

Modes of firm growth

ERC Research Paper No.46

May 2016

Modes of firm growth

Neil Lee

London School of Economics and Political Science
n.d.lee@lse.ac.uk

Ross Brown

University of St Andrews
Ross.Brown@st-andrews.ac.uk

Teresa Schlueter

London School of Economics and Political Science
t.j.schlueter@lse.ac.uk

The authors would like to thank Rob Turner from Grant Thornton, Dave Thomas and John Leach from Winning Pitch and the entrepreneurs who gave their time for their support of this project. The data was accessed using the Secure Data Service. We are also grateful to Dr Michael Anyadike-Danes for his help in using the data.

The Enterprise Research Centre is an independent research centre which focusses on SME growth and productivity. ERC is a partnership between Warwick Business School, Aston Business School, Imperial College Business School, Strathclyde Business School, Birmingham Business School and Queen's University School of Management. The Centre is funded by the Economic and Social Research Council (ESRC); the Department for Business, Innovation & Skills (BIS); Innovate UK and the British Business Bank. The support of the funders is acknowledged. The views expressed in this report are those of the authors and do not necessarily represent those of the funders.

EXECUTIVE SUMMARY

Background

There is now a general consensus that high growth firms (HGFs) are economically important, and governments across the world have targeted resources to help firms achieve high growth. Yet while there is a large evidence base on the nature of HGFs, little research considers ‘how’ potential HGFs are trying to grow and ‘what’ is preventing firms from achieving sustained growth (i.e. the barriers firms face to sustain a longer period of rapid growth).

This report aims to better understand the nature of growth processes within high growth firms (HGFs). A HGF is defined by the OECD as ‘*an enterprise with average annualised growth (in number of employees or turnover) greater than 20% per annum, over a three year period, with a minimum of 10 employees at the beginning of the growth period*’ (OECD 2008, p. 61).

The report has three main components: (1) a review of the literature on HGFs and their growth paths, (2) data analysis using the ONS Business Structures Database to investigate how HGFs grow, and (3) a series of interviews with HGFs and potential HGFs about how they have achieved growth.

Findings

Literature Review

The literature review found that despite decades of firm growth research, we still understand relatively little about the growth process in firms. While entrepreneurship researchers have been examining the question of ‘how many’ firms grow rapidly, little attention has been focused on ‘how’ firms grow.

In the past, firm growth was meant to correspond with a linear model where firms undergo sequential phases of growth similar to the human life-cycle. In recent years there has been a significant shift away from this perspective: instead of transitioning through relatively orderly growth

stages, rapid growth is seen as erratic, unpredictable and often limited in duration.

Recent academic literature has stressed the importance of key episodes during firm growth which play a strong role in shaping the growth trajectory of firms. Bursts of growth have been found to result from external growth opportunities or “growth triggers”. These triggers may result in erratic growth or relatively rapid decline.

Data Analysis

Our data analysis shows that firms have a variety of growth trajectories. We show that 41% of HGFs were already growing in the period before their high growth spell. In contrast, 25% of HGFs achieved high growth from a standing start – without having experienced employment growth in the period before. A minority of firms (14%), had been shrinking in the period before high growth. 20% of HGFs were startups, newly founded firms that entered the market one or two years before the start of the high growth period.

However, it is very difficult to sustain high growth. Almost half of HGFs decline or cease to exist after their rapid expansion, with 40% of HGFs experiencing shrinkage and 6% dropping out of the market – ‘Icarus firms’ which experience rapid growth, but then fall quickly. 17% of firms manage to sustain their size after rapid employment growth while 37% continue on their growth trajectory.

Firms in the hotel and restaurant sector are most likely to decline after their high growth period, with 55% of firms declining or exiting. The high share of financial intermediates that exit the market after a high growth period is also notable. However, the share of financial intermediates that continue to grow after a period of high growth is also the highest across industries, indicating a larger variation in the ability to cope with high growth than in other sectors.

Larger firms are more likely to shrink following their high growth spell, while younger firms are more likely to exit the market (as a business failure or by

being taken over). The highest exit rate (10%) is for firms born two years before experiencing high growth. In other words, start-ups who grow rapidly are the most likely firms to encounter difficulties in terms of business continuity.

