckman*, *heckprob*, *heckoprobit*, *xtreg*, *xtprobit*, *xttobit*, *triprobit*, *mvprobit*, *biprobit*, *mvtobit*. For models in which three or more equations are censored at once for some observation, cumulative joint normal distributions of dimension three or higher is required. In such case, *cmp* uses the simulation algorithm of Gewede, Hajivassiliou, and Keane (GHK) by accessing *ghk* process in Mata.

In Stata, rho (ρ) is not directly estimated. Instead, the inverse hyperbolic tangent of ρ - $\text{atanh } \rho$ ¹³ - is directly estimated. Both values of ρ and $\text{atanh } \rho$ are reported as */athrho* and */rho*, respectively. If $\rho = 0$, the log-likelihood ratio of the probit models with sample selection equals to the sum of the log-likelihood ratio of selection equation and the log-likelihood ratio of the outcome equation. In other words, if $\rho = 0$, the error terms in outcome and selection equations are not significantly correlated. Thus, there is no sample selection bias in the regression of outcome.

¹³ The inverse hyperbolic tangent of rho is estimated as $\text{atanh } \rho = \frac{1}{2} \ln \left(\frac{1+\rho}{1-\rho} \right)$.

TABLES

Table 1: Need, Applicant, Self-rationing, and Credit rationing

	LSBS 2016 – Last 12 months		FM 2012-17 - Next 3 months	
	(1)		(2)	
	Number	Percentage (% over total firms)	Number	Percentage (% over total firms)
Need = 1	1495	20.54%	31040	30.69%
Applicants = 1	1021	14.03%	16243	16.06%
Self-rationing = 1	555	7.62%	3422	3.38 %
Direct-DB = 1	227	3.12%		
Credit-rationing = 1	204	2.80%		

Table 2: Summary Statistics

			LSBS 2016				FM 2012-17			
Variables		Descriptions	Obs.	%	Mean	S.D	Obs.	%	Mean	S.D
Discour- agement	DB	Dummy=1 if firm claimed that they have a need that they did not apply for because: they thought they would be rejected (LSBS, FM); they thought it would be too expensive (LSBS, FM); the decision would have taken too long/too much asshole (LSBS, FM); the current economic conditions is not appropriate (LSBS); did not know where to find appropriate finance (LSBS); poor credit history (LSBS); mentioned it formally to the bank but they seemed reluctant to lend to us (FM); think the bank would want security (FM); do not find bank forms and literature easy to understand (FM); facilities come with too many	1495		.371	.483	31040		.110	.313

		terms and conditions (FM); did not want to go through application process (FM); bank terms are unacceptable; do not trust banks (FM)						
	Direct DB	Dummy=1 if firm claimed that they have a need that they did not apply for because they thought they would be rejected (LSBS, FM); or mentioned it formally to the bank but they seemed reluctant to lend to us (FM)	1495	.152	.359	31040	.057	.232
Previous credit rationing	Rejected	Dummy=1 if rejected in the last 12 months	1331	.182	.386	25732	.132	.338
	Rejected_10	Dummy=1 if firm is rejected in the past 10 years	7073	.078	.268			
Bank relationship	Main bank	Dummy=1 if the main bank is one of those Barclays, HSBC, Lloyds Group, Natwest/RBS, Santander	7279	.758	.428			
	Breadth	Dummy=1 if firm is doing business with more than one bank				101149	.060	.237

	Depth	Dummy =1 if firm used more than one service from the same main bank	101149	.010	.098
	Hard lending	Dummy =1 if collateral was required	101149	.060	.237
Firms' profile	Risk level	=0 if minimal risk	16784	18.2%	
		=1 if below average	27233	29.5%	
		=2 if average	24390	26.4%	
		=3 if above average	24011	26%	
	Firm size	=0 if firm has no employee	1656	20229	
		=1 if firm has 1 – 9 employees	2353	33123	
		=2 if firm has 10 - 49 employees	2068	32441	
		=3 if firm has 50 - 99 employees	1202	10444	
		=4 if firm has > 100 employees		4912	
	Age	=1 if 0 – 5 years old (LSBS)	595	22418	
		=2 if 6 - 10 years old (LSBS); 6- 9 years (FM)	1122	11963	

