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**BIG
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Disrupted Innovation:
Financing small innovative firms in the UK

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Acknowledgements

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The Big Innovation Centre is an initiative of The Work Foundation and Lancaster University. Launched in September 2011, it brings together a range of companies, trusts, universities and public bodies to research and propose practical reforms with the ambition of making the UK a global open innovation hub as part of the urgent task of rebalancing and growing the UK economy, and with the vision of building a world-class innovation and investment ecosystem by 2025. For further details, please visit www.biginnovationcentre.com.

Executive summary

Despite a steady rise in intangible assets held on their balance sheets, firms, and particularly high growth small and medium sized firms, face systemic difficulties in financing their intangible assets.

We know that the disruptive innovation needed to create new markets, increase demand, raise productivity and sustain the recovery is currently being disrupted by an inability to finance intangible assets.

This research identifies the source of the systemic problem in financing innovation, and examines what type of finance is most suitable to finance innovation. We identify two systemic barriers in the access of finance faced by innovating firms, and specifically innovating small firms: differences in information available about a firm between entrepreneurs and financiers and the intangible nature of knowledge-based assets. The lack of information and trading history about the firm available to financiers, and the inability to value the intangible assets of innovative businesses are currently preventing high growth firms from accessing finance. Although intangibility of assets does result in asymmetric information problems, we have separated the two as barriers due to the specific nature of collateralised bank lending.

Our empirical evidence reveals that intangible assets held by firms are increasing substantially, which demonstrates the importance of knowledge in an increasingly information-based and data driven economy. Particularly, young and micro high growth firms are increasing their investment in intangible assets, and yet they are also the most likely to not be able to access funds to finance their growth. This indicates that the two key barriers faced by small innovative firms in securing finance are a lack of information and trading history about the firm, and the valuation of the intangible assets of innovative businesses.

We use data provided by Experian to map out how firms are financed, and specifically how intangible assets are financed. Our analysis also suggests that there is a role for policy to enable access to finance for SMEs.

There are four key results that we can summarise from our empirical analysis:

- Firms are much more likely to finance their intangible assets through equity rather than debt – for high growth firms this effect is much stronger. We find that within high-growth firms for every £1m increase in equity, they invest a further £499,000 in intangible assets, compared to just £195,000 among all firms. This suggests that equity is better at valuing intangible assets and innovative business models when compared to debt.

- However, small high growth firms are still reliant to some extent on debt to finance intangible assets, reflecting the importance of debt finance, in addition to equity finance.
- Significantly, high growth micro firms are unable to finance intangible assets through either long-term or short-term debt – they tend to reduce their total debt and increase total equity as they accumulate intangible assets.
- Since lenders are less interested in the value of the businesses they are lending to, and more concerned with cash flow and ability to repay the loan, they are unlikely to finance innovative activities. For debt to finance intangible assets, new business models for finance are required.

The implications of this for policy are two fold:

- First, this presents a case for policy to focus more on equity as opposed to debt. The government’s flagship programme to support lending to SMEs, the ‘Funding for Lending’ scheme has supported the economy at a macro-level, but is not resulting in addressing the access to finance issues faced by many firms. To address this issue, policy needs to focus on facilitating more equity funds such as the Enterprise Capital Funds, a public-private venture capital fund set up to address the weakness in the provision of equity finance for early stage SMEs¹.
- Second, our analysis also suggests that a clear structural problem exists in valuing innovative business models, primarily in debt markets but also for start-ups and small firms in equity markets. New ways of financing innovation such as P2P lending, crowdfunding, and new lending technologies suited for innovative companies need to be developed and promoted, without compromising on risk management and prudent lending.

These alternative and disruptive forms of lending could enable banking business models to do better lending, as well as create new markets for lending. Projects that were previously considered to be unviable, with new financial instruments and platforms could be de-risked and funded. New alternative lending technologies and platforms such as these are needed to give businesses greater choice and promote competition amongst finance providers, potentially reducing cost, which would promote greater resilience in the financial system. A wider range of bank and non-bank finance options for businesses will create a more diverse and efficient market, enabling new innovative products and processes to be brought to market.

¹ Department for Business, Innovation and Skills (2013) “SME Access to finance scheme: Measures to support SME growth”

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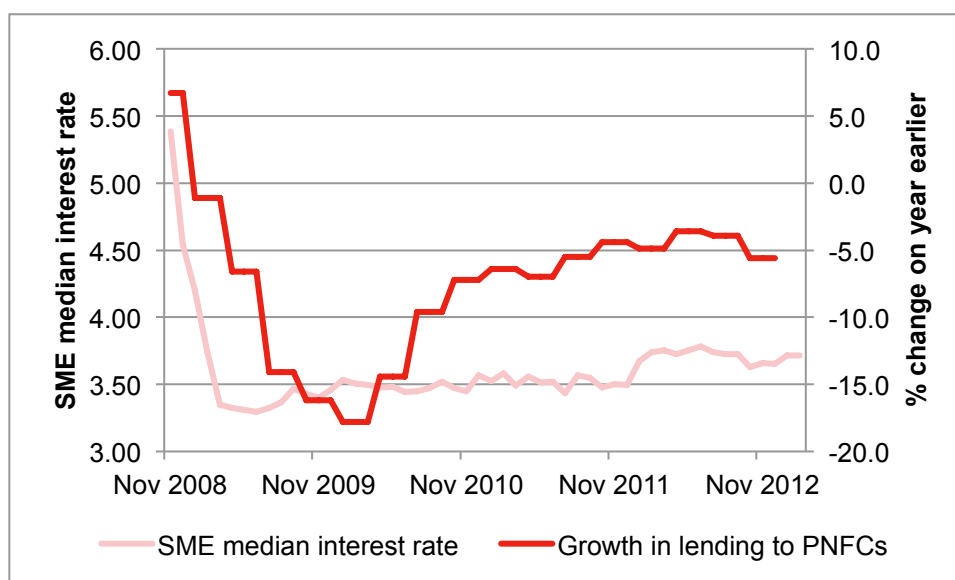
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1. Introduction

Background

Since the onset of the financial crisis in 2007, the stock of lending by banks has been falling year on year. The figure below shows that, lending to UK businesses continues to fall, albeit at a decreasing rate, while interest rates facing small and medium sized enterprises (SMEs) have increased marginally by 50 basis points since June 2009. This suggests that decreasing access to finance for SMEs may be associated with the increasing cost of finance that they face.

Figure 1.1: Interest rates for SMEs² and growth in lending to PNFCs³



Source: Trends in lending data, Bank of England, April 2013

SMEs appear to have been particularly affected by the financial crisis, with interest spreads on loans increasing compared to large firms⁴, while margins on SME overdrafts rose from an average of 0.6ppts in 2005-7 just before the crisis, to 3.6ppts in 2008-9 in its immediate

² Indicative median interest rates on new SME variable-rate facilities - median by value of new SME facilities priced at margins over base rates, by four major UK lenders (Barclays, HSBC, Lloyds Banking Group and Royal Bank of Scotland).

³ Growth in the stock of lending by UK monetary financial institutions to PNFCs, excluding the real estate sector. Not seasonally adjusted.

⁴ http://www.fsb.org.uk/frontpage/assets/fsb%20alternative%20investment_web.pdf, p7

aftermath; even in 2011-12, margins had not fallen, averaging 3.7ppts⁵.

These credit constraints facing SMEs have a significant impact on the economy – it is well acknowledged that innovative SMEs play an important role in productivity, competition and growth. SMEs account for over half of private sector employment, nearly half of private sector turnover and three-quarters of new jobs⁶. Without access to finance, their ability to survive and grow is severely impeded, particularly as SMEs are also more reliant on banks as a source of finance than large companies.

That small firms have been particularly affected may be explained, at least to some extent, by an increase in risk. According to credit ratings of SMEs, the proportion valued as “above average risk” trebled from nine per cent in 2004 to 28 per cent in 2012⁷. Coupled with higher levels of information asymmetry for small firms, it is easy to see why credit constraints have particularly affected SMEs. Nevertheless, there is some evidence that low risk firms were more affected by the crisis, with much of the increase in rejection rates coming from low risk firms⁸. Larger firms were also less affected by the crisis as they could use internal financial resources to finance on-going innovation activities⁹.

The financial crisis has impacted the functioning of our banks – our financial system is performing particularly poorly at its core function, i.e. the allocation of capital¹⁰. Furthermore, the same issues that limit access to finance for SMEs, i.e. a lack of information and collateral, also particularly affect innovative firms. Investment in innovation is partly due to the greater challenges of financing innovation over the economic cycle¹¹, with reduced liquidity in a downturn leaving fewer resources available to finance new investments¹².

In order to overcome problems of information asymmetry, banks typically require firms to provide collateral in order to provide finance¹³ – this provides a clear problem for firms with a high proportion of intangible assets, who are unable to as easily provide any.

Intangible assets, which are crucial for innovation, often require a higher proportion of finance upfront, so this preferential treatment towards tangible assets in banking business models is bad for innovation, and bad for growth.

In order to help address issues around access to finance, the government has launched a

⁵ BIS (2013) “Evaluating Changes in Bank Lending to UK SMEs over 2001-12 – Ongoing Tight Credit?”, p18

⁶ BIS (2012) “SME Access to External Finance”, BIS Economics Paper No. 16, p1

⁷ BIS (2013) “Evaluating Changes in Bank Lending to UK SMEs over 2001-12 – Ongoing Tight Credit?”, p16

⁸ Ibid, p33

⁹ OECD (2012) “Innovation in the crisis and beyond”, p31-2

¹⁰ Broadbent, Ben (2012) “Productivity and the allocation of resources”, Bank of England Speech given at Durham Business School

¹¹ OECD (2012) “Innovation in the crisis and beyond”, p36

¹² Ibid, p26

¹³ From 2001-2012, around 55 per cent of SME term loans had collateral requirements; BIS (2013) “Evaluating Changes in Bank Lending to UK SMEs over 2001-12 – Ongoing Tight Credit?”, p23

number of schemes. Funding for Lending, launched by the Bank of England in July 2012, allows banks and building societies to borrow from the Bank at below the market rate. The government, through the Department for Business, Innovation and Skills, is also creating a new 'business bank' which is tasked with increasing the amount of lending to business and diversifying sources of finance. The bank will manage £3.9 billion, £1 billion of which is new money, and will be fully operational by autumn 2014. The Enterprise Finance Guarantee (EFG) is designed to increase lending to small businesses that lack either security or a track record, providing lenders with a 75 per cent guarantee on each loan. It is expected to lead to £2 billion in extra lending¹⁴.

The government also commissioned a report, "Boosting Finance Options for Business", which identified a funding gap of between £26bn and £59bn for small business over the coming five years¹⁵. One of its recommendations was to increase awareness of forms of alternative finance (see Box 4.1).

Despite the government introducing a number of schemes, lending to SMEs is still severely constrained – although such schemes may have helped to some degree, they have clearly not been able to fix what is a systemic problem.

Our paper identifies the source of the systemic problems in financing innovation, and looks at what type of finance is most suitable to finance innovation. The remainder of this paper is structured as follows:

- In **section 2**, we will survey the literature to identify systemic barriers faced by innovating firms, specifically innovating small firms.
- In **section 3**, we use data provided by Experian to map out how firms are financed, and measure using advanced econometric techniques, particularly how intangible assets are financed.
- Next, in **section 4** we look at the role of policy in enabling access to finance for innovation.
- And finally, **section 5** provides some concluding remarks on our analysis.

¹⁴ BIS (2013) "Building the Business Bank: Strategy Update"

¹⁵ Industry Taskforce (2012) "Boosting Finance Options for Business", Department for Business, Innovation and Skills, p16

2. Identifying systemic barriers to finance for innovative SMEs

In this section, we first we outline the data and review the trends in our data. Next, we briefly survey the evidence on access to finance for SMEs and how this affects firm growth. We then digress to establish the empirical and theoretical literature on how firms are financed, i.e. the capital structure of firms, and whether this is different for small firms. Building on this review, we then identify two systemic barriers facing innovative firms in access to finance and growth: asymmetric information and the intangibility of assets.

Experian Data

The data used in the following sections of this paper is provided by Experian PH for firms that have had an equity deal between 1997 and 2012. Data includes balance sheet data such as a breakdown of current and non-current liabilities and current, intangible and fixed assets, overdrafts, bank loans, turnover, profit and equity; as well as also including a firm's Standard Industrial Classification (SIC) code to the four-digit level, date of incorporation, date and type of equity deal and number of employees. As the data is derived from balance sheet information, intangible assets are defined as those assets that can be capitalised on the balance sheet. These include intangible assets such as patents, copyrights, designs, trademarks, goodwill etc. However, it is worth noting that intellectual assets that are internally generated can not be moved on to the balance sheet – accordingly, the majority of intangibles represented in our data are capitalised research and development expenditure.

The dataset includes 20,984 firms, with a total of 202,578 observations. It is an unbalanced panel set and so follows firms over time. We deflate the financials using GDP deflators and, where necessary, normalise the reporting to 52 weeks. We then removed micro non-high growth firms with total assets of more than £10m, leaving 197,181 observations. For the econometric analysis, firms which were balance sheet insolvent – having negative total net assets – were also removed, leaving 172,961 observations.

Firms were defined as micro if turnover was less than £2m; small if between £2m and £10m; medium between £10m and £50m and large if turnover was greater than £50m. These figures are in line with the European Commission definition (albeit in £ rather than Euros). We also used a definition of size by employment (0-9; 10-49; 50-249; 250+); however, results were distorted by a few firms with minimal employment but very high turnover, so the turnover definition for firm size was used.