Qualitative Findings

We also interviewed firms to investigate how they had achieved growth. The interviews showed a very diverse picture. No one mode of growth dominated. For many of the firms interviewed, product innovation, diversification and internationalisation had only played a relatively small role. By contrast, investment in human and managerial capital and the strategic use of business models was important for the firms interviewed.

The “growth triggers” varied. For a significant minority of firms, introducing a new product was important. Others had improved their processes and used this as a trigger to further growth. But one common theme was a changed mindset amongst the entrepreneurs: many had a reasonable business, but had later decided to focus on growth and entered new markets. However, growth itself caused problems. One key barrier to growth noted by the interviewees was coping with the uncertainties entailed with rapid growth and the erratic nature of growth.

In terms of perceived support requirements, the greatest demand seemed to be access to finance, especially to ease problems associated with cash-flow. Support for management to help navigate the growth process was identified as a key factor to enable firm growth to continue.

CONTENTS

EXECUTIVE SUMMARY	3
Background.....	3
Findings	3
INTRODUCTION	7
BACKGROUND TO THE RESEARCH.....	8
Defining high growth firms.....	8
Unpacking firm growth	9
METHODOLOGY	12
RESULTS OF THE ANALYSIS	15
Firm growth trajectories.....	15
How do firms achieve high growth?	26
Coping with growth and erratic growth trajectories	36
Barriers to firm growth.....	38
CONCLUSIONS AND POLICY RECOMMENDATIONS	43
REFERENCES	46

INTRODUCTION

High growth firms (HGFs) are generally seen as “vital” for economic growth. They can help disseminate innovations, shake up existing markets and increase productivity. They are an important part of jobs growth, with estimates suggesting that almost half of all new jobs are created by high growth firms. And they have a significant impact on local economies – cities with more high growth firms tend to grow more quickly. Because of this, policymakers across the world have aimed to support the development of HGFs (Coutu, 2014). While this is now a common policy objective across many developed economies there is no standard approach utilised to further this aim (OECD, 2013).

There have been many studies of high-growth in the UK. These studies have considered the share of high growth firms in the wider economy, the characteristics of HGFs, their impact on local economies and their financing needs. Yet the issue of ‘how’ firms grow has been largely neglected by previous research. There is a need for more research on the way in which they grow, their growth trajectories before and after achieving rapid growth and how these two factors are interrelated.

For governments to effectively support this important cohort of firms requires a solid understanding of both ‘how’ potential HGFs are trying to grow and ‘what’ is preventing firms from achieving sustained growth (i.e. the barriers firms face to sustain a longer period of rapid growth). However, despite the wide set of studies published on HGFs, relatively little research has considered these points.

This report – conducted by researchers from the London School of Economics and the University of St Andrews – addresses this gap through an investigation into the “how” questions around the growth of firms. Our methodology consisted of three linked phases: (1) a literature review, (2) data analysis, and (3) a series of interviews with HGFs and those with high growth potential.

The report is structured as follows:

- **Section two provides a background to the research.** It defines high growth firms, summarises the existing literature and suggests that a focus on the 'how' questions of firm growth would be useful.
- **Section three outlines our research questions and methodology.** It presents the four questions we seek to answer and the combination of literature review, quantitative analysis and interviews with entrepreneurs which we use to answer them.
- **Section four considers evidence on patterns of firm growth.** These are important questions about whether high growth firms. It focuses on four issues: the trajectories followed by high growth firms, the trigger points which influence these growth paths, the challenges for entrepreneurs experiencing erratic growth, and the barriers firms perceive for their future growth.
- **Section five concludes with implications of the results for entrepreneurs and policymakers.**

BACKGROUND TO THE RESEARCH

Defining high growth firms

Researchers have used numerous definitions and metrics such as employment, turnover and assets to identify and categorize HGFs (Delmar et al. 2003; Henrekson and Johansson 2010). However, since the mid-2000s, there have been concerted moves by the OECD to standardize the way in which HGFs are formally defined and identified (OECD 2008). Under this definition a HGF is defined by the OECD as '*an enterprise with average annualised growth (in number of employees or turnover) greater than 20% per annum, over a three year period, with a minimum of 10 employees at the beginning of the growth period*' (OECD 2008, 61). It is important to note that this official definition of high growth is a very exacting growth threshold which is why less than 10% of firms fall into this bracket.