	=3 if 11-20 years old (LSBS); 10-15 years (FM)	1286		16633	
	=4 if > 20 years old (LSBS); >15 years (FM)	4262		50135	
Sector	=1 if ABDEF – Production and Construction	1603		34890	
	=2 if GHI – Transport, Retail and Food service	1699		28340	
	=3 if JKLMN – Business Services	2406		18611	
	=4 if PQRS – Other Services	1571		19308	
Legal status	=1 if sole proprietorship	1018		27763	
	=2 if company & others	5547		60054	
	=3 if partnership	714		13332	
Turnover growth in the last 12 months	=1 if experiencing shrinkage	1416	19.9%	8926	10.6%
	=2 if experiencing no change	3129	44%	34624	41.2%
	=3 if experiencing growth	2569	36.1%	40500	48.2%

Expected growth in the next 12 months	=1 if expecting shrinkage	785	11.1%			43172	44%	
	=2 if expecting no change	3376	47.6%					
	=3 if expecting growth	2931	41.3%			54946	56%	
Exporting	Dummy=1 if firm exported >25% in the last 12 months (LSBS); exported >50% (FM)	7193		0.029	0.169	101149		.019 .136
Innovating	Dummy=1 if firm claimed that they introduced new or significantly improved good/services/processes in the last 3 years	7279		0.423	0.494	101149		.483 .500
Wled	Dummy=1 if >50% owned by women (LSBS); led by women (FM)	6879		0.226	0.418	98787		0.190 0.392
Mled	Dummy=1 if led by ethnic minority	6760		0.044	0.205	92917		0.051 0.221
Owner's age	=1 if owner is 18-30 years old					3440		
	=2 if owner is 31-50 years old					43339		
	=3 if owner is 51-65 years old					41214		
	=4 if owner is > 65 years old					8683		

Education	=1 if the person in charge of financial management has a finance qualification or undertaken any financial training	98139	.411	0.492
Injecting personal fund	=1 if the owner injected personal fund into the business in the last 12 months	101149	.116	.320
Personal loan	=1 if overdraft, loan or credit card finance is in owner's personal name	42027	.170	.376
Personal application	=1 if in the last 12 months, application for overdraft, loan or credit card is in owner's personal name	16101	.072	.258

Table 3: Impact of credit rationing on discouraged borrowing decision from LSBS

		probit1	probit2	probit3		logit1		ols1
		b/se	b/se	b/se	ME	b/se	ME	b/se
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reject		0.469***	0.473***	0.391***	.126***	0.650***	.125***	0.137***
		0.115	0.115	0.131		0.214		0.045
Bank relationship	Big5		-0.129	-0.034	-.011	-0.057	-.011	-0.010
			0.118	0.147		0.246		0.048
	Switch bank		-0.025	-0.036	-.012	-0.056	-.011	-0.004
			0.206	0.228		0.380		0.075
Size	1 – 9 employees			-0.032	-.011	-0.044	-.009	-0.006
				0.193		0.320		0.065
	10 - 49 employees			-0.018	-.006	-0.029	-.006	-0.008
				0.195		0.324		0.066
				-0.566**	-.171**	-0.990***	-.175**	-0.171**

	> 50 employees	0.222		0.384		0.072
Age (base: >15 years old)	< 6 years old	0.272	.082	0.466	.082	0.093
		0.231		0.387		0.076
	6 – 9 years old	0.457**	.144**	0.776**	.145**	0.156**
		0.229		0.379		0.076
	10 - 15 years old	0.251	.075	0.439	.077	0.084
		0.210		0.352		0.069
Industry	GHI	0.167	.050	0.266	.047	0.048
		0.154		0.263		0.050
	JKLMN	0.341**	.108**	0.574**	.108**	0.110**
		0.149		0.251		0.049
	PQRS	0.534***	.176***	0.901***	.178***	0.174***
		0.190		0.316		0.062
		0.280	.085	0.479	.085	0.094