Firms were defined as high growth if they met at least one of the following criteria: year-on-year growth in employment of at least 20% for three consecutive years; or year-on-year growth in turnover of at least 20% for three consecutive years.

Below, we provide a summary of firms, and high growth firms by size in our sample – 90% of the firms in our dataset are SMEs.

Table 2.1: Summary of data set

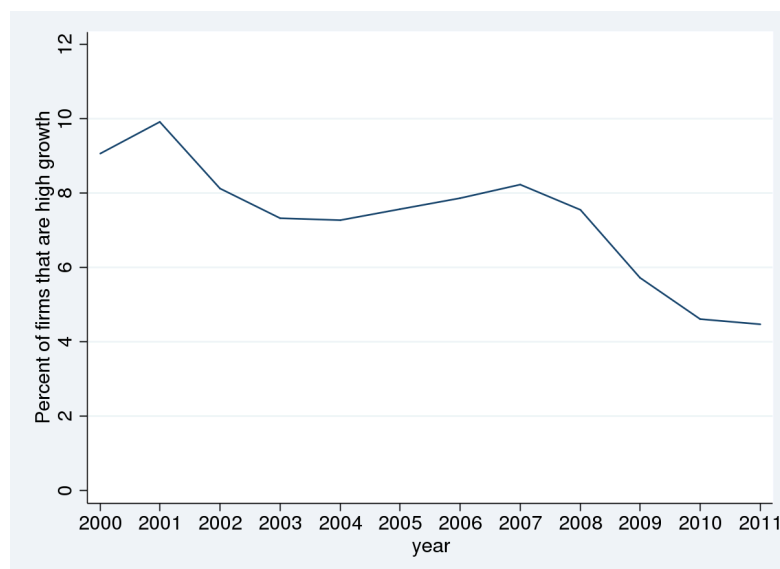
| | Micro | Small | Medium | Large | All |
|-----------------------|-------|-------|--------|-------|--------|
| Per cent of all firms | 58.82 | 15.12 | 15.90 | 10.16 | 100.00 |
| Per cent high growth | 5.90 | 6.52 | 7.89 | 7.31 | 7.06 |

Economic trends in the data

The effects of the financial crisis can clearly be seen in Figure 2.1, with high growth firms falling as a proportion of all firms after 2007, from around eight per cent in the years before the crisis to just over four per cent in 2011. The size and age of firms affected prospects during the recession (Figures 2.2 and 2.3, respectively). Younger firms, whilst typically more likely to be high growth, saw a greater fall since the financial crisis, whilst micro and small firms are the least likely to grow. Micro firms seem to have been on a steady decline since before the recession, however.

One of the main obstacles to growth is access to finance, particularly for innovative firms, who are both more likely to apply for finance, and more likely to be rejected if they do. This problem has only increased during the recession¹⁶.

Figure 2.1: High growth firms over time



¹⁶ Lee, N., Sameen, H. & Martin, L. (2013) "Credit and the crisis: Access to finance for innovation small firms since the recession", Big Innovation Centre, p3

Figure 2.2: High growth firms by firm size over time

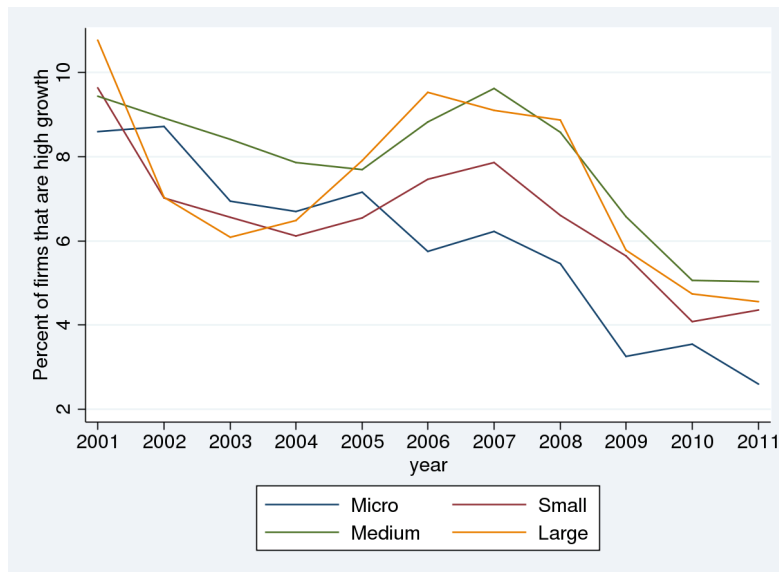
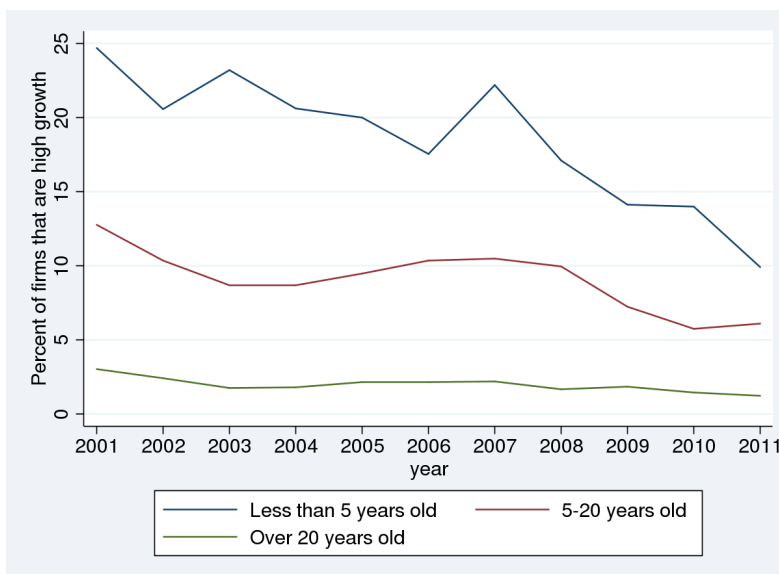


Figure 2.3: High growth firms by firm age over time



Access to finance for SMEs

Empirical studies have shown SMEs face greater challenges when trying to access finance than larger firms¹⁷. Firms access two broad sources of finance when seeking funds – debt and equity. Debt is borrowing or an obligation, ordinarily against some form of collateral, while equity is funds received for a claim on future profits. In start-ups, for instance, where

¹⁷ Coluzzi, C., Ferrando, A. and Martinez-Carrascal, C. (2009) “Financing Obstacles and Growth: An Analysis for Euro Area Non-Financial Corporations”, European Central Bank Working Paper, p15

problems of asymmetric information are greater, banks still finance debt, but provide a smaller fraction¹⁸ – this reduces their risk of exposure to potential losses, but allows them to build a relationship with the firm, which may pay off in the longer term. Nevertheless, this leaves firms with a shortfall in funding. One way that banks try to mitigate imperfect information is to ask for collateral; one-fifth of SMEs having difficulties raising finance cited insufficient collateral as the reason they were rejected for finance¹⁹. Rather than being rewarded on the basis of merit, finance for many SMEs is based on banks trying to minimise exposure to unknown risks, a clear instance of market failure.

High growth firms face a particular disadvantage – due to imperfect information they are often undervalued by banks: a study by Experian showed that high growth firms had consistently lower rates of insolvencies than non-high growth firms of the same grade²⁰. As a result, these high growth firms are charged at a higher rate than their performance merits. High growth SMEs are also more likely than non-high growth SMEs to cite cash flow as an obstacle to success²¹.

As firm owners wish to retain control of the firm, equity finance is preferred less by SMEs than debt finance. Nevertheless, once other forms of finance are exhausted, firms will turn to equity finance. Equity finance, however, can be costly: one, albeit dated, study of US firms found the cost of raising debt to be as low as 1% of the amount raised; for equity the range was between 4 and 15%²². Furthermore, the difficulties of accurately valuing an SME in order to provide a useful figure of equity are potentially prohibitive²³.

A 2003 consultation by HMT and the Small Business Service showed a particular gap in funding for firms seeking investments of between £250,000 and £1m²⁴. The latest BIS estimates put the ceiling at between £2m and £5m, noting that “very few private sector Venture Capitalists now invest below £5m”²⁵. The effect is particularly stark for sectors where R&D or capital expenditure is high, where the equity gap may be as high as £15m. For many SMEs, therefore, equity finance is effectively out of reach.

The financial crisis has increased the difficulty of SMEs to access finance. Whilst banks have

¹⁸ Franck, T. and Huyghebaert, N. (2009) “Financing of Business Start-Ups: A Topic of Great Relevance for Firm Performance, Growth and Survival”, in Balling M., Bernet, B. and Gnan, E. (eds) *Financing SMEs in Europe*, Vienna: SUEF Studies, p22

¹⁹ Department for Business, Innovation and Skills (2012) “SME Access to External Finance”, BIS Economics Paper No.16, p9

²⁰ Experian presentation (2011) “NESTA analysis of High Growth Firms before and during the recession compared to other firms”

²¹ Lee, N. (2012) “Free to grow? Assessing the obstacles faced by actual and potential high growth firms”, Big Innovation Centre, p30

²² Baskin, J. (1989) “An Empirical Investigation of the Pecking Order Hypothesis”, *Financial Management* 19, pp26-35

²³ Moro, A., Lucas, M., Grimm, U. and Grassi, E. (2010) “Financing SMEs: a model for optimising the capital structure”, in 17th Annual Global Finance Conference, 27-30 June 2010, Poznan, pp4-5

²⁴ HMT and SBS (2003), “Bridging the Finance Gap: Next Steps in Improving Access to Growth Capital for Small Businesses”, p6

²⁵ Department for Business, Innovation and Skills (2012) “SME Access to External Finance” BIS Economics Paper No.16, p11

tightened their lending criteria, it is also the case that SMEs are now, on average, more risky investments due to the macroeconomic environment – according to Fraser (2009), the share of high risk SMEs increased from 4.4% to 21.7% between 2004 and 2008, for instance²⁶.

New financial service regulations (Basel 3) require banks to hold more capital against certain types of assets. Combined with the added effects of banks becoming more risk averse due to the crisis and firms becoming increasingly risky, this has seen lending to firms shrink. Although a higher proportion of SMEs applying for finance are rejected (21% in 2010, up from 8% in 2007/8), it is not just supply that has contracted – demand has also fallen. Demand for overdrafts and term loans fell by 15 and 20% respectively between 2001-2004 and 2005-2008 according to a survey of SMEs²⁷.

Impact of financial barriers on firm growth

A number of studies have found a positive relationship between access to finance and growth²⁸; and obstacles in accessing finance are frequently cited as an obstacle for growth by firms.

High growth firms are particularly likely to view obtaining finance as an obstacle to growth – according to one study, 18% of high growth firms cited either short-term cash flow or long-term finance as the most important barrier to growth. This compares with 13% of other firms²⁹.

Financing obstacles are seen as a larger constraint on growth the smaller the size of the firm³⁰, whilst financial sector development is positively correlated with growth, especially for new firms, as they are disproportionately dependent on external finance³¹.

A study of UK SMEs found both short term and long term debt were positively related with firm growth for rapidly growing small firms, but that almost twice as much short term debt was raised to finance growth than long term debt, indicating the particular importance of short term debt for firm growth³². Short term debt is seen as preferable for both entrepreneurs, who perceive it as cheaper, and for banks who view it as less risky as they

²⁶ Fraser, S. (2009) “Small Firms in the Credit Crisis: Evidence from the UK Survey of SME Finances”, Warwick Business School, University of Warwick, p27

²⁷ Ibid, p6

²⁸ For a summary, see Department for Business, Innovation and Skills (2012) “SME Access to External Finance”, BIS Economics Paper No.16, p7

²⁹ Lee, N. (2012) “Free to grow? Assessing the obstacles faced by actual and potential high growth firms”, Big Innovation Centre, p37

³⁰ Ayyagari, M., Demircuc-Kunt, A. and Maksimovic, V. (2006) “How Important Are Financing Constraints? The role of finance in the business environment”, World Bank Policy Research Working Paper 3820, p4

³¹ Rajan, R. and Zingales, L. (2001) “Financial Systems, Industrial Structure, and Growth”, *Oxford Review of Economy Policy*, Vol. 17, No. 4, p470

³² Michaelas, N., Chittenden, F. and Poutziouris P. (1999) “Financial Policy and Capital Structure Choice in the UK SMEs: Empirical Evidence from Company Panel Data”, *Small Business Economics* Vol. 12, p121

can more quickly recover the loan in the event of bad news³³.

A firm's capital structure, that is, how a firm finances itself, is not only affected by the firm's size, growth and age – it can also be affected by the sector of the firm. As firms grow, the ratio of long term debt to short term debt increases, but this effect is particularly evident for construction and wholesale and retail trade, whilst minimal for education, health and social work.

Firms in sectors with, on average, a higher proportion of intangible assets, have been shown to require higher levels of collateral for loans and also to rely proportionally more on equity for investment than other sectors, possibly reflecting greater information asymmetries³⁴.

The credit crunch has also seen substantially different financing issues in different sectors. Results from the Small Business Survey showed that in 2008, around one in four SMEs in the 'Wholesale and Retail' and 'Hotels and Restaurants' sectors reported having had an overdraft application rejected outright in the last three years, compared to an average of 15 per cent of all SMEs. For 'Wholesale and Retail' this was a stark change from the period of 2001-2004 when just 2.6 per cent of firms reported as such, compared to 4.2 per cent of all SMEs³⁵.