It is worth highlighting that there is also an ongoing debate over the merits and drawbacks of different forms of measurement criteria associated with HGFs (Anyadike-Danes et al. 2015; Coad et al. 2014), particularly the use of the OECD definition (Daunfeldt et al. 2015). As with any standardized definition, a number of problematic issues have been raised. Key concerns are that the definition omits firms which may be growing rapidly but fall just outside this exacting growth threshold (Anyadike-Danes et al. 2015); turnover and employment do not necessarily reflect how entrepreneurs conceptualise growth (Achtenhagen et al. 2010); and the mathematics of percentages means that the measure is biased towards smaller – and hence newer – businesses (for example, a sole trader taking on a single employee would be counted as having doubled in size although the absolute increase is minimal).

While many studies originally focused on growth in employment (Anyadike-Danes et al. 2009), there is now an increasing use of growth in turnover as a means of defining HGFs (e.g. Mason and Brown 2014; Mohr et al. 2014; Brown and Mawson, 2016). However the choice of metric to measure growth rarely examines profitability as one of the criteria when measuring or assessing these firms. This appears to be a serious omission as evidence of a link between growth and profitability is, at best, mixed (Moreno and Casillas, 2007; Senderovitz et al, 2015).

Unpacking firm growth

Despite the large number of studies examining HGFs, there is a common belief that there is a lack of knowledge about the ‘growth mode’ and associated ‘growth processes’ within the firm growth literature (McKelvie and Wiklund 2010; Wright and Stigliani 2013). According to McKelvie and Wiklund (2010), entrepreneurship researchers have been too anxious to examine the how ‘much’ question without paying sufficient attention to ‘how’ firms use these different growth modes. Despite decades of firm growth research, we still understand very little about the growth process which, consequently, some depict it as something of a “random walk” or “coin toss” (Daunfeldt and Halvarsson, 2012).

McKelvie and Wiklund (2010) suggest that the three main 'modes' of growth are thought to be organic, acquisition and hybrid growth strategies. Notwithstanding the fact that entrepreneurial firms confront these various growth mode options, the overwhelming bulk of firm growth research typically focuses on organic growth as the dominant growth strategy underpinning rapid growth. Indeed, there is now increasing recognition given to the nature of how different modes of growth strategies affect rapidly growing firms. Despite this, the view within the policy community typically views growth as an incremental organic process.

In addition to the mode of growth, organisational factors are also receiving considerable attention as key ingredients underpinning high growth. Researchers have examined factors such as firm innovation, levels of product diversification, business models and internationalisation. In the main the evidence base relating to each of these individual factors is far from conclusive (Coad, 2009; Mason et al, 2015). Overall, however the evidence suggests that HGFs tend to innovative (especially regarding their adept use of business models) and more internationalised than non-HGFs (Brown and Mawson, 2016; Mason et al, 2015). These factors are examined more closely in section 4.2.

One aspect of the literature which has been somewhat overlooked is the levels of ambition within entrepreneurs and how this influences the level and nature of firm growth. While the cognitive mindset of entrepreneurs is something which is an established part of the entrepreneurship literature (Lumpkin and Dess, 1996), few studies have examined the nature of entrepreneurial ambition within HGFs. However, recent research by BIS (2015) is starting to address these issues more fully. This work has developed a typology which categorises entrepreneurs into three main categories. While broad-ranging, they nevertheless enable policy makers to segment the entrepreneurial marketplace. The categories include:

Substantive ambition: this is where entrepreneurs intend to grow their business to a point where it is significantly larger than its current size.

Moderate ambition: this is where entrepreneurs might display high levels of ambition for growth but are not intending acting on that ambition, or have low levels of ambition for growth.

Low ambition: this is where entrepreneurs explicitly state they are not intending to grow their organisation and view their business as being its ideal size.

BIS (2015) undertook survey work to track some of the types of entrepreneurs from 2012 to 2014. It found that the majority of entrepreneurs fall into the moderate ambition category and 20% were in the substantive ambition category. When re-surveyed in 2014, the work found that 41% of firms with substantive ambition had grown in employment terms, compared to 38% of firms with moderate ambition and 32% of firms with low ambition. In other words, despite claiming substantive ambition these firms display little in the way of superior performance to more modestly ambitious firms. Interestingly, just six percent of firms provided 75% of new jobs created by these firms between 2012-2014. What this shows is that while a small proportion of the entrepreneurs have strong growth ambitions an even smaller proportion actually go on to achieve growth.