Legal status	Company & others	0.234		0.392		0.077
	Partnership	0.216	.064	0.388	.068	0.072
		0.279		0.468		0.091
Location	Scotland	-0.052	-.016	-0.075	-.014	-0.009
		0.218		0.368		0.070
	Wales	0.423	.146	0.725	.150	0.141
		0.287		0.464		0.097
	Northern Ireland	0.400	.137	0.693	.143	0.136
		0.244		0.404		0.084
Past growth	No change vs Shrinkage	0.024	.008	0.043	.009	0.009
		0.150		0.250		0.050
	Growth vs Shrinkage	-0.258*	-.082*	-0.422*	-.080*	-0.080*
		0.147		0.249		0.049
Export		0.104	.034	0.159	.030	0.029

			0.311		0.521		0.105
Innovation			0.053	.017	0.085	.016	0.017
			0.112		0.189		0.037
Women-led business			0.066	.021	0.092	.018	0.021
			0.151		0.251		0.049
Ethnic minority-led business			-0.451**	-.145**	-0.739**	-.142**	-0.165**
			0.228		0.368		0.077
Constant	-0.593	-0.494	-0.412		-0.701		0.374
	0.058	0.108	0.644		1.053		0.214
N	690	690	629		629		629

Table 4: Selection bias & Endogeneity - LSBS

	Bivariate probit model				Trivariate probit model					
	Heckman Probit estimation		Conditional Mixed Process estimation		Conditional Mixed Process estimation			eprobit		
	(1)		(2)		(3)			(4)		
	DB ₂₀₁₆	Need ₂₀₁₆	DB ₂₀₁₆	Need ₂₀₁₆	DB ₂₀₁₆	Need ₂₀₁₆	Reject ₂₀₁₅	DB ₂₀₁₆	Need ₂₀₁₆	Reject ₂₀₁₅
Reject	.423***		.389***		.476***			1.662***		
	.129		.129		.179			.145		
Main bank is Big5	-.050		-.032		-.029			.047		
	.143		.144		.144			.180		
Switch main bank	-.104		-.034		-.040			-.109		
	.226		.224		.224			.272		
Breadth								-.130		
								.130		
Depth								-.475***		
								-.390***		

				.137		.131
No Change	.097	.015	.023		-.122	
	.084	.060	.060		.201	
Increase	.296***	.236***	.243***		.053	
	.087	.062	.062		.199	
Trade credit issue	.473***	.501***	.499***	.440***	.366***	.414***
	.082	.063	.063	.138	.132	.132
$\rho_{DB-Need}$.217	.215	.213		.500	
$\rho_{DB-Reject}$			-.056		-.659	
$\rho_{Need-Reject}$.283***		.322	

Table 5: Robustness check

LSBS 2016						FM 2012-17				
	DB (M.E)	DB (M.E)	DB (M.E)	Direct DB (M.E)	Direct DB (M.E)	DB (b)	DB (b)	Direct DB (b)	Direct DB (b)	Direct DB (b)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 type only	0.205***									
2 types	0.242***									
3 or more types	0.559***									
Rejection				0.158***				0.614***		
Rejection_10			-0.026							
Credit Rejection		0.151***			0.230***		1.073***			1.469***
Partial Rejection						0.673***			0.891***	
Controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Impact of credit rationing on discouraged borrowing decision from FM 2012-17

		Probit	Probit	Probit		Logit		LPM
		(1)	(2)	(3)		(4)		(5)
		Coef. (s.e)	Coef. (s.e)	Coef. (s.e)	M.E	Coef. (s.e)	M.E	Coef.
Reject		1.286***	1.254***	1.100***	0.102***	2.280***	0.096***	0.139***
		0.075	0.076	0.129	0.018	0.279	0.017	0.011
Lending technique	Breadth		-0.119	0.066	0.004	0.237	0.008	0.007
			0.196	0.240	0.017	0.487	0.018	0.015
	Depth		-0.328	-0.289	-0.016	-0.703	-0.018	-0.007
			0.194	0.289	0.013	0.745	0.015	0.011
	Secured OD/L			-0.284	-0.017*	-0.700*	-0.020*	-0.010
				0.145	0.008	0.345	0.009	0.008
Network			-0.180	-0.011	-0.392	-0.012	-0.011	
			0.127	0.007	0.267	0.008	0.008	