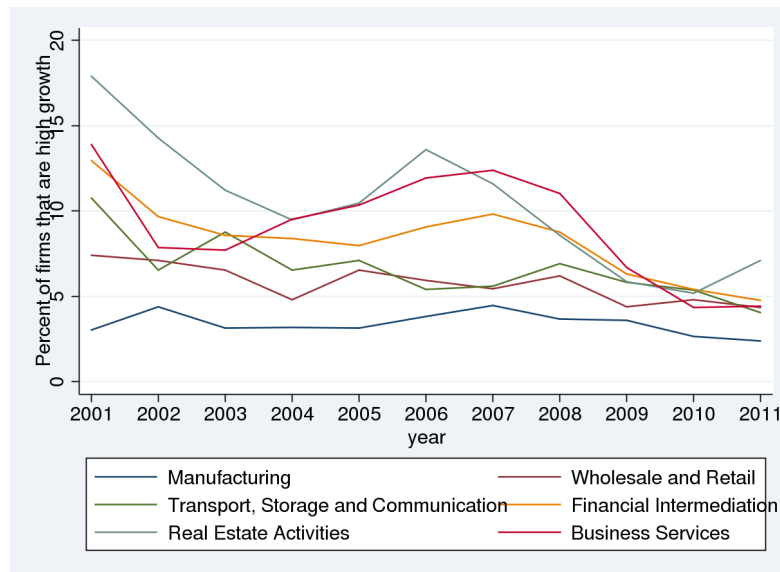
Our results also show large differences between sectors, as seen in Figure 2.4 – manufacturing, wholesale and retail trade and transport, storage and communication saw relatively less steep declines after 2007, partially due to having a small proportion of high growth firms going in to the crisis. Business services, real estate activities and financial intermediation all saw large declines after 2007. One effect of the crisis was to reduce the variation between sectors' performance on this measure, with high growth rates converging to around five per cent in 2010.

³³ For a summary, see Moro, A., Lucas, M., Grimm, U. and Grassi, E. (2010) "Financing SMEs: a model for optimising the capital structure", in 17th Annual Global Finance Conference, 27-30 June 2010, Poznan, p2

³⁴ Mac an Bhaird, C. and Lucey, B. (2009) "Determinants of the Capital Structure of SMEs: A Seemingly Unrelated Regression Approach", *Small Business Economics*, pp16-17

³⁵ Fraser, S. (2009) "Small Firms in the Credit Crisis: Evidence from the UK Survey of SME Finances", Warwick Business School, University of Warwick, pp32-34

Figure 2.4: High growth firms by sector over time



Box 2.1 Theory of the capital structure of firms

The seminal theoretical framework and reference point for all subsequent research on the financial structure of firms (i.e. how firms choose to finance themselves) is the Modigliani-Miller Propositions,³⁶ also known as the ‘Capital Structure Irrelevance Theorem’. The theorem states that the value of a firm is not affected by whether it chooses to finance itself through debt or equity (ignoring the tax treatment of different sources of financing) under certain capital market perfectness. The theorem is best understood as the conditions under which the source of financing does not affect the firm’s value. Put another way, it makes no difference to the value of a company how much of it is financed by equity and how much by debt, *unless the capital structure changes the way in which assets are managed.*

This no-arbitrage result suggests that observed firm capital structures should not entail systematic patterns of within-group homogeneity and between-group heterogeneity. However, these patterns are observable within and across industry, such as industry-specific and size-specific leverage ratios, implying the importance of capital market imperfections.

The observable patterns in firm capital structure suggest that there are likely to be various imperfections in capital markets, such as asymmetry of information and agency costs. The

³⁶ Modigliani, F. and Merton H. Miller (1958) “The Cost of Capital, Corporation Finance and the Theory of Investment”, *The American Economic Review*, Vol. 48, No. 3, pp. 261-297

most influential and mainstream theories of capital structure under capital market imperfections, are the trade-off theories³⁷ and the pecking order theory³⁸. The static trade-off theory considers costs and benefits of debt (in particular tax savings versus expected deadweight costs from bankruptcy) and based on the trade-off between the costs and benefits, firms can determine an optimal level of leverage that maximises firm value^{39,40}. In dynamic trade-off theories the optimal leverage ratio varies over time (due to time-varying determinants) and firms dynamically adjust to shocks in leverage or asset prices.

A significant fraction of these trade-off theories have focused on the role of agency costs, i.e. costs due to conflict of interest⁴¹. The literature identifies broadly two types of conflicts: conflicts between shareholders and managers, and between debt holders and equity holders. Conflicts between shareholders and managers arise because managers hold less than 100% of the residual claim and consequently they do not capture the entire gain from their profit-enhancement activities. Conflicts between debt holders and equity holders arise because as an investment yields large returns above the value of the debt, equity holders capture more of the gain. However, if the investment fails, because of limited liability, they also absorb the losses before any cuts to debt-holders.

Is the capital structure of SMEs different compared to larger firms?

Pecking order theories are based on the premise that 'inside' management is better informed of the true value of the firm than 'outside' investors. When financing investment projects, firms seek to use sources of funds least susceptible to undervaluation due to information asymmetries. Thus, pecking order theories predict that firms have a preference to finance investment projects with internal equity. When internal equity is exhausted, firms use debt financing before resorting to external equity. The relatively greater information asymmetries and the higher cost of external equity for SMEs⁴² suggest that the pecking order theories are an appropriate theoretical approach for the sector. Empirical evidence suggests that SME owners try to meet their financing needs from a pecking order of, first, their own money (personal savings and retained earnings); second short-term borrowings; third, longer term

³⁷ For example, see Heinkel, R. (1982) "A Theory Capital Structure Relevance Under Imperfect Information", *The Journal of Finance*, Vol. 37, No.5, pp. 1141-1150 and Myers, S.C. (1984) "The Capital Structure Puzzle", *The Journal of Finance*, Vol. 39, No.3, pp. 575-592

³⁸ See Myers, SC and Majluf, N. (1984) "Corporate financing and investment decisions when firms have information that investors do not", *Journal of Financial Economics*, Vol. 13, No. 2, pp. 187-221

³⁹ For details see Kraus, A. and Litzenberger, R. (1973) "A state-preference model of optimal financial leverage", *The Journal of Finance*, Vol. 28, No.4, pp. 911-922. The optimal point can be attained when the marginal value of the benefits associated with debt issues exactly offsets the increase in the present value of the costs associated with issuing more debt.

⁴⁰ Also, note that firm value can be measured by either asset-based or market-based approaches in the literature.

⁴¹ Seminal paper in this sub-stream of research is Jensen, MC and Meckling W., "Theory of the firm: Managerial behaviour, agency costs and capital structure", *Journal of Financial Economics*, Vol.3, pp 305-360

⁴² Ibboston et al (2001), Initial Public Offerings. IN CHEW, D.H.J. (Ed.) *The New Corporate Finance: Where Money Meets Practice*. 3rd Ed, McGraw Hill-Irwin

debt; and lastly the introduction of new equity investors which represents maximum intrusion⁴³.

The primary explanatory factor for the adherence of SMEs to the pecking order theories of financing is the desire of the firm owner to retain control of the firm and maintain independence⁴⁴. Adherence to these theories is, crucially, not dependent on demand side preferences, but also on the availability of the preferred source of financing. The supply of the finance depends on many factors, including the stage of development and business model of the firm. Sources of internal equity for the start-up and nascent firms typically consist of the personal funds of the firm owner and funding from friends and family.

Trade-off models based on agency costs between managers and shareholders do not typically apply to SMEs as in most cases the managers are in fact the owners. However, the firm's security holders (debt and shareholders) are seen as principals and the firm's management as the agent, managing the principals' assets. Whilst a number of these relationships are relevant for SMEs, the primary agency conflict in small firms is generally not between owners and managers but inside and outside contributors of capital⁴⁵. It is worth mentioning that potential agency costs are exacerbated by information asymmetries resulting from the lack of uniform, publicly available and detailed accounting information. The primary concern for outside contributors of capital arises from moral hazard⁴⁶, i.e. the possibility of the SME owner changing their behaviour to the detriment of the capital provider after credit is granted. This is because the firm owner has an incentive to alter his behaviour ex post to favour projects with higher returns and greater risk.

How do innovative firms choose to finance themselves?

Theories of capital structure can suggest reasons why innovative firms may favour particular sources of finance.

One approach emphasises the importance of bankruptcy costs. These are likely to be relatively low for firms with a high proportion of tangible assets, particularly property and equipment associated with generally applicable technologies, as tangible assets can more easily be used to pay off debt. They are likely to be higher for innovative firms with a higher proportion of intangible assets, such as knowledge and reputation, and with more specialised equipment. For a given level of debt, the risk of bankruptcy may also be higher. Both factors suggest that more innovative firms are likely to be less reliant on debt finance, to minimise bankruptcy costs.

⁴³ Cosh, A. D. and Hughes, A. (1994) "Size, financial structure and profitability: UK companies in the 1980s" IN A. Hughes and D. Storey (eds) *Finance and the small firm*, London: Routledge

⁴⁴ Jordan, J., Lowe, J. and Taylor P. (1998) "Strategy and Financial Policy in UK Small Firms", *Journal of Business Finance & Accounting*, Vol. 25, pp. 1-27

⁴⁵ Hand et al. (1982) "Agency relationships in the close corporation", *Financial Management.*, Vol. 11, pp. 25-30

⁴⁶ Fraser, S., Bhaumik, S. and Wright, M. (2013) "What do we know about the relationship between entrepreneurial finance and growth?", Enterprise Research Centre, p20

However, another approach considers agency costs and informational asymmetries between investors and firm managers or entrepreneurs to be central to the choice between debt and equity. More specifically, by selling equity to outside investors, the firm's current owners may signal that its future prospects are less than excellent, otherwise they would have chosen to remain the full residual claimant on the firm's revenues (e.g. by issuing debt, rather than equity). This signalling problem leads to new share issues being under-priced, which imposes a dilution cost to the firm's initial owners.

Finally, a third approach emphasises control rights⁴⁷. Here, the idea is that the higher amount of intangible assets inside a firm, the more outside investors will insist on having control rights over the firm's decisions in order to decrease their risk. Firms will first try to fund investment from their retained earnings in order to relax the participation constraint of outside investors; but then, as more investment funds are required, firms will use debt financing (whereby managers retain control except when the firm defaults on its repayment obligations); and it is only when the project's size (or scope) becomes sufficiently large and/or when assets become sufficiently intangible that firms will allocate fuller control rights to outside investors by issuing new equity. To the extent that more innovative firms have more attractive investment opportunities and fewer tangible assets, this approach predicts that they will tend to be more reliant on new equity finance. This alternative theory of the pecking order thus also predicts that they will tend to be more reliant on external funds, but suggests that they may favour new equity rather than debt among these external sources.

Empirical studies on the financial structure of innovative firms suggest that innovative firms are more reliant on external finance compared to less innovative firms, and also that they are more likely to finance themselves through new equity as opposed to debt, in line with the approaches that emphasise control rights and bankruptcy costs⁴⁸.

Financing of innovative firms

In a market-based economy, those who create and manage firms (entrepreneurs) are usually not the same individuals as those who have the means to finance this activity. This implies that an information gap is likely to exist between those asking for funds and those supplying them. As will be discussed in more detail below, economists refer to the extra costs thus induced as arising from the problems of "asymmetric information" and "moral hazard". Both of these are expected to raise the costs of obtaining finance from sources external to the firm. And although this will be true to some extent for all firms, the problem is particularly salient in the case of new firms and firms undertaking innovative activities.

⁴⁷ Aghion and Bolton (1992) "An Incomplete Contracts Approach to Financial Contracting", *The Review of Economic Studies*, Vol. 59, No.3, pp. 473-494 and Hall, BH. (2009) "The financing of innovative firms", European Investment Bank Papers, Volume 14, No.2

⁴⁸ Aghion P., Bond S., Klemm A. and Marinescu I. (2004) "Technology and Financial Structure: Are Innovative Firms Different?", *Journal of the European Economic Association* 2(2-3): pp277-288

Three different levels of difficulty are distinguished with regarding the financing of innovation: the problems of existing innovating firms in acquiring sufficient funds for their investments; the reluctance of non-innovators to undertake innovation due to its high cost; and the problems faced by new start-up firms. Although all of these difficulties arise from the same ultimate set of causes, the empirical analysis of each differs substantially and the possible range of policy solutions will differ. In particular, the first case, on which most of the econometric literature has focused, is subject to marginal analysis, whereas the second two cases involve the overcoming of (often substantial) fixed costs of entry into innovation.

What makes financing innovation different?

From the perspective of investment theory, innovation investments⁴⁹ have a number of characteristics that make them different from ordinary investments. Most importantly, most of the expenditure, with the exception of that on new capital equipment, consists of worker wages. From considerable survey evidence over the past 50 years, we know that in practice 50 per cent or more of the R&D portion of this investment goes toward paying scientists and engineers, who are usually highly educated. Their efforts create an intangible asset, the firm's knowledge base, from which profits in future years will be generated. Added to this knowledge base are the specific human capital created by worker training in new products and processes and the knowledge created by design and marketing investments. To the extent that all this knowledge is "tacit" rather than codified, it is embedded in the human capital of the firm's employees, and is therefore lost if they leave or are fired.

This fact has an important implication for the conduct of R&D investment and innovation investment more broadly. The focus in the discussion below is on R&D as it is the measure on which much of the previous empirical research has usually been based. Because part of the resource base of the firm itself disappears when knowledge workers leave or are fired, firms tend to smooth R&D spending over time in order to avoid having to lay them off. This implies that R&D spending at the firm level will behave as though it has high adjustment costs⁵⁰. The consequence is that the equilibrium required rate of return to R&D may be high simply to cover the adjustment costs of changing output.