In sum, it is evident that firms adopt different approaches – or growth modes – towards the growth of their businesses. While there does not appear to be a single formula for organisational success, a common thread within successful firms is their underlying innovative behaviour, a strong outward focus and high levels of business internationalisation. While much less work has examined the cognitive traits of successful entrepreneurs, it appears that being growth-oriented in itself is not a strong predictor of firms who realise growth. However, there seems some tentative evidence that more ambitious entrepreneurs (and firms) are more likely to undertake more risk-oriented modes of growth such as high levels of involvement in overseas markets, product diversification and the strategic use of acquisitions (BIS, 2010; Brown and Mawson, 2016).

METHODOLOGY

To develop an improved understanding of the 'how' of firm growth, this report addresses 4 main research questions. These are:

1. What growth trajectories do high growth firms follow?
2. What 'growth triggers' help firms achieve high growth? Are there triggers for subsequent decline?
3. What are the causes of erratic growth and how do firms cope with erratic growth trajectories?
4. What do firms feel the principal barriers to growth are?

To investigate these questions about we used a three phase methodology:

- **A literature review** – of the existing research related to the topic of how HGFs grow.
- **Quantitative analysis** – building on past work on HGFs to investigate what happens to firms before and after they experience high growth.
- **In-depth interviews** – with entrepreneurs running companies which have either achieved high growth or

The first phase of the research was a **literature review**. We reviewed both the grey and academic literatures on high growth firms which related to our key questions. We also developed Brown and Mawson's model of growth triggers and applied to our research.

The second phase of the research was **quantitative analysis of firm growth paths**. To this, we used the UK Business Structure Database that has information on firms between 1997 and 2013. This is the most commonly used dataset for the analysis of high growth firms in the UK. We identify a total of 47,999 firms that experience high growth between 2000 and 2007 and conduct our analysis on these firms. It is important to note

that this period pre-dates the global financial crisis, so some changes may have occurred since this pre-recessionary period.

The third phase was to interrogate the issues raised in phases 1 and 2 with 12 in-depth interviews with high-growth and growth oriented entrepreneurs. We identified firms both through the FAME database (6 firms) or as participants in the GrowthAccelerator programme that was delivered through the recently closed Business Growth Service (7 firms). The aim was not exclusively to focus on firms which achieved high growth, but to consider the perspectives of entrepreneurs from a range of companies – all of which were growth oriented, but only some of which had managed to achieve high growth. To enable interviewees to be frank about their experiences, all interviews were conducted anonymously. Broad details about the firms we interviewed are included in Table 1 below.

Table 1. Nature of firms interviewed

Firm number	Description of business	Sampled as high growth firm or BGS client
1	Medical provision company	BGS Client
2	Office supplies company	BGS Client
3	Furniture company	BGS Client
4	Specialist retail store and website	BGS Client
5	Pharmaceuticals manufacturer	BGS Client
6	Medical supplies	BGS Client
7	Oil and gas exploration	High growth
8	Conference organisation	High growth
9	IT Provider	High growth
10	Business Support Provider	High growth
11	Financial services company	High growth
12	Website designer	High growth

Quantitative data analysis: The detail

To investigate the growth patterns of firms before and after high growth period we develop the seminal work of Anyadike-Danes et al (2009). Our database is the UK Business Structure Database that has information on firms between 1997 and 2013 (ONS, 2016). The database comprises firms that are registered for VAT or operate a PAYE scheme. It is estimated that these firms represent 99% of economic activity (Business Structure Database User Guide). We use the panel version of the database created by Anyadike-Danes and access it through the Secure Data Service.

The unit of analysis is an enterprise that has at least one employee. We exclude firms belonging to the SIC 92 sections: Public administration and defense (L), Education (M), Health and Social work (N), Private households with employed persons (P), and Extraterritorial organisations and bodies (Q), from our analysis as these are likely to belong to the public sector.

In order to identify HGFs we apply the OECD definition. The OECD defines firms as HGFs if they:

- have an average annual growth of at least 20% over a period of three consecutive years,
- are alive throughout the period and born at least one year before HG period starts, and
- have at least 10 employees in the starting period.

As we are interested in the phase prior and post to the high growth phase we identify HGFs that experience their first year of high growth between 2000 and 2007. This allows us to analyze a three-year pre-high growth and a three year post-high growth period.