First time application		-0.011	-0.001	-0.003	-0.000	-0.000
		0.132	0.008	0.254	0.008	0.011
Risk	Low	-0.129	-0.009	-0.317	-0.010	-0.009
		0.198	0.013	0.429	0.015	0.011
	Average	-0.172	-0.011	-0.420	-0.013	-0.018
		0.197	0.013	0.426	0.014	0.011
	Above average	-0.024	-0.002	-0.065	-0.002	0.006
		0.197	0.014	0.416	0.015	0.012
Age	6-9 years	-0.135	-0.010	-0.275	-0.010	-0.022
		0.170	0.013	0.334	0.012	0.014
	10-15 years	-0.191	-0.014	-0.304	-0.011	-0.022
		0.177	0.013	0.350	0.012	0.014
	> 15 years	-0.339*	-0.023*	-0.553	-0.018	-0.031*
		0.157	0.012	0.314	0.011	0.013
Size	1-9	0.196	0.013	0.494	0.016	0.032*

(no of employees)		0.179	0.011	0.347	0.010	0.015
	10-49	0.073	0.005	0.244	0.007	0.025
		0.227	0.014	0.460	0.014	0.017
	> 50	-0.490	-0.021	-1.388	-0.024	0.009
		0.363	0.014	0.913	0.013	0.020
Turnover	£25k - £100k	-0.197	-0.014	-0.395	-0.014	-0.056**
		0.203	0.015	0.373	0.014	0.020
	£100k - £500k	-0.339	-0.022	-0.766	-0.025	-0.076***
		0.228	0.017	0.430	0.016	0.021
	£500k - £1m	-0.171	-0.012	-0.338	-0.012	-0.059**
		0.261	0.019	0.502	0.019	0.023
	£1m - £5m	-0.066	-0.005	-0.276	-0.010	-0.051*
		0.278	0.021	0.547	0.021	0.023
	> £5m	0.223	0.020	0.559	0.027	-0.036
		0.373	0.035	0.792	0.041	0.026

Industry	GHIJ	0.176	0.011	0.363	0.011	0.014
		0.132	0.009	0.268	0.009	0.009
	KLMN	-0.009	-0.001	0.044	0.001	0.001
		0.178	0.010	0.371	0.011	0.011
	PQRS	0.129	0.008	0.359	0.011	0.012
		0.171	0.011	0.346	0.011	0.011
Region	Midlands	0.244	0.015	0.384	0.012	0.018
		0.148	0.009	0.304	0.009	0.010
	Southern England	0.103	0.006	0.246	0.007	0.010
		0.158	0.009	0.324	0.010	0.010
	Scotland	0.358	0.024	0.697	0.024	0.026*
		0.186	0.014	0.377	0.014	0.013
	Wales	0.150	0.009	0.279	0.008	0.013
		0.228	0.014	0.445	0.014	0.016
		0.241	0.015	0.448	0.014	0.017

	Northern Ireland	0.259	0.018	0.532	0.018	0.017
Legal status	Partnership	-0.526**	-0.041**	-0.984*	-0.037**	-0.061***
		0.194	0.015	0.399	0.014	0.014
	Ltd Liability Co.	-0.531***	-0.041**	-1.006***	-0.038**	-0.064***
		0.148	0.014	0.295	0.013	0.012
Exporting		-0.546	-0.025	-1.024	-0.024	-0.026
		0.488	0.015	1.050	0.016	0.022
Innovating		-0.124	-0.008	-0.259	-0.008	-0.007
		0.115	0.007	0.233	0.008	0.008
Growth in the last 12 months	Stayed the same	-0.099	-0.007	-0.137	-0.005	-0.005
		0.161	0.011	0.327	0.011	0.011
	Grew < 20%	-0.060	-0.004	-0.093	-0.003	-0.004
		0.153	0.011	0.311	0.011	0.011
	Grew > 20%	-0.203	-0.013	-0.336	-0.010	-0.017

		0.195	0.012	0.389	0.012	0.013
Women-led		-0.007	-0.000	-0.124	-0.004	-0.004
		0.143	0.009	0.293	0.009	0.009
Ethnic Minority		-0.166	-0.010	-0.419	-0.012	-0.019
		0.232	0.012	0.459	0.011	0.017
Owner's age	31-50 years old	0.296	0.015	0.503	0.013	0.020
		0.317	0.013	0.577	0.013	0.025
	51-65 years old	0.346	0.018	0.558	0.015	0.022
		0.324	0.014	0.590	0.013	0.025
	> 65 years old	0.638	0.040*	1.124	0.036	0.035
		0.361	0.020	0.685	0.021	0.027
Education		0.009	0.001	0.027	0.001	-0.000
		0.118	0.008	0.242	0.008	0.008
Constant		-2.160***	-2.121***	-1.654***	-3.103***	0.117***
		0.056	0.059	0.430	0.825	0.035