However, evidence suggests that in the recent past, the variance of innovation spending growth has increased somewhat, for at least two reasons. The first is the increased importance of the ICT sector, where there is fairly rapid obsolescence of R&D outputs, and a

⁴⁹ Investment in innovation usually consists of Research and Development (R&D) spending, design and marketing expenses for bringing a new product to market, investment in new capital equipment, and investment in training. Although these can vary by industry and type of innovation, R&D is usually the most important, accounting for more than 50 per cent of innovation expenditure – see Hall, B.H. (2009) "The financing of innovative firms", European Investment Bank Papers, Volume 14, No.2.

⁵⁰ Hall, B.H., Griliches, Z. and Hausman, J.A. (1986) "Patents and R&D: Is there a lag?". *International Economic Review*(27), pp.265-283; Lach, S. and Schankerman, M. (1988) "Dynamics of R&D and investment in the scientific sector". *Journal of Political Economy*, (97:4), pp.880-904

consequent reduction in the incentives to safeguard human capital⁵¹. The second is that markets for technology have become somewhat more important, which reduces the need to keep firm's entire knowledge in-house⁵². Nonetheless, it remains true that the variances in innovation investment growth rates are about one quarter to one fifth that for ordinary investment⁵³.

In addition, investment in innovation is also associated with a degree of uncertainty with regards to output. This uncertainty tends to be greatest at the beginning of a research project, which implies that an optimal innovation strategy has an options-like character and should be analysed in a dynamic, rather than static, framework. Innovative projects with small probabilities of great success in the future may be worth continuing even if they do not pass an expected rate of return test. The uncertainty here can be extreme. In these cases, standard risk-adjustment methods do not work well. Looked at from the perspective of standard finance theory, the variance of a portfolio constructed from such assets is unbounded so the usual diversification analysis does not apply.

High uncertainty of returns to innovation has been exacerbated in the recent past by the rise of network, or "winner-take-all" products, such as in software or Web-based services. Examples such as Google, eBay and Facebook are familiar – these are characterised by very high returns to the initial investment, but there are a large number of similar entrants who either fail or never reach critical mass and settle for a small niche of the market.

Another characteristic of investment in innovation is that has implications for financing is that the "capital" created is intangible, including human capital embedded in employees. Such capital typically has relatively low salvage value because it is also idiosyncratic – for example, the fact that the firm owning the capital goes out of business is a signal that its value was low. Except for the type of effort now underway to harvest patents from such firms (e.g., Ocean Tomo or Intellectual Ventures), there is little market for distressed intangible assets. The human capital involved goes with the employee, and usually he or she will capture any residual value from that in the form of wages in future employment. Nevertheless, most of the knowledge generated by employees is often codified in to the firm, such as with the creation of copyright whereby the knowledge becomes a business asset. Where this is not acknowledged by external financiers, it will lead to the firm being undervalued. Thus debt instruments that are secured by the value of the capital asset are not likely to provide a useful source of funding for innovation.

Summing up, the academic literature identifies the following characteristics of R&D and other

⁵¹ Hall, B.H. (2009) "The financing of innovative firms", European Investment Bank Papers, Volume 14, No.2

⁵² Arora, A., Arunachalam, V., Asundi, J., & Fernandes, R. (2001) "The Indian software services industry", *Research Policy*, 30, 1267–1287

⁵³ Hall, B.H. (2006) "Measuring the returns to R&D: The depreciation problem". *Annales d'Economie et de Statistique*, N° 79/80,

innovation investments that can result in access to finance problems: (i) innovation investment needs to be smoothed in order to retain valuable employees; (ii) they are highly uncertain and information about success or failure is revealed over time; and (iii) they create an idiosyncratic intangible capital with a limited resale market⁵⁴. With respect to innovation investments, a market failure exists which creates a gap between the external and internal costs of capital; these can be divided into two main types of market failures: (i) asymmetric information between innovator and investor; (ii) an inability to value the intangible assets of innovative firms.

Barriers to innovation

From the preceding analysis we can identify two barriers to innovation that result in a higher cost to finance innovation, i.e. asymmetric information between innovator and investor, and related to this, the intangibility of assets that poses problems in valuing the business models of innovative businesses.

Asymmetric information problems

In the R&D setting on which much of the literature is based, the asymmetric information problem refers to the fact that an inventor or entrepreneur frequently has better information about the nature of a project and the likelihood of its success than potential investors. It has been suggested that the market place for financing innovative ideas looks like the market for 'lemons' described by Akerlof (1970)⁵⁵. An innovator has to offer higher returns, and hence a lower price, to compensate the financier for the possibility that the project is not as good as claimed. Thus, the 'lemons' premium for innovation is greater than that for ordinary investments because of the greater uncertainty in identifying good projects.⁵⁶

In the most extreme version of the lemons model, the market for R&D projects may disappear entirely if the asymmetric information problem is too great. Reducing information asymmetry via fuller disclosure is of limited effectiveness in this arena: firms are reluctant to reveal their innovative ideas to the marketplace as there could be a substantial cost to revealing information to their competitors, reducing the quality of the signal they can make about a potential project^{57,58}. Thus the implication of asymmetric information coupled with the costliness of mitigating the problem is that firms and inventors will face a higher cost of external than internal capital for R&D due to the 'lemons' premium.

Asymmetric information problems can sometimes be mitigated by reputations developed

⁵⁴ Hall, BH. (2009) "The financing of innovative firms", European Investment Bank Papers, Volume 14, No.2

⁵⁵ *Ibid*

⁵⁶ Leland, HE. and Pyle, D. (1977) " Informational asymmetries, financial structure and financial intermediation", *Journal of Finance*, Vol. 32

⁵⁷ Bhattacharya, S. and Ritter, JR. (1983) "Innovation and Communication: Signalling with Partial Disclosure", *Review of Economic Studies*, Vol. 50, No. 2, pp.331-346

⁵⁸ Anton, James J. and Yao, Dennis A. (1998) "The Sale of Intellectual Property: Strategic Disclosure, Property Rights, and Incomplete Contracts." Duke University and the Wharton School, University of Penn

through repeated interactions, however. Venture capital funds help build reputation through repeated interactions and supply information and monitoring of early stage technology start-ups, thereby reducing the risk premium. In addition, serial entrepreneurs too, often face less difficulty in accessing finance for new projects as they develop reputations through setting up successful businesses in the past.⁵⁹

Young firms face particular financing challenges, arising from both their specific funding requirements as new firms and issues arising from a lack of track record, especially information asymmetry. However, young firms are generally better at innovating despite facing financial challenges. This is evidenced by the fact that large firms tend to innovate through imitation of new disruptive innovations from smaller firms and through working with small firms that innovate through either equity participation, contract research, licensing or simple outsourcing. This suggests that SMEs have particular advantages in innovating owing to their smaller size and flexibility.⁶⁰

Much of the literature focuses on how capital structure can vary with firm size, but firm age may be just as⁶¹, if not more, important. A number of studies have shown that younger firms are more likely to face financing obstacles than older firms⁶². One study of innovative firms in the EU found that young, innovative firms were, on average, more likely to list financial constraints – internal and external – as barriers to innovation than other innovative firms⁶³.

As start-ups have no track record themselves, this leads to a high level of asymmetric information, with financiers often relying on the owner's personal financial history, rather than the merits of the business. Collateral for a loan will have to come from the initial funds for the business, themselves usually from the owner, and often also from friends and family. Start-ups also have high failure rates, with only about half of new ventures surviving beyond five years, making them risky investments. Furthermore, as the owner is also usually the manager, there are high private benefits of control, leading to reluctance to seek equity finance⁶⁴.

With no accumulated profits from previous sales, new firms are more dependent on external

⁵⁹ Hall, BH. (2009) "The financing of innovative firms", European Investment Bank Papers, Volume 14, No.2

⁶⁰ Zenger, Todd R. and Sergio G. Lazzarini. 2004. "Compensating for Innovation: Do Small Firms Offer High-powered Incentives that Lure Talent and Motivate Effort." *Managerial and Decision Economics*. 25: 329–345.

⁶¹ Berger, A. and Udell, G. (1998) "The economics of small business finance: The role of private equity and debt markets in the financial growth cycle", *Journal of Banking and Finance*, Vol. 22, p662

⁶² For example, see Coluzzi, C., Ferrando, A. and Martinez-Carrascal, C. (2009), "Financing Obstacles and Growth: An Analysis for Euro Area Non-Financial Corporations", *European Central Bank Working Paper*, p3

⁶³ Gaspar, V., Bovha-Padilla, S. and Veugelers, R. (2009) "Finance for Innovation and Growth", in Balling M., Bernet, B. and Gnan, E. (eds) *Financing SMEs in Europe*, Vienna: SUEF Studies, pp51-53

⁶⁴ Franck, T. and Huyghebaert, N. (2009) "Financing of Business Start-Ups: A Topic of Great Relevance for Firm Performance, Growth and Survival", in Balling M., Bernet, B. and Gnan, E. (eds) *Financing SMEs in Europe*, Vienna: SUEF Studies, p20

finance⁶⁵; over time, however, they may have access to accumulated profits⁶⁶ as internal equity increases with age⁶⁷.

Intangibility of assets

Investment in intangible assets is growing rapidly. In some cases this investment matches or exceeds investment in traditional capital such as machinery, equipment and buildings. Intensified global competition, ICTs, new business models, and the growing importance of the services sector have all amplified the importance of intangible assets to firms, industries and national economies⁶⁸. The global economic crisis has placed a new focus on how policies might help the accumulation of intangible assets and provide new sources of growth. Concerns also exist that the crisis might undermine the financing of investment in intangible assets. And in many emerging economies policymakers are seeking to develop the intangible assets necessary for success in high value-added activities.

Intangible assets are assets that do not have a physical or financial embodiment. Much of the focus on intangibles has been on R&D, key personnel and software. But the range of intangible assets is considerably broader. One classification groups intangibles into three types: computerised information (such as software and databases); innovative property (such as scientific and non-scientific R&D, copyrights, designs, trademarks); and economic competencies (including brand equity, firm-specific human capital, networks joining people and institutions, organisational know-how that increases enterprise efficiency, and aspects of advertising and marketing). Recent evidence shows that only a small proportion of firms report these intangible assets on their balance sheets – 8% of UK firms surveyed in the European Commission’s 2011 Innobarometer Survey reported R&D investment as intangible assets on their balance sheet, 11% of UK firms reported software development on their balance sheet, and 30% of UK firms reported other assets such as training, design, reputation, organisation and business process improvements on their balance sheet⁶⁹.

As the data we use in this paper is derived from balance sheet information, we can only look at those assets which have been reported on the balance sheet. These largely include the innovative property such as patents, copyrights, designs, trademarks and economic competencies such as reputation, organisational know-how etc.

This likely understates the level of intangibles in a firm – whilst there are ways for a firm to capitalise the cost of intangibles on their balance sheets, standard accounting rules make it very difficult to show the value of these assets. There is also evidence that in many

⁶⁵ Rajan, R. and Zingales, L. (2001) “Financial Systems, Industrial Structure, and Growth”, *Oxford Review of Economy Policy*, Vol. 17, No. 4, p470

⁶⁶ Michaelas, N., Chittenden, F. and Poutziouris P. (1999) “Financial Policy and Capital Structure Choice in the UK SMEs: Empirical Evidence from Company Panel Data”, *Small Business Economics* Vol. 12, p122

⁶⁷ Mac an Bhaird, C. and Lucey, B. (2009) “Determinants of the Capital Structure of SMEs: A Seemingly Unrelated Regression Approach”, SSRN Working Paper, p17

⁶⁸ OECD (2012) “New sources of growth: Intangible Assets”

⁶⁹ European Commission (2013) “Investing in Intangibles: Economic Assets and Innovation Drivers for Growth”, Flash Eurobarometer 369.

instances, banks discount any intangibles when valuing a firm leading to even greater difficulty in accessing debt finance.

Despite the lack of reporting of intangible assets on balance sheets, we can see in Figures 2.5 and 2.6 that investment in intangibles is increasing substantially over time, particularly for high growth firms and young firms. This may further reveal that the reporting of intangible assets on financial statements is also increasing.