We generate the annual average growth pre- high growth and post high growth in the following way:

- the first year of the high growth period is set to 0 and the other years are rebased accordingly (period -3, -2, -1 = pre- high growth, period 0, 1, 2, 3, = high growth and period 4, 5, 6, = post high growth)

- the annual average growth pre- high growth is defined as $(\text{employees in period } 0 / \text{employees in period } -3)^{1/3} - 1$
- the annual average growth post- high growth is defined as $(\text{employees in period } 6 / \text{employees in period } 3)^{1/3} - 1$

Using this methodology our data sample comprises all HGF that start their high growth period between 2000 and 2007. Next we classify each HGF according to the growth path prior and post their high growth phase. We use the categories “Shrinking, stagnant, growing and entry / exit”, where a firm is stagnating if it experiences average annual growth between -1% and +1% over the three year period.

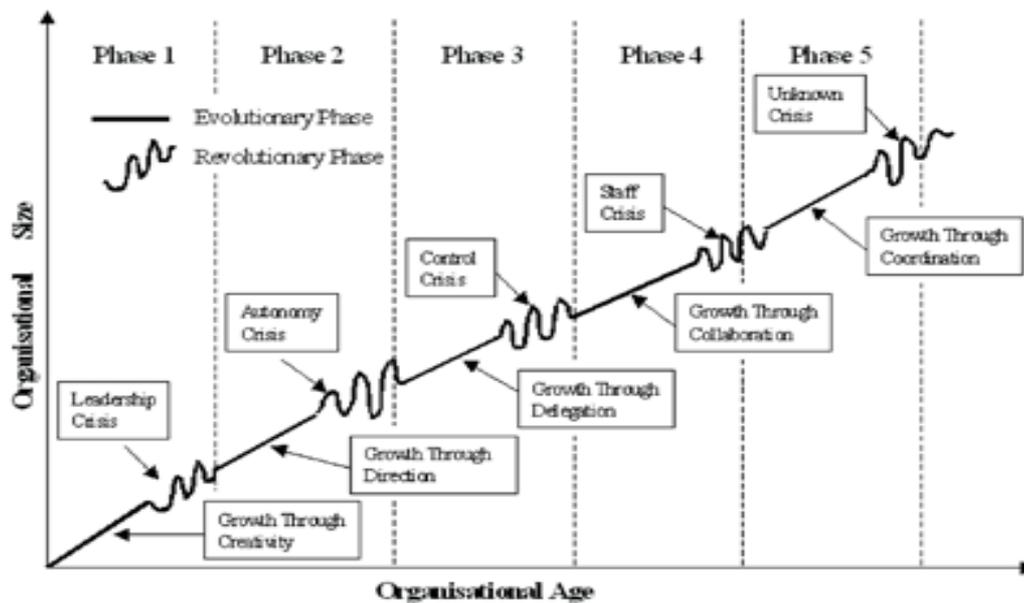
RESULTS OF THE ANALYSIS

Firm growth trajectories

A widely held assumption within the early firm growth literature is the belief that firms experience steady linear growth in their development (Churchill and Lewis 1983). Dating back to the early 1970s (see Figure 1), firm growth was depicted as something akin to the human life cycle whereupon firms orderly transition between various stages from inception to growth, maturity, decline and then death (Greiner, 1972). Research in entrepreneurship has taken on these simple models enthusiastically (Levie and Lichtenstein, 2010).

Classic models of firm growth tended to link firm growth in a linear, predictable fashion with firm age (Deakins and Freel, 1998). Greiner's (1972) six-stage model is based on the assumption of a staged progression through a series of different growth phases. These are linear, but in some cases punctuated by “crises” (Greiner, 1972). In their similar model Churchill and Lewis (1983) identified five stages in firm growth: existence, survival, success, take-off and resource maturity.