N	4085	4085	2713	2713	2713	2713	2713
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Table 7: Selection bias & Endogeneity - FM

	Bivariate probit model				Trivariate probit model					
	Heckprobit		CMP		CMP			eprobit		
	DB	Need	DB	Need	DB	Need	Reject	DB	Need	Reject
Reject	.785***		1.102***		1.444***			1.143***		
	.176		.129		.158			.443		
Breadth	.080		.065		.122		.037	.223		.027
	.162		.241		.231		.137	.221		.144
Depth	-.220		-.289		-.256		-.834***	-.257		-.884***
	.215		.289		.286		.159	.258		.192
Hard-lending technique	-.207**		-.285**		-.189		-.595***	-.099		-.616***
	.106		.145		.146		.073	.155		.074
Expect Growth		.184***		.156***		.156***			.118**	
		.022		.012		.012			.049	
Personal fund							-.138			-.128

				.098	.098
Personal loan				.188**	.144*
				.084	.087
Personal application				.286**	.350**
				.142	.147
$\rho_{\text{DB-Need}}$.794	.047	.027	.822**	
$\rho_{\text{DB-Reject}}$			-.341***	-.066	
$\rho_{\text{Need-Reject}}$.409***	.410***	

Table 8: Summary statistics of LSBS 2015-17

Variable	Description	N	Mean	S.D
Turnover Growth_1	Dummy=1 if sale increased compared to previous year; =0 otherwise	12495	.310	.463
Turnover Growth_2	$=(\text{sale}_t - \text{sale}_{t-1}) / \text{sale}_{t-1}$	7527	.271	5.558
Emp growth_1	Dummy=1 if employments increased compared to previous year; =0 otherwise	12469	.310	.462
Emp growth_2	$=(\text{employee}_t - \text{employee}_{t-1}) / \text{employee}_{t-1}$	12434	.229	3.341
Turnover growth expectation	=1 if firm expects turnover shrinkage in the next 12 months	1259		
	=2 if expecting no change	5647		
	=3 if expecting growth	5341		
Employment growth expectation	=1 if firm expects turnover shrinkage in the next 12 months	809		
	=2 if expecting no change	8197		
	=3 if expecting growth	3441		
Prdfc (perceived financial constraint)	Dummy=1 if firm perceived access to external finance as a constraint to business objectives; =0 otherwise	12495	.189	.391

Fincon (financial constraint)	Dummy=0 if no need		9963		
	=1 if approved		1337		
	=2 if rejected		204		
	=3 if discouraged		991		
Prdcf (perceived flow)	cash	Dummy=1 if firm perceived late payment as a constraint to business objectives; =0 otherwise	12495	.310	.463
Experror_turnover	Dummy=1 if expected turnover growth is lower than realized growth		1360		
	=2 is the same		4448		
	=3 if higher		2243		
Experror_emp	Dummy=1 if expected employment growth is lower than realized growth		1753		
	=2 is the same		3953		
	=3 if higher		2587		
Groint	Dummy=0 if firm has no growth intention in the next 3 years		3910		
	=1 if aiming increase 1-9%		1542		
	=2 if aiming increase 10-24%		5143		
	=3 if higher than 25%		1447		
Mainbank	Dummy=1 if firm has main bank as one of Big 5			.762	.426

Changebank	Dummy=1 if firm switched the main bank in the last 12 months		.042	.200
Tradecredit	Dummy=1 if firm has trade credit as a problem		.077	.266
Size	=1 if no employees	2899		
	=2 if 1-9 employees	4015		
	=3 if 10-49 employees	3477		
	=4 if more than 50 employees	2104		
Age	=1 if 0-5 years	668		
	=2 if 6-10 years	1008		
	=3 if 11-20 years	1557		
	=4 if more than 20 years	5080		
Sector	=1 if ABCDEF	2724		
	=2 if GHI	2831		
	=3 if business services	4262		
	=4 if other services	2678		
Legal status	=1 if sole proprietorship	1687		
	=2 if company	8913		
	=3 if partnership	1259		
	=4 if others	636		
Nation	=1 if England	10754		
	=2 if Scotland	950		