Figure 2.5: Intangibles as a share of total assets over time

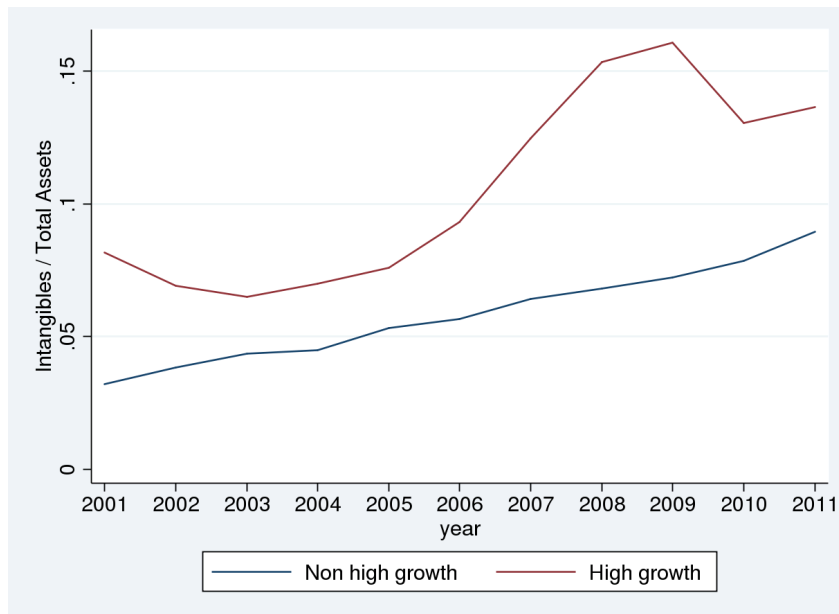
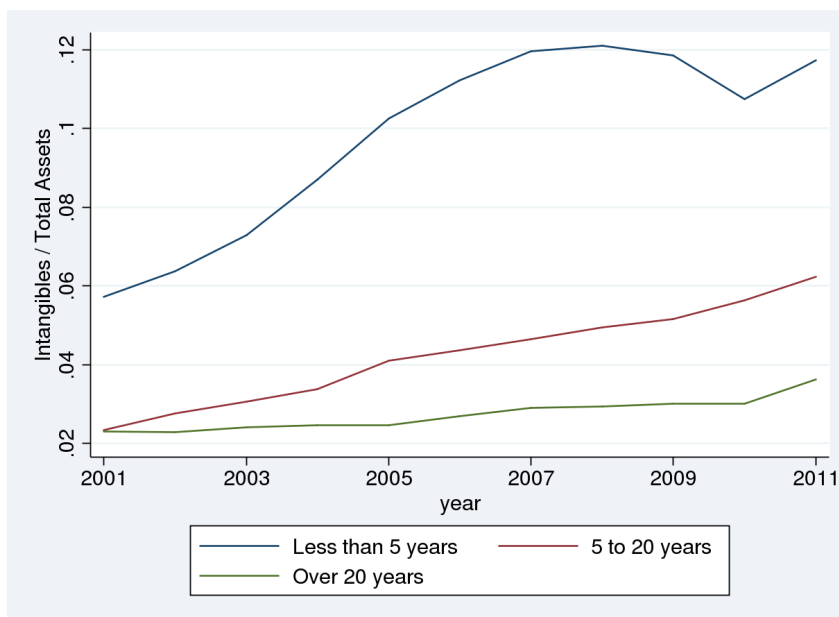


Figure 2.6: Intangible assets as a proportion of total assets by firm age over time



Empirical evidence shows that firms with high levels of intangible assets have similar

systemic barriers to young firms, as they too are often characterised as having high levels of asymmetric information, a result of the difficulty of clearly pricing intangible assets. Other issues, such as the non-transferability of intangibles lead to them not being as easy to use for collateral.

Intangible assets share some common characteristics that differentiate them from other types of capital, such as: lack of visibility; non-rivalry; partial excludability; non-tradability; non-separability; knowledge transferability; and, uncertainty and perception of risks⁷⁰.

Intangibles can therefore be difficult to price, and due to a number of these characteristics, not easy to use as collateral. Traditional debt finance is therefore less suitable, leading to intangibles being financed proportionally more out of retained earnings⁷¹, which is particularly problematic for young firms who, as discussed earlier, have less internal equity. Young firms with a high proportion of intangible assets therefore face particularly severe barriers to debt finance.

Consistent with this is the finding that having more tangible assets is correlated with a firm having more debt, suggesting that it is easier to have debt issued with more tangible assets⁷².

Furthermore, the less tangible a firm's assets, the more likely it is to be credit constrained⁷³. Also, where firms are credit constrained and then experience an increased cash flow, those with high levels of intangibles see less benefit on their borrowing capacity than firms with high levels of tangible assets⁷⁴, suggesting that the marginal benefit to cash flow on borrowing capacity is lower for firms with a higher proportion of intangible assets.

⁷⁰ Andrews, D. and de Serres, A. (2012) "Intangible Assets, Resource Allocation and Growth: A Framework for Analysis", OECD Economics Department Working Papers, No. 989, OECD Publishing, pp9-10

⁷¹ Ibid, p22

⁷² Michaelas, N., Chittenden, F. and Poutziouris P. (1999) "Financial Policy and Capital Structure Choice in the UK SMEs: Empirical Evidence from Company Panel Data", *Small Business Economics* Vol. 12, p121

⁷³ Almeida, H. and Campello, M. (2007) "Financial Constraints, Asset Tangibility, and Corporate Investment", *Review of Financial Studies*, Vol. 20, p1458

⁷⁴ Ibid

3. How do firms finance innovation and growth?

This section maps how firms choose to finance growth and innovation using balance sheet data from Experian PH, of all firms that have had an equity investment in the last 15 years. First, we map the financial structure of firms, and assess whether financial structure has an impact on firm growth, across various firm characteristics such as age, size and sector. Next, we establish the relationship between intangible assets and growth. Finally, we measure these relationships robustly using econometric techniques.

Mapping financial structure and growth

High growth firms have, on average, more equity and less debt than non-high growth firms (Figure 3.1). This is, however, driven by large firms, where the difference is greatest (Figure 3.2). As firms increase in size, however, non-high growth firms tend to increase debt faster than equity, whilst high growth firms fund growth equally between debt and equity, until between medium and large, equity dominates.

This may indicate a problem with access to equity finance for smaller high-growth firms, but is also in line with the pecking order whereby firms would first turn to debt finance. High growth firms turning to equity finance faster than non-high growth firms would also be consistent with debt finance becoming exhausted faster for high growth firms than non-high growth firms. Furthermore, as high growth firms increase in size, information asymmetries will decrease. As high growth firms have, on average, a higher proportion of intangible – and thus difficult to collateralise – assets than non-high growth firms, this may also go some way to explain their higher reliance on equity finance.

These results are also consistent with empirical studies that innovative firms are more likely to finance themselves through new equity than debt, in line with an emphasis on control rights and bankruptcy costs.

Figure 3.1: Debt and equity by growth status

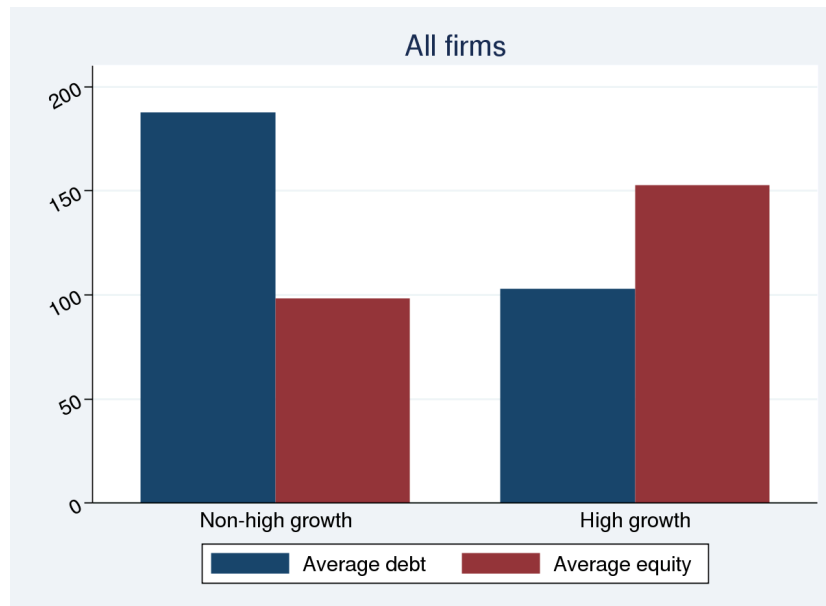
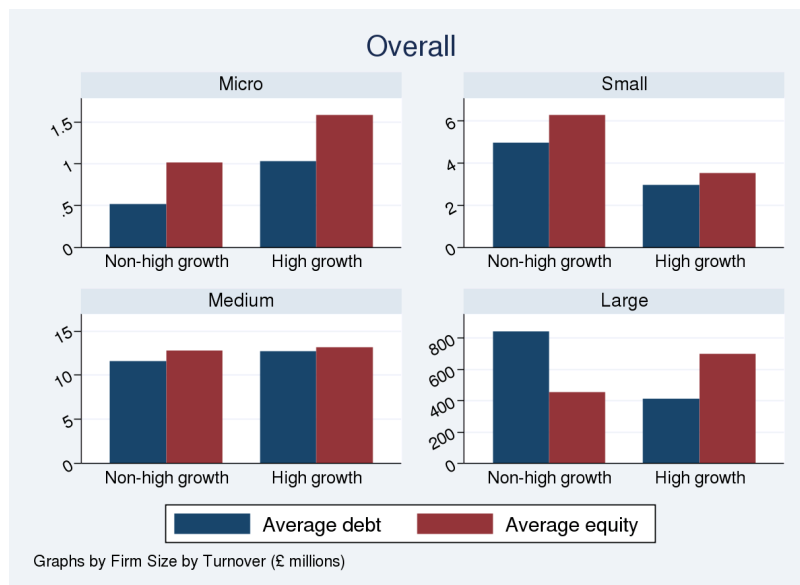


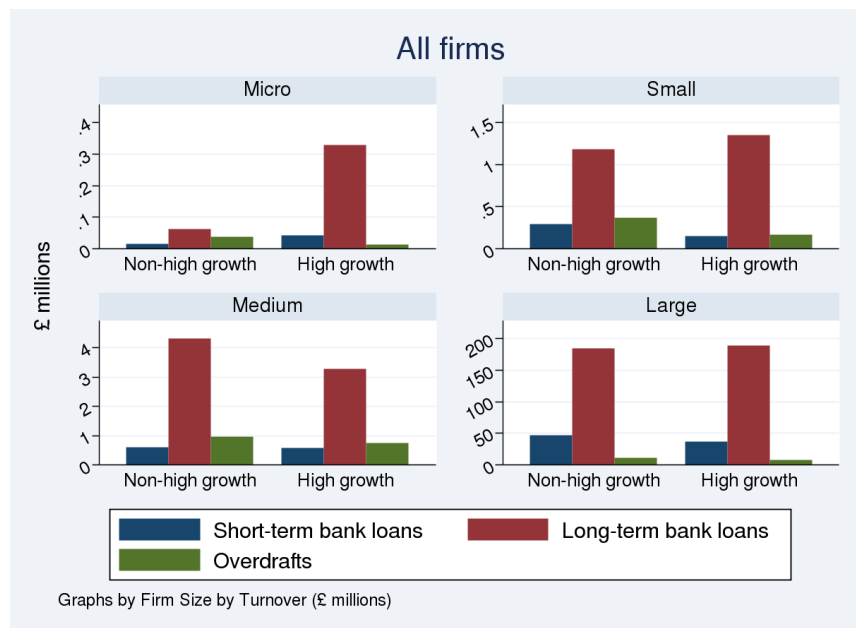
Figure 3.2: Debt and equity by firm size and growth status



Financial sources and growth

Long-term bank loans are the dominant form of external finance for all types of firm, regardless of growth status or size, as seen in Figure 3.3. Non-high growth firms are more reliant on overdrafts and short-term loans than high growth firms of the same size; correspondingly, high-growth firms tend to be more reliant on long-term bank loans than non-high growth firms of the same size.

Figure 3.3: Loans and overdrafts by firm size and growth status



For external equity, HGFs rely most on merger and acquisitions, with large numbers of issues and others rights⁷⁵ and development capital (Table 3.1). Only eight start-ups received equity finance, 0.2 per cent of all deals. Development capital for small, medium and large firms were more likely to be for high growth firms than any other deal type, though for micro firms, they were more likely to be high growth if the deal was a flotation or issue.

Table 3.1: External equity by type and size of business

| Deal Type | % of deals at size that are high growth firms | | | | | Number of HGF deals |
|-----------------------------|---|-------|--------|-------|-----------|---------------------|
| | Micro | Small | Medium | Large | All firms | |
| Mergers & Acquisitions | 0.48 | 2.94 | 4.38 | 4.43 | 1.64 | 1942 |
| Refinancing | 0.50 | 2.84 | 4.33 | 5.04 | 2.70 | 319 |
| Flotation | 1.79 | 5.49 | 8.18 | 5.81 | 4.26 | 192 |
| Management & Other Buy-Outs | 0.28 | 2.03 | 2.73 | 4.84 | 1.33 | 347 |
| Investor Buy-Outs | 0.72 | 3.41 | 5.51 | 5.96 | 3.63 | 280 |
| Development Capital | 1.20 | 9.01 | 13.12 | 9.87 | 3.51 | 465 |

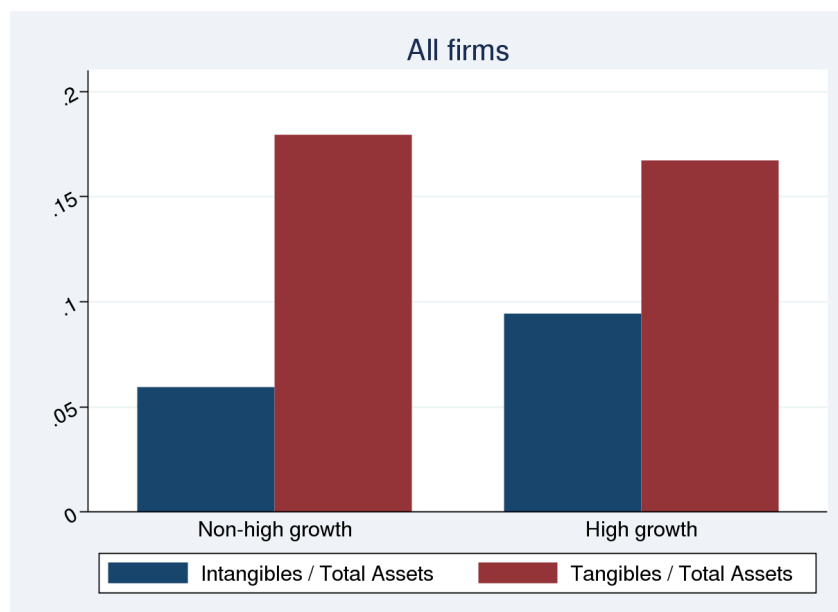
⁷⁵ Issues are defined as minority stakes, rights and other issues.

| Deal Type | % of deals at size that are high growth firms | | | | | Number of HGF deals |
|--------------|---|-------------|-------------|-------------|-------------|---------------------|
| | Micro | Small | Medium | Large | All firms | |
| Issues | 1.45 | 7.41 | 9.36 | 5.23 | 4.51 | 658 |
| Start-ups | 0.21 | 5.80 | 0.00 | 5.08 | 1.25 | 8 |
| Total | 0.60 | 3.46 | 5.01 | 5.10 | 2.14 | 4211 |

Intangible assets and growth

Intangible assets are higher as a proportion of total assets for high growth firms. For all firms, they have been increasing over time, with the highest ratio amongst the youngest firms – this matches a structural shift in our economy towards intangible assets, with the rise of spending on ICT.