Figure 1: The Five Phases of Organisational Growth



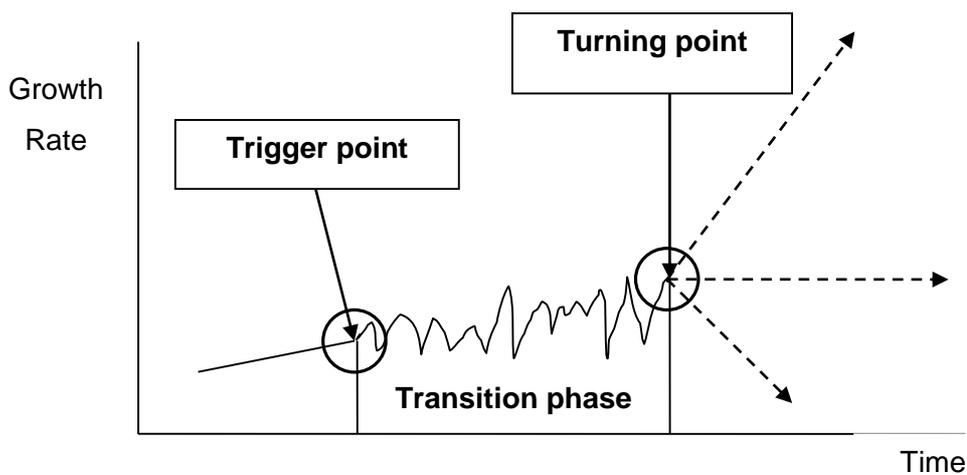
Source: Greiner (1972)

Over the past two decades, the life cycle view of firm growth has come under sustained critique as crude and simplistic. Whilst increasingly discredited (Levie and Lichtenstein, 2010), a growing body of empirical evidence demonstrates that firm growth is in fact a fundamentally “idiosyncratic and unstable process” (Vinnell and Hamilton, 1999, p. 5). Indeed, the empirical evidence base in recent years emphatically corroborates this belief (Garnsey et al, 2006; Brown and Mawson 2013; Daunfeldt and Halvarsson, 2014).

Recent work has shown that firms do not transition through a series of ordered growth stages, but rather experience erratic, short-lived spells of unpredictable growth. These short ‘bursts’ of rapid growth are often interspersed with longer periods with slower, non-existent or even negative growth (Garnsey et al. 2006). This new body of work also dispels the myth that the majority of HGFs are young de novo start-ups. Indeed, one of the latest studies found that over half of Scottish HGFs were over 10 years old when they experienced a period of rapid growth (Mason et al, 2015). In other words, growth is erratic and can occur at any time in the lifespan of a firm.

To address these new findings, in recent years an alternative conceptualisation has been put forward to help understand the antecedents of rapid growth. Research on HGFs shows that rather than undergoing orderly transitions the growth process for many firms is much more unpredictable (See Figure 2 below).

Figure 2: The growth “trigger point” process



Source: Brown and Mawson (2013)

Brown and Mawson (2013) argue that bursts of growth can come from external growth opportunities rather than lifecycle stage, with these growth opportunities termed “growth triggers”. This neo-Schumpeterian perspective suggests that triggers can be endogenous, exogenous and co-determined (see Table 1 below). Some examples include: innovation and new product development, new market entry, acquisition, other changes in ownership including management buy-outs (MBOs) or management buy-ins (MBIs), or the injection of new sources of funding.

Table 1. Classification of growth trigger points

Endogenous	Exogenous	Co-Determined
New product/service offering	Technological development	Entry into a joint venture
Change in company ownership (e.g. MBO, MBI, employee-share ownership etc.)	Government regulatory issues	Acquisition by another firm
Acquisition of another firm	Macroeconomic changes	Major new capital investment
Change in management or Board personnel	Changes to public policy	Adoption (or adaptation) of new business models
Development of a new production process	Access to public sector assistance (e.g. R&D or capital expenditure grants)	Injection of risk capital or new bank funding
Implementation of new management systems	Product failure in the marketplace	Receipt of a major contract or obtaining a new customer

Source: Brown and Mason (2013)

This newer perspective is quite a departure from the original depiction by Greiner. It demonstrates that growth is quite a discontinuous and disruptive process rather than one that can be planned and coordinated. It also shows that these growth triggers can be destabilising for firms as well as being beneficial. This work suggests that different firms react and exploit different types of growth triggers which make blanket policy prescription in this area highly problematic.

The work has two important implications for policy makers. First, it challenges the strong priority given to early stage ventures who are often deemed the most likely cohort of firms likely to be able to undergo rapid growth. While growth triggers can happen to firms of any age or size, the emerging empirical evidence suggests that rapid growth will often occur when firms are more fully developed ventures. Second, it infers the need for temporal flexibility in terms of the assistance needed for firms experiencing periods of high growth. In other words, assistance may become more important after rather than before a period of rapid growth.

Growth trajectories – What happens before and after high growth?