	=3 if Wales	389		
	=4 if Northern Ireland	402		
Busplan	Dummy=1 if firm has a business plan	12331	.536	.499
Export	Dummy=1 if firm exported >25% of sales in the last 12 months	12495	.107	.310
Innovation	Dummy=1 if firm claimed that they introduced new or significantly improved good/services/processes in the last 3 years	12495	.477	.499
Advice	Dummy=1 if firm takes advice	12418	1.643	.479
Family	Dummy=1 if firm is family-owned	12367	.657	.475
Mled	Dummy=1 if firm is led by ethnic minority	11757	.037	.188
Wled	Dummy=1 if firm is led by women	12056	.206	.405

Table 9: The impact of discouraged borrowing & credit rationing on growth

	Turnover				Employment			
	Single regression		Bivariate regressions		Single regression		Bivariate regressions	
	OLS (1)	Probit - ME (2)	OLS (3)	Probit - ME (4)	OLS (5)	Probit - ME (6)	OLS (7)	Probit - ME (8)
Gr. Expectation (t-1)								
Shrink vs no change	-0.122	-.135***	-0.018	-0.122***	-0.138	-.097***	-0.030	-0.084***
Growing vs no change	0.279***	.183***	0.353***	0.199***	-0.030	.139***	-0.017	0.143***
Fin. Constraints (t)								
Rejected vs Approved	0.531*	-.068	1.580*	0.128	0.275	.027	-0.171	0.417
DB vs Approved	-0.064	-.431***	1.322**	0.196	0.220	-.062	1.673***	-0.222

Fin. Constraints (t-1)									
Rejected vs Approved	0.481**	.028	0.326	0.027	0.213	-.002	0.277	-0.003	
DB vs Approved	-0.029	.012	-0.151	0.010	-0.035	-.004	-0.053	-0.006	
Fin. Constraints (t-2)									
Rejected vs Approved	0.348*	.131**	0.736***	0.129**	0.382	-.167***	0.291	-0.153***	
DB vs Approved	0.142	.014	0.259	0.014	0.241**	-.071**	0.295**	-0.073**	
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
N	1489	3344	1489	3344	1086	3382	1086	3382	

Table 10: The impact of discouraged borrowing & credit rationing on growth by size and industry

	Turnover			Employment			Turnover			Employment		
	Micro	Small	Medium	Micro	Small	Medium	Producti on & Constru- ction	Transpo- rt, retail & food service	Services	Product- ion & Constru- ction	Transpo- rt, retail & food service	Services
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Expected Growth_{t-1}												
Shrink vs no change	-.386***	-.435**	.740***	-.462**	-.294*	-.160	-0.138	-0.499***	-0.546***	-0.520***	-0.643***	-0.098
Growing vs no change	.578***	.662***	.448***	.485***	.392***	.451***	0.657***	0.433***	0.574***	0.328***	0.505***	0.456***
Financial constraint_t												

Rejected vs Approved	-.319	-1.390**	-.135	.618	-1.043	-1.925**	-0.376	1.017	0.741	1.051	-0.034	0.958
DB vs Approved	-1.206	.464	-.633	.087	.510	-.447	0.436	-1.393*	-0.362	0.336	-0.181	-.835
Financial constraint_{t-t}												
Rejected vs Approved	.352	-.107	-.922*	.211	-.627	.047	0.307	0.311	0.237	0.403	-0.762*	0.176
DB vs Approved	-.139	.203	-.181	-.124	.023	.187	0.076	-0.208	0.091	-0.339	0.093	0.031
Financial Constraint_{t-2}												
Rejected vs Approved	.490**	.472	.244	-.957***	.089	-.271	0.572	0.339	0.326*	-0.995**	-0.625	-0.398
DB vs Approved	.237	-.080	-.131	-.232	-.142	-.439	-0.001	0.058	-0.016	-0.394**	-0.214	-0.006

Table 11: Simultaneous probit models of growth expectation and funding gap perception