Figure 3.4: Intangibles and tangibles by growth status⁷⁶



⁷⁶ The ratios do not add up to 1 as they exclude current assets such as inventory, etc.

Measuring relationships between financing innovation and growth

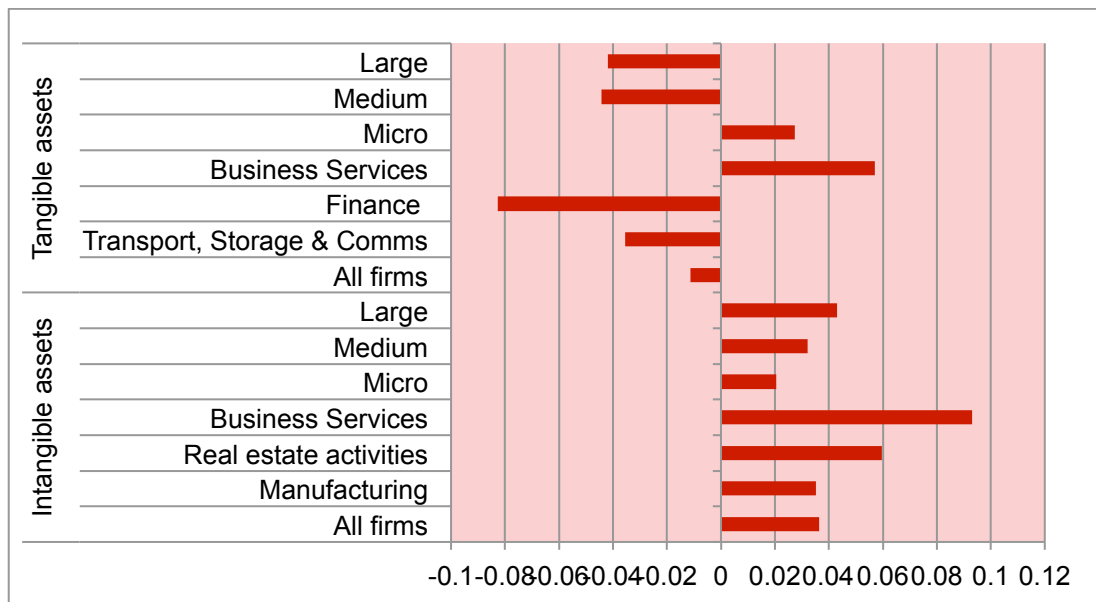
In this section, we robustly measure the impact of intangible assets on firm growth, and how firms finance their intangible assets – through debt or equity, and specifically what type of debt and/or equity. For our econometric analysis, we change our sample slightly to remove firms if they are balance sheet insolvent, i.e. their total net assets are less than 0.

In table 3.2 below, we run a logistic regression estimating the impact of intangible assets on the probability of the firm being high growth or not. We control for firm size, industry and the age of the firm. We estimate the following generalised model:

$$Pr(HGF_i = hgf_i | intangible\ asset\ ratio_i, tangible\ asset\ ratio_i, control\ variables_i)$$

We run this for the full sample and by samples for selected sectors and firm size. The results in Table 3.2 and Figure 3.5. indicate that firms with higher levels of intangible assets as a proportion of total assets are more likely to be high growth firms; specifically, doubling the intangible asset ratio increases the probability of being high growth by 3.6%. This effect is much larger for firms in some sectors – for firms in the Business Services sector a doubling the intangible asset ratio increases the probability of being high growth by 9.8%. This suggests that a relationship exists between the intangible asset ratio and whether a firm is high growth or not. There may be some reverse causality here too, however – it may also be that as firms grow they tend to invest more in intangible assets.

Figure 3.5: Regression coefficients for probability of being a high-growth firm



Bars represent marginal effects from logistic regression. Only significant coefficients reported. Negative coefficients indicate firms' reduction in probability of being high growth and positive marginal effects indicate an increase.

Next, we study how firms finance these intangible assets. Our econometric model looks at how a change in total debt (Δ Total Debt) and a change in total equity (Δ Total Equity) are associated with a change in intangible assets for a particular firm (Δ Intangible Assets). We also look at these results by disaggregated type of debt and for different types of equity deals. We control for the sales growth, an interaction for growth and equity, cash held by the firm, employment, profit, firm size and age.

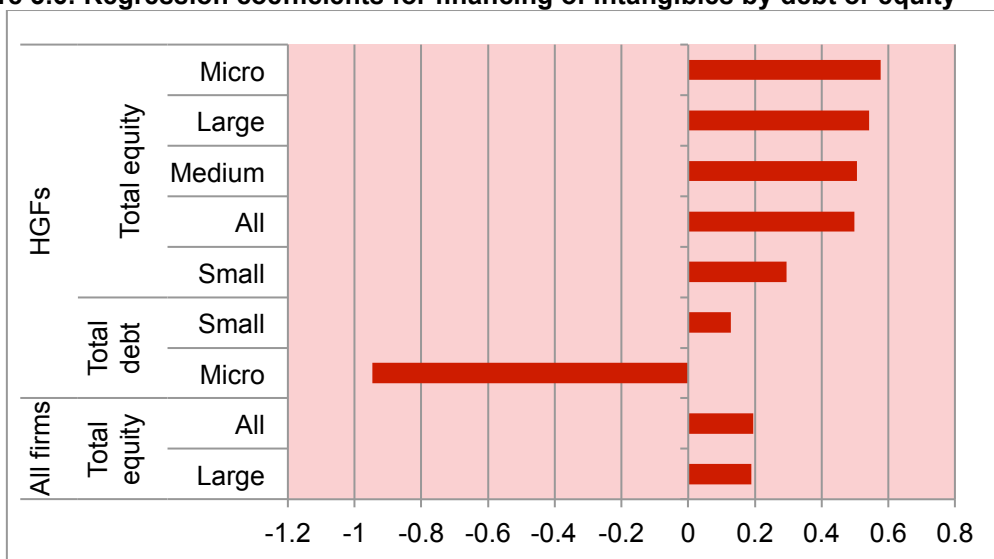
In general, we estimate the following model:

$$\Delta \text{Intangible Assets}_{it} = \alpha + \beta \Delta \text{Type of financing}_{it} + \gamma \text{Controls}_{it} + \mu_{it}$$

We estimate this model for various different samples – all firms, high growth firms, and by micro, small, medium and large firm size samples.

The results in table 3.3 show that firms tend to finance their intangible assets through increased equity as opposed to debt. For high growth firms this effect is even stronger – HGFs finance a higher proportion of their intangible assets through equity. For every £1m increase in equity, high growth firms invest a further £499,000 in intangible assets, compared to just £195,000 among all firms. Micro firms tend to reduce their level of total debt – an increase in intangible assets is associated with a reduction in the accumulation of debt. Small firms finance some part of their intangible assets through debt, although they finance more through equity. However, medium and large sized firms finance their increase in intangible assets largely through increased equity. This result, to some extent, reflects the availability of different sources of finance across the funding escalator. For example, small firms and young firms will have few sources of equity available to them to finance their intangible assets, and thus have to rely on debt. Large firms have more diverse credit profiles, as their size allows for flexibility in their approach.

Figure 3.6: Regression coefficients for financing of intangibles by debt or equity



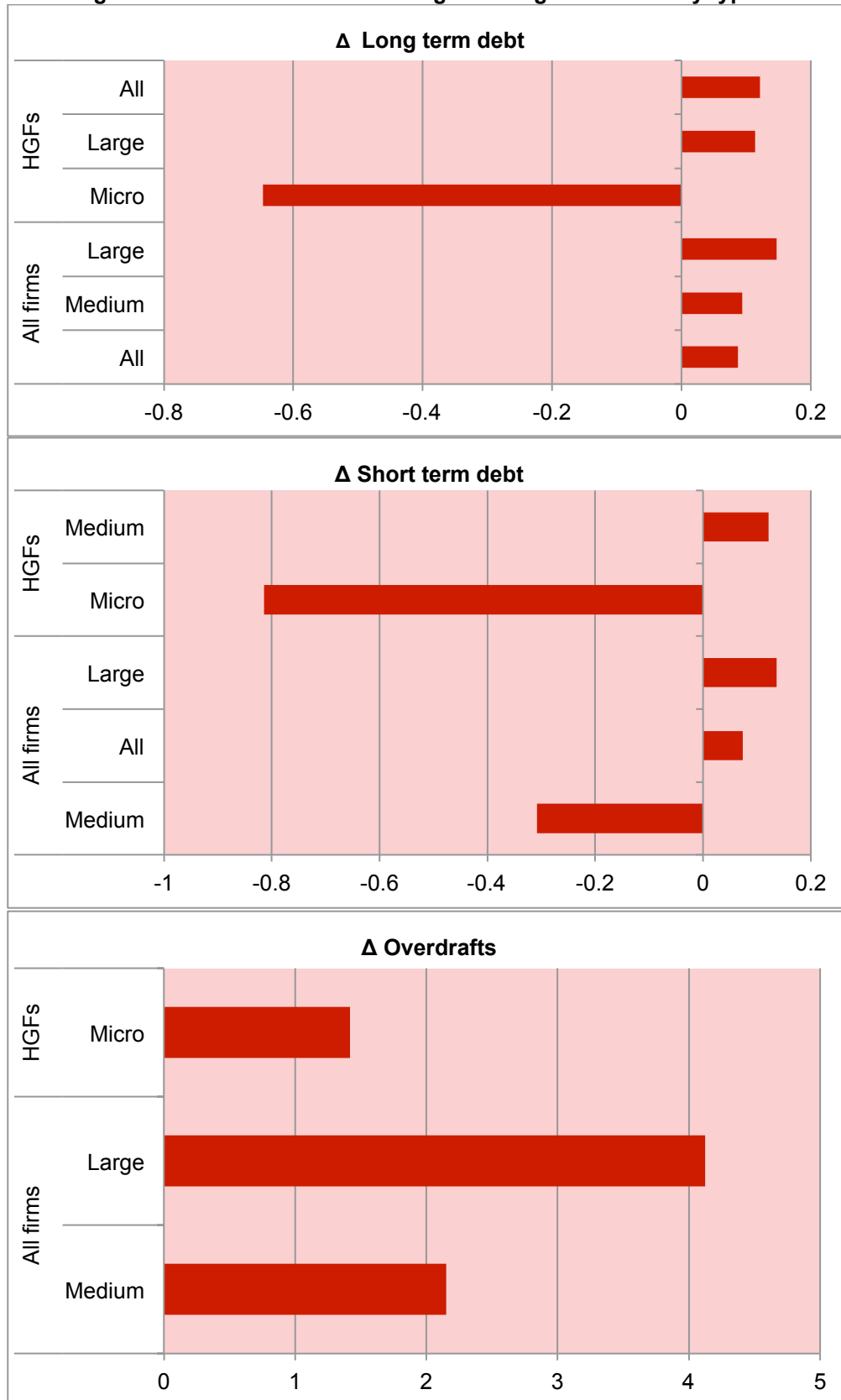
Bars represent fixed effects GLS regression coefficients. Only significant coefficients reported. Negative coefficients indicate firms reduce investment in intangible assets for an increase in debt or equity; positive coefficient shows an increase in investment in intangibles. For full results see table 3.3.

| | HGFs | Micro | Micro HGFs | Small | Small HGFs | Medium | Medium HGFs |
|--|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-------------------------|-------------------------|
| | -0.0318 (0.0590) | -0.0402 (0.0534) | -0.946*** (0.291) | 0.0271 (0.0236) | 0.127** (0.0591) | -0.334 (0.252) | 0.0263 (0.0831) |
| | 0.499*** (0.101) | 0.00167 (0.00420) | 0.576* (0.318) | 0.00429 (0.0468) | 0.295*** (0.0911) | 0.546 (0.384) | 0.506*** (0.180) |
| | -10.22*** (4.012) | -7.81e-05 (0.000124) | -0.0337 (0.0701) | 0.00278 (0.00295) | -0.0416 (0.180) | -0.0167 (0.0164) | 0.657 (0.496) |
| | 0.230*** (0.0550) | 0.000473*** (0.000119) | 0.468** (0.192) | 0.000441 (0.000408) | -0.0416 (0.0381) | 0.000356 (0.000278) | 0.0501 (0.105) |
| | 3.43e-06 (1.07e-05) | -5.27e-10*** (1.35e-10) | -8.99e-07 (5.50e-07) | -7.97e-07** (3.69e-07) | -1.28e-06* (7.05e-07) | -4.97e-06 (4.94e-06) | -1.28e-06 (5.68e-06) |
| | -0.00365 (0.00956) | 0.000909 (0.00636) | -0.00806 (0.0131) | -4.65e-06 (3.34e-05) | -0.00147 (0.00141) | -2.23e-05 (2.25e-05) | 0.0058e (0.0034) |
| | -1.24e-06*** (4.27e-07) | -4.98e-08 (6.27e-08) | -7.60e-07** (2.99e-07) | -4.30e-07*** (1.61e-07) | -2.44e-07*** (9.21e-08) | -5.11e-09 (9.36e-08) | -3.61e-06 (2.68e-06) |
| | -12.46 (9.276) | | | | | | |
| | -21.08 (13.74) | | | | | | |
| | -21.24 (13.65) | | | | | | |
| | 2.906** (1.369) | 0.0117 (0.0151) | 0.166** (0.0673) | 0.0294*** (0.00901) | 0.177** (0.0811) | 0.0449 (0.0610) | -0.646* (0.385) |
| | -2.751*** (659.5) | -0.335 (0.233) | -1.240* (0.662) | -0.0269 (0.196) | -0.441 (0.667) | -3.226 (2.421) | 10.25** (4.809) |
| | 3.223 | 10.173 | 327 | 19.381 | 759 | 22.731 | 1.269 |
| | 0.750 | 0.002 | 0.795 | 0.186 | 0.376 | 0.298 | 0.584 |
| | 1.785 | 3.494 | 239 | 5.402 | 524 | 5.030 | 815 |

Regression with robust standard errors clustered by sectors. Hausman test reveals that different estimators are systematically different, thus we use the consistent estimator in our fixed effects model. Sample: All balance sheet solvent firms. Standard errors in parentheses. ^a is Micro.

Next, in table 3.4, we look at which types of debt are used to finance intangible assets. Figure 3.7 illustrates the significant results for each type of debt separately. Firms tend to finance their intangible assets through long-term debt, relative to other types of debt finance. However, high growth micro firms do not finance intangible assets through long-term debt from banks, which typically requires either collateral or trading history, which micro firms are unlikely to have. They are also unable to finance their intangible assets through short-term debt, as can be seen in the figure below. High growth firms spend a larger proportion of an increase in long-term debt on intangible assets relative to all firms. Medium sized high growth firms also finance their intangible assets through overdrafts, reflecting the importance of revolving credit lines for working capital and operational liquidity as firms scale up.

Figure 3.7: Regression coefficient for financing of intangible assets: By type of debt



Bars represent fixed effects GLS regression coefficients. Only significant coefficients reported. Negative coefficients indicate firms reduce investment in intangible assets for an increase in a particular type of debt; positive coefficient shows an increase in investment in intangibles associated with that source of debt. For full results see table 3.4.

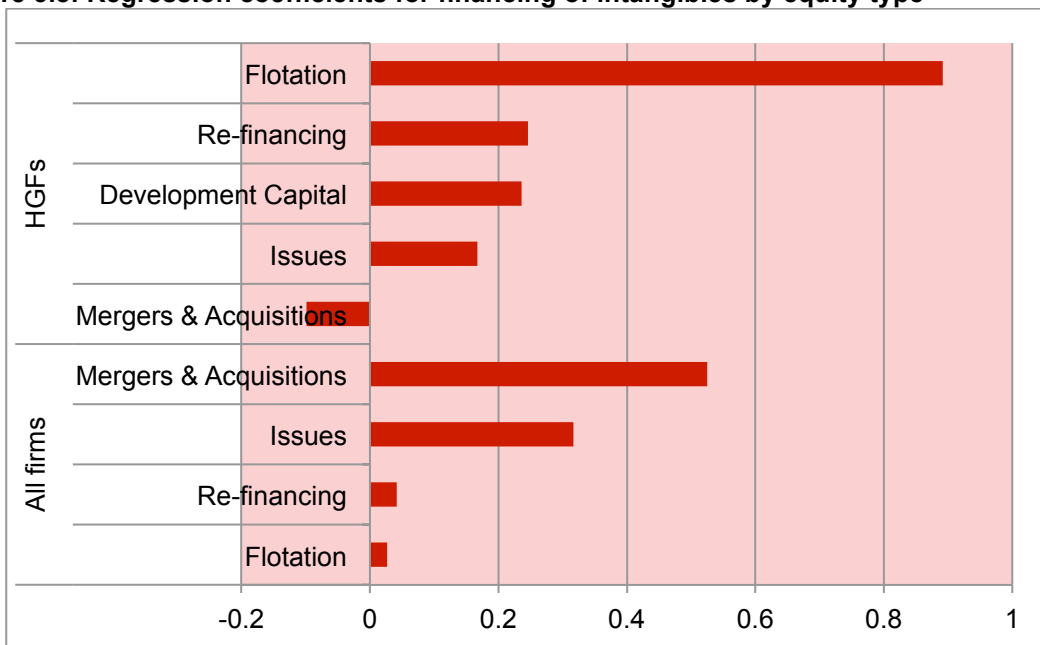
Assets: By type of debt

| | (3) | (4) | (5) | (6) | (7) | (8) |
|--------------|---------------------------|----------------------------|---------------------------|-------------------------|---------------------------|----------------------|
| | HGFs | Micro HGFs | Small HGFs | Small HGFs | Medium HGFs | Medium HGFs |
| Micro Assets | | | | | | |
| 1) | 0.121** (0.0419) | -0.109 (0.138) | 0.0287 (0.0259) | 0.00249 (0.0710) | 0.0941*** (0.0248) | 0.370 (0.246) |
| 2) | 0.0340 (0.0537) | -0.0857 (0.116) | 0.0525 (0.0486) | -0.0301 (0.0704) | -0.308** (0.116) | 0.122* (0.0626) |
| 3) | 0.237 (0.319) | 0.0403 (0.0775) | 0.0194 (0.0326) | 0.0500 (0.163) | 2.152*** (0.454) | 0.243 (0.344) |
| 4) | -2.909 (3.587) | -7.40e-05 (0.000136) | 0.00285 (0.00318) | -0.127 (0.315) | -0.00582 (0.00485) | -0.439 (0.904) |
| 5) | 0.0963 (0.0619) | 0.000483*** (0.000121) | 0.000432 (0.155) | -0.0281 (0.0635) | 0.000235*** (7.03e-05) | 0.308* (0.152) |
| 6) | 2.73e-06 (5.45e-06) | -5.42e-10*** (1.35e-10) | -8.34e-07** (3.50e-07) | -9.53e-07 (6.38e-07) | 8.62e-07 (2.24e-06) | -7.80e-0 (4.23e-0 |
| 7) | -2.43e-06** (8.81e-07) | -1.27e-08 (8.23e-08) | 4.23e-07* (2.06e-07) | -2.40e-08 (8.60e-08) | -3.96e-08 (4.68e-08) | 1.69e-0; (5.52e-0 |
| 8) | 0.0344* (0.0193) | 0.000992 (0.00342) | -7.79e-06 (2.40e-05) | -0.000377 (0.00117) | -1.44e-05 (8.92e-06) | 0.00206 (0.0013) |
| 9) | -8.987 (5.145) | | | | | |
| 10) | -12.33 (7.045) | | | | | |
| 11) | -14.73 (8.430) | | | | | |
| 12) | 2.740* (1.349) | 0.0119 (0.0148) | 0.0303*** (0.0101) | 0.0746 (0.0931) | 0.0126 (0.0347) | -0.599 (0.581) |
| 13) | -1,169 (740.1) | -0.390 (0.262) | -0.0410 (0.220) | 0.131 (0.696) | -3.399** (1.213) | 4.547 (5.811) |
| 14) | 3,223 | 10,170 | 19,380 | 759 | 22,731 | 1,269 |
| 15) | 0.343 | 0.007 | 0.198 | 0.055 | 0.738 | 0.254 |

Finally in table 3.5, we see how different types of equity deals finance different types of intangible assets. For flotations, the magnitude of the increase in investment in intangible assets that results from a float is much higher for high growth firms than for all firms, although it is significant for both. A large amount of the change in equity is associated with an increase in intangible assets for high growth firms that have had a flotation. For firms that have had a development capital deal or refinancing, a large proportion of a change in equity is associated with an increase in intangible assets for high growth firms.

High growth firms which have had an investment buyout are also more likely to finance their intangible assets through equity. Start-ups, however, are less likely to finance intangible assets with equity but this is likely to do with the fact that there are very few sources of equity available for start-ups in the UK⁷⁷. There are too few start-up firms in the dataset which are high growth, to see the effect for high growth start-ups.

Figure 3.8: Regression coefficients for financing of intangibles by equity type



Bars represent fixed effects GLS regression coefficients. Only significant coefficients reported. Negative coefficients indicate firms reduce investment in intangible assets for an increase in equity from a particular type of equity; positive coefficient shows an increase in investment in intangibles. For full results see table 3.5.

⁷⁷ Brinkley, I., Levy, C. and Sameen, H (2012), "Autumn Statement Submission", The Work Foundation, London

Table 1: Financing

| Issuance | Floatation | | Management & other Buyouts | | Investment Buyouts | | Development Capital | | Issuance | |
|----------|------------|------------|----------------------------|------------|--------------------|------------|---------------------|------------|------------|-------|
| | HGFs | All | HGFs | All | HGFs | All | HGFs | All | | |
| 1) *** | 0.246* | 0.0268** | 0.892*** | 0.0471 | 0.149 | 0.0307 | 0.194 | 0.390 | 0.236** | 0.3 |
| 2) 22) | (0.144) | (0.0118) | (0.0556) | (0.0448) | (0.139) | (0.0310) | (0.130) | (0.324) | (0.109) | (0.1) |
| 3)) | 2.535 | 0.0101** | 1.092 | -0.604*** | 14.32 | 0.00438 | -0.737 | -4.65e-05 | -0.193** | 0.0 |
| 4)) | (2.375) | (0.00434) | (1.205) | (0.00793) | (10.66) | (0.00464) | (1.147) | (0.000156) | (0.0948) | (0.1) |
| 5)) | -0.0149 | - | 0.00217 | 0.000663* | -0.343 | -1.30e-05 | 0.0243 | 2.72e-05 | 0.0809** | -0.1 |
| 6) 4) | (0.0111) | 0.000204* | (0.0153) | (4.88e-05) | (0.484) | (3.98e-05) | (0.0347) | (5.71e-05) | (0.0392) | (0.1) |
| 7) 06 | -7.60e-06 | 7.19e-08 | -1.34e-07 | -3.94e-07 | 5.04e-06** | -1.49e-06 | -2.40e-06 | -9.18e-11 | -3.65e-08 | 9.7 |
| 8) -05) | (1.05e-05) | (9.71e-08) | (1.12e-05) | (6.21e-07) | (2.54e-06) | (1.69e-06) | (4.29e-06) | (9.23e-11) | (7.38e-08) | (1.1) |
| 9) 05 | 0.000366 | -0.00204 | 0.00285 | 0.000588 | -0.00111 | 0.00109 | 0.00930 | 0.000645 | -0.000282 | 8.9 |
| 10) 143) | (0.00235) | (0.00557) | (0.00205) | (0.000544) | (0.000879) | (0.00129) | (0.00567) | (0.00292) | (0.000464) | (0.1) |
| 11)) | -8.996 | 0.207 | -2.643 | 0.377 | 1.384 | -1.938 | 2.825 | -0.565 | 0.730 | -33 |
| 12)) | (11.47) | (0.604) | (2.118) | (0.282) | (1.145) | (1.643) | (1.907) | (0.529) | (0.584) | (28) |
| 13)) | -5.896 | 2.130 | -5.068 | 0.515 | 3.479* | 0.371 | 1.194 | -2.629 | 0.298 | -28 |
| 14)) | (11.11) | (2.260) | (4.934) | (0.324) | (1.782) | (0.667) | (1.555) | (1.854) | (0.562) | (29) |
| 15)) | (9.869) | (8.332) | (4.711) | (0.617) | (3.412) | (1.500) | (3.898) | (2.524) | (1.106) | (43) |
| 16)) | -0.133 | -0.0397 | 0.109 | 0.00484 | 0.000764 | -0.0658 | -0.292 | -0.0588 | -0.0467 | -0.1 |
| 17)) | (0.576) | (0.0481) | (0.159) | (0.00518) | (0.0190) | (0.0504) | (0.211) | (0.0570) | (0.0310) | (0.1) |
| 18)) | 12.84 | 0.363 | -1.425 | -0.661 | -7.416* | 0.854 | 2.238 | 0.0511 | 0.0984 | 33. |
| 19)) | (14.05) | (0.386) | (4.440) | (0.423) | (4.334) | (0.872) | (2.491) | (0.390) | (0.479) | (29) |
| 20) 63 | 1,459 | 130 | 82 | 3,016 | 82 | 1,234 | 59 | 1,175 | 135 | 3.0 |

In conclusion, there are four key results that we can summarise from our analysis:

- Firms are much more likely to finance their intangible assets through equity rather than debt; for high growth firms this effect is much stronger. For every £1m increase in equity, high growth firms invest a further £499,000 in intangible assets, compared to just £195,000 among all firms. This is due to the fact that equity is much better at valuing intangible assets and innovative business models compared to debt.
- However, small high growth firms are still reliant to some extent on debt to finance intangible assets, reflecting the importance of debt finance, in addition to more equity funding opportunities for firms further down the funding escalator seeking finance for innovation and growth.
- Significantly, high growth micro firms are unable to finance intangible assets through either long-term or short-term debt – they tend to reduce their total debt and increase total equity as they accumulate intangible assets.
- Since lenders are less interested in the value of the businesses they are lending to, and more concerned with cash flow and ability to repay the loan, they are unlikely to finance innovative activities. For debt to finance intangible assets, new business models for finance are required.

4. Financing innovative SMEs: A role for policy

Our analysis provides evidence that new business models for finance are needed to meet the growth demands of a knowledge-based economy. A sustainable and functional financial system requires maturity transformation to support innovation and finance intangible assets; that is, borrowing short and lending long. This requires trust, a lender of last resort, a wide diversity of assets, new modes of financing for firms with intangible assets, and an appetite for risk. The more the system can provide finance for relatively illiquid assets whose pay-offs may be both risky and long-term, the better it will support innovation.