Panel A: Growth expectation									
		Turnover					Employment		
Perception of external finance	prdfc(t)	.473***	.473***	.335***	.299***	.506***	.505***	.352***	.315***
	prdfc(t-1)	-.016	-.016	-.184***	-.197***	-.029**	-.030***	-.167***	-.174***
Perception of cash flow	prdcf(t)	.004	.005	.007	.004	.009	.008	.011	.011
	prdcf(t-1)	.006	.006	.007	.007	.011	.011	.018*	.012
Growth	grew(t)	.158***	.161***	.174***	.151***	.057***	.058***	.076***	.068***
Expected Growth	expgro(t-1)	.169***	.167***	.173***	.133***	.170***	.171***	.191***	.158***
Expectation error (base: no error)	Under-estimate	-.004	-.007	-.018	-.019	-.044***	-.044***	-.040**	-.043***
	Over-estimate	.085***	.085***	.084***	.072***	.064***	.065***	.073***	.067***
Growth intention in the next 3 years	1-9%				.142***				.094***
	10-24%				.202***				.141***
	>25%				.273***				.191***

Panel B: Financial constraints perception									
Expected growth	expgr(t)	.341***	.341***	.319***	.279***	.395***	.396***	.363***	.336***
	expgr(t-1)	-.104***	-.105***	-.100***	-.095***	-.097***	-.097***	-.101***	-.095***
Actual funding gap	Failed	.115***	.114***	.053**	.049	.110***	.108***	.050**	.051**
	DB	.075***	.075***	.040***	.036**	.085***	.085***	.040***	.039**
Perceived funding gap	prdfc(t-1)			.207***	.216***			.202***	.208***
	mainbank	-.005	-.006	-.003	-.007	-.013	-.013	-.012	-.008
	changebank	-.006	-.008	-.011	-.017	.003	.001	-.005	-.016
	trade credit	.042***	.041***	.030***	.035***	.040***	.040***	.024*	.027**
Control		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies		No	Yes	Yes	Yes	No	Yes	Yes	Yes
N		6494	6494	6633	6673	6563	6563	6563	6563

Table 12: Probit models of growth expectation adjustment and funding gap perception

		Coeff	ME (upward)	Coeff	ME (upward)	Coeff	ME (upward)	Coeff	ME (upward)
Panel A: Growth expectation adjustment									
		Turnover				Employment			
Perception of external finance	prdfc(t)	1.389***	.273***	1.431***	.315***	1.694***	.281***	1.686***	.270***
	prdfc(t-1)	-.288***	-.057***	-.186***	-.037***	-.626***	-.122***	-.654***	-.128***
Perception of cash flow	prdcf(t)	.102***	.020***	.171***	.034***	.011	.002	.002	.0003
	prdcf(t-1)	.055*	.011*	.039	.008	.026	.005	.032	.006
Growth	decrease(t-1)	1.043***	.252***	1.107***	.263***	1.451***	.324***	1.454***	.325***
	increase(t-1)	-1.168***	-.191***	-1.258***	-.207***	-1.567***	-.212***	-1.561***	-.210***
Growth intention in the next 3 years	<10%	.419***	.073***	.347***	.060***	.184***	.034***	.156***	.028***
	10-50%	.598***	.110***	.606***	.114***	.292***	.056***	.280***	.054***
	>50%	.972***	.199***	1.056***	.222***	.444***	.089***	.437***	.088***
Expectation error	Under-estimate	1.713***	.454***	1.741***	.450***	1.512***	.331***	1.506***	.330***

(base: no error)	Over-estimate	-1.587***	-.204***	-1.684***	-.219***	-1.869***	-.248***	-1.864***	-.247***
Panel B: Perception of financial constraints									
Expected growth (base: expect no change)	decrease	-0.564***	-.050***	-.549***	-.040***	-.976***	-.098***	-.956***	-.096***
	increase	1.145***	.242***	1.128***	.203***	1.258***	.342***	1.283***	.348***
Actual funding gap	failed	0.263**	.061**	.314***	.067***	.216**	.051**	.244**	.060**
	DB	0.235***	.054***	.223***	.047***	.153**	.036**	.126**	.030**
Perceived funding gap	prdfc(t-1)	1.118***	.213***	1.203***	.199***	1.044***	.218***	1.035***	.215***
Control		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies		No	No	Yes	Yes	No	No	Yes	Yes
N		6574	6318	6574	6318	6659	6439	6659	6439