The evidence has shown that high growth firms tend to have higher levels of intangible assets, and that this has been increasing over time. Financing such intangible assets is going to be critical for firm growth in the long-run. The empirical evidence suggests that equity is better suited to finance intangible assets as opposed to debt – the reason for this is likely to be that equity finance is much more concerned with the overall value of the business model, whereas debt finance has traditionally been more concerned with whether a business has the cash flow profile to make repayments.

The implications of this are two fold: first, this presents a case for policy to focus more on equity as opposed to debt. The government's flagship programme to support lending to SMEs, the 'Funding for Lending' scheme has supported the economy at a macro-level, but is not resulting in addressing the access to finance issues faced by many firms. To address this issue, policy needs to focus on facilitating more equity funds such as the Enterprise Capital Funds, a public-private venture capital fund set up to address the weakness in the provision of equity finance for early stage SMEs⁷⁸.

Second, our analysis suggests that a clear structural problem exists in valuing innovative business models, primarily in debt markets but also for start-ups and small firms in equity markets. New ways of financing innovation such as P2P lending, crowdfunding, and new lending technologies suited for innovative companies need to be developed and promoted, without compromising on risk management and prudent lending.

The long-term solution will lie in the evolution of banking business models to respond to the reality of a modern intangible asset based economy. In a data-driven economy, banking business models are moving from traditional methods of banking to become knowledge-intensive service providers. Information is becoming increasingly valuable and banks are well placed to use this opportunity to expand their role in the financial ecosystem by becoming a value-added information broker to grow lending to fast growing innovative firms and sectors. This would require finding new ways to value

⁷⁸ Department for Business, Innovation and Skills (2013) "SME Access to finance scheme: Measures to support SME growth"

innovative business models based on intangible assets, and new alternative forms of financial platforms and instruments to finance these business models.

Not only can such alternative sources of lending step in to plug the gap left by conventional bank lending, there is also the potential to develop new markets for lending – projects that were previously considered unviable could become viable with the introduction of new lending technologies and risk management techniques. The government has a role in this space, facilitating through regulation and institutional infrastructure, to enable and develop further such modes of finance. Box 4.1 summarises some of the new disruptive technologies developing within the financial system.

Box 4.1: Alternative forms of finance and new financial instruments for innovation

The Federation of Small Businesses reported that lending through alternative sources for SMEs was on the rise. As banks have become much more risk averse and have tightened up their lending criteria, there has been a new push towards alternative finance arrangements, such as Invoice Factoring, Invoice Discounting, Asset Leasing and Peer-to-Peer (P2P) Lending.

The difficulty which many young firms and firms with high intangibles face when trying to obtain finance through conventional means has led to a small, but growing, number turning to these alternative methods of financing.

In particular there is immense interest in online P2P lending – a relatively new concept that allows individuals from any background to lend to SMEs and other individuals; examples include Funding Circle and Zopa, who between them have seen over £500m lent via their online platforms⁷⁹; this number is growing rapidly.

Alternative sources of finance, such as P2P and crowdfunding, have already started to attract business, but questions around legislation and the ability for these types of funding to be scaled up leave some doubt about whether they have the potential to be a significant part of a diverse market in the future⁸⁰.

P2P lending platforms, where micro loans can be crowd-sourced from a number of lenders, allow lenders to pool risk and borrowers to gain credit in small chunks, whilst “bypassing many of the fixed costs attached to the traditional banking model”⁸¹.

As the industry is still in its infancy, it is unclear as to which businesses are using the service. Loans at Funding Circle have an average interest around double that of that for ‘smaller SMEs’

⁷⁹ Figures as of 11th September 2013, accessed via <https://www.fundingcircle.com/statistics> and <http://uk.zopa.com/> - having lent over £148m and £371m respectively

⁸⁰ See O'Brien, L. (2012), “The future of crowd-sourced funding in the UK”, Big Innovation Centre, for a summary of the challenges and opportunities for these forms of funding

⁸¹ Ibid, p5

as reported by the Bank of England, suggesting borrowers may have been turned down by traditional lenders, or perhaps are attracted by the speed at which a loan can be arranged⁸². Whether P2P lending is replacing, or complementing, traditional banking is therefore not clear at the moment.

That said, in order for P2P lending to scale up to become a significant part of the debt lending landscape, it has substantial challenges to address. Possibly the largest risk to the industry is a lack of clarity surrounding regulation. P2P platforms are regulated by the Office of Fair Trading, but not the Prudential Regulation Authority, and lenders are not covered by the Financial Services Compensation Scheme. This lack of regulatory oversight reduces the credibility of the industry – clarity from government on the future regulatory framework of the industry may well help increase confidence in the market, helping it to grow.

Government has, however, intervened in a way that may, at least in the short-term, help the industry with another potential challenge – growing a lending base. In the 2012 Budget, it made available £100m of match-funding⁸³ showing its willingness to support P2P lending as part of a wider move to promote “non-banking lending channels”⁸⁴.

Crowdfunding platforms have a similar model to P2P, with users able to raise funds through a number of sources; however, rather than being a loan, the funds are often in the form of donations or some sort of access to the finished product. This may include some role in the development of the product or early-stage access to it. As a result, these platforms are likely to have limited scope for large-scale expansion, and are more easily suited to creative projects and consumer products than, say, business services⁸⁵.

Nevertheless, crowdfunding platforms, which can provide an alternative source of equity finance, also face regulatory barriers: companies are prohibited from promoting the sale of equity to individuals who are neither self-certified, high worth or endowed with specialist knowledge⁸⁶. Such restrictions are a barrier to the development of online equity platforms and, as with P2P lending, suggests government needs to review regulation of these areas to facilitate growth in these markets.

Mezzanine finance is a hybrid between debt and equity finance whereby the debt lent to a company can be converted to equity in the event that the loan is not paid back according to the terms of the agreement (i.e. not on time or in full). It is particularly used for acquisitions and buyouts, but also for firms looking to grow who are reluctant to cede control to equity investors, but who need finance over and above what standard debt finance they can raise. As mezzanine

⁸² O'Brien, L. (2012), “The future of crowd-sourced funding in the UK”, Big Innovation Centre, pp5-6

⁸³ <http://www.ft.com/cms/s/0/05b3e528-aa60-11e1-8b9d-00144feabdc0.html#axzz2DWm4LzLL>

⁸⁴ <http://www.hm-treasury.gov.uk/bfp.htm>

⁸⁵ O'Brien, L. (2012), “The future of crowd-sourced funding in the UK”, Big Innovation Centre, p4

⁸⁶ Ibid, pp9-10

finance often comes with low cash coupons, it can benefit high growth firms in particular, as it restricts cash flow less than other forms of finance during an early period of expansion⁸⁷.

Usage of mezzanine finance is, however, limited, with just 1% of UK businesses using it in 2010. This may suggest real potential for growth in mezzanine finance; an industry taskforce report commissioned by the Department for Business, Innovation and Skills was of the opinion that the government could help the market's development through the Business Finance Partnership⁸⁸.

The Big Innovation Centre recently released a provocation piece for another type of business debt finance – a 'Flexible Project Investment'⁸⁹, which is an innovative new instrument that banks can use to finance SMEs. An FPI is a series of project-based bonds, released to match the cash flow profile of a project. Projects would be closely monitored and the release and risk attached to future bonds adjusted based on deviation from initial cash flow projections.

If, for instance, a project was set up requiring two bonds – one at the beginning for initial investment and a second bond a certain time later for an expected expansion, the repayment rate of the second bond may increase if outgoings are higher than originally forecast, to reflect increased risk in the project.

This proposal for an innovative new form of finance aims to address specific issues that firms, particularly SMEs, often face when trying to raise funds. By being closely monitored, information asymmetries should be reduced, encouraging investors, whilst for firms it should appeal as the repayment schedule would be clearly linked to the project's lifecycle.

The government has the opportunity to facilitate this transition through the design and structure of its 'Business Bank'. At present, the remit of the bank is to join-up and deliver the existing programmes of the Department for Business, Innovation and Skills, with £1 billion (leveraged up to £10bn) for additional lending to innovative and high-growth firms. The rationale is that the bank will be able to access funds on more favourable terms than a commercial bank (especially those that have a large share of bad debt on their balance sheets such as RBS) and will therefore have a lower cost of capital.

The Business Bank's lower cost of capital and remit to consider long-term social returns would allow it to make loans that would typically be avoided by commercial banks. In particular, it would be able to take a wider economic view of the benefits of investing in certain markets, including cases where there are potential long-term social returns from developing new technologies (such as green technologies). This would mean a particular focus on lending and investment for

⁸⁷ Industry Taskforce (2012) "Boosting Finance Options for Business", Department for Business, Innovation and Skills, p32

⁸⁸ Ibid, p33

⁸⁹ Douglas, B. (2013) "Flexible Project Investments: A proposal for a new form of debt finance for SMEs", Big Innovation Centre

innovation, particularly to young and high-growth firms, which experience the most acute financial market failures and where the externalities will be greatest. Since this would include green technologies, there would be a case for including the Green Investment Bank into the Business Bank. In general, the government should build such a bank around its broader industrial strategy.

The Business Bank should go further and play an important role in creating a corporate bond market for SMEs. This would require a platform for SME loan securitisation along the lines advocated by the Breedon report. Previously, in our report 'Credit where it's due', we put forward a proposal for an SPV to enable SMEs to access the corporate bond market to raise finance⁹⁰. This bank could serve a similar purpose by bundling SME debt through acting as an aggregating agency. This would not only securitise SME assets and selling them on to investors, but by reducing risk exposure it could also use the proceeds for other business activities – to fund more lending, for example.

By removing the requirement for investors to analyse the credit quality of many small issuances from individual SMEs, these platforms would relax SME financing constraints and kick-start institutional investment in these firms. Private banks would continue to operate as the frontline funders of loans to SMEs, offering facilities over an extended period – five or more years, say. However, they would be more willing to do so knowing that they would then be able to sell most of the loan on to the Business Bank, tying up far less capital against such liabilities without compromising on risk management and prudent lending. The state-backed institution would then group packages of such loans together to issue as securities on the corporate bond market. However, to be effective, the governance structure of the Business Bank has to be carefully set out to ensure that it responding to clear economic incentives. The LSE has proposed that such a bank be run with an “appointed independent board to oversee operational decisions independently from BIS”. They also think that the bank should operate under a charter that clearly articulates its mission and ensures that it is held accountable for delivering that mission⁹¹.

The Business Bank is taking steps in the right direction by promoting alternative sources of finance for SMEs, but its current scope and scale are too small to make a big difference in the finance gap for SMEs. The government needs to increase its scale by dedicating more capital to the bank, and also increase its scope by facilitating access to public corporate bond markets for SMEs. New alternative forms of lending could be the disruptive technology that shake up banking business models to do better lending, as well as create new markets for lending. New alternative lending technologies and platforms such as these are needed to give businesses greater choice, promote competition amongst finance providers – potentially reducing cost – and to promote greater resilience in the financial system. A wider range of bank and non-bank finance options for businesses will create a more diverse and efficient market, enabling new innovative products and processes to be brought to market.

⁹⁰ Hutton, W. and Peasnell K. (2011) “Credit where it's due: How to revive bank lending to British small and medium sized enterprises”, Big Innovation Centre

⁹¹ LSE Growth Commission (2013) “Investing for Prosperity: Skills, Infrastructure and Innovation”, Centre for Economic Performance, London School of Economics

5. Conclusions

In conclusion our analysis suggests that the disruptive innovation needed to create new markets, increase demand, raise productivity and sustain the recovery, is currently being disrupted itself by an inability to finance intangible assets.

Our empirical evidence reveals that intangible assets held by firms are increasing substantially, demonstrating the importance of knowledge in an increasingly information-based and data driven economy. Particularly, young and micro high growth firms are increasing their investment in intangible assets, and yet they are also the most likely to not be able to access funds to finance their growth.

This report identifies two systemic barriers in the access of finance faced by innovating firms, and specifically innovating small firms: differences in information available about a firm between entrepreneurs and financiers and the intangible nature of knowledge-based assets. The lack of information and trading history about the firm available to financiers, and the inability to value the intangible assets of innovative businesses are currently preventing high growth from accessing finance.

Our empirical analysis revealed that equity is better suited to finance innovation compared to debt, as equity is better at valuing intangible assets and innovative business models. The gap in the equity markets for young and small firms is extremely damaging for the growth prospects for such firms as they are not able to finance innovative activities. However, we also see that small high growth firms are still reliant on debt to finance intangible assets – this reflects the importance of debt finance, in addition to more equity funding opportunities, for firms further down the funding escalator seeking finance for innovation and growth.

High growth micro firms are unable to finance intangible assets through either long-term or short-term debt. This suggests that the structural problem within debt markets is particularly affecting micro and small firms. Since lenders are less interested in the value of the businesses they are lending to, and more concerned with cash flow and ability to repay the loan, they are unlikely to finance innovative activities. For debt to finance intangible assets, new business models for finance are required.

The implications of this for policy are two fold: (1) this presents a case for policy to change focus from debt support programs to equity support schemes such as the Enterprise Capital Funds, a public-private venture capital fund set up to address the weakness in the provision of equity finance for early stage SMEs⁹², and (2) our analysis suggests that a clear structural problem exists in

⁹² Department for Business, Innovation and Skills (2013) “SME Access to finance scheme: Measures to support SME growth”

valuing innovative business models, primarily in debt markets, but also for start-ups and small firms in equity markets. New ways of financing innovation such as P2P lending, crowdfunding, and new lending technologies suited for innovative companies need to be developed and promoted.

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