Very few firms will be able to sustain rapid growth over a long time period: doing so indefinitely would be a mathematical impossibility. Indeed, the firm growth literature has suggested a number of potential theories related to firm growth. Much of this literature is preoccupied with the question of whether firm growth is random or whether certain firms have the ability to 'buck the trend' for some reason. It also considers whether growth in a previous period (i.e. a spell of high-growth) is associated with growth or decline in subsequent periods (technically this is "autocorrelation" between growth rates in t and $t-1$). This literature may seem controversial to those working in entrepreneurship policy, but is based on large scale data analysis.

In one study in this area, Coad et al. (2013) set out "Gamblers Ruin" theory. This theory suggests that firm growth proceeds like a gambler in a casino: the results are essentially random (depending on the spin of the wheel), but the larger the firm the longer it will survive (as it has more 'chips' to bet). Using data from a large sample of firms they find some support for this view.

Parker et al. (2010) investigate what happens to UK 'gazelles' in the period after they achieve rapid growth. They find that relatively few gazelles manage to sustain their rapid growth into the subsequent period, but that firms which remain large seem to adopt a series of strategies to do so: having a marketing department and having a major product which contributes to sales. Other activities, such as customer surveys, operating in a b2b market and, surprisingly, not issuing new products. Again, somewhat surprisingly, they also found that firms which attempted to learn from their period of growth is also misconceived: "firms are unlikely to be successful if they attempt to draw lessons from observing growth in one period and applying these lessons routinely at a different point in time." (Parker et al., 2010: 223).

Overall, this literature on firm growth does not suggest there is some "magic" ingredient to achieving rapid growth. But it would be surprising if there was such a thing. Definitionally, high growth becomes harder and

harder to sustain, requiring greater and greater increases in employment or turnover. Studies have also considered the determinants of “persistent high growth” firms, but these often find that this is unusual. Characteristics associated with persistent high growth include firm youth and a small initial size, but only in some countries (Bianchini, Bottazzi, & Tamagni, 2015),

What happens to firms before and after they experience a period of high growth? Table 2 shows the distribution of HGFs across different growth trajectories before and after the high growth phase. A share of 41.4% of HGFs was already on a growth trajectory before the actual high growth period. 20% of HGFs are newly founded firms that entered the market one or two years before the start of the high growth period. 25% of HGF didn't experience any change in employment in the period leading up to high growth and 14.3% experienced negative growth.

Table 2: Growth paths for HGFs

<i>ALL</i>	<i>entry/exit</i>	<i>shrinking</i>	<i>stagnant</i>	<i>growing</i>
Pre high growth period	19.6%	14.3%	24.7%	41.4%
Post high growth period	6.2%	40.3%	16.5%	37.0%
Total number of HGFs	47999			

The distribution of growth paths in the period following the high growth phase is strikingly different. Almost every second HGF declines or ceases to exist after their rapid expansion. 40% of HGFs experience shrinkage while 6.2% drop out of the market. 16.5% of firms manage to sustain their size after rapid employment growth while 37% continue on their growth trajectory.

As the level of complexity increases in firm size, HGF need to rapidly adjust to the new conditions. Only one out of two HGFs seem to be able to successfully manage this transition. The remaining firms experience a period of ongoing decline or drop out of the market.

The quantitative literature suggests a great diversity of growth paths, and this is reflected in the interviews we conducted. Many firms had

experienced long periods of stagnation or decline, before a “growth trigger” such as a change of management had pushed them to grow. One company we interviewed had been taken over by experienced managers and had then experienced relatively rapid growth (albeit not from the initial size needed to make it ‘high growth’ on the OECD definition) [company 4]. Another had experienced these periods of rapid growth but then changed their business model and declined in employment terms while continuing rapid turnover growth [company 7], reaching a scale at which they needed specialised contractors to undertake research rather than others.

Case study: The decision to go for high growth

This business services company had been established for lifestyle reasons as the entrepreneur wanted to leave her corporate job when she started a family. The business did not grow for some time after this, and the entrepreneur did not seek to do so. However, after her family had left home the entrepreneur decided to begin to grow the company. She developed a strategy for the company and worked with mentors. The management team has been expanded, with new directors put in place and incentivised through equity stakes. The result has been steady growth since.

Box: Regression Results

The descriptive analysis suggested that firms experiencing high growth are likely to undergo a subsequent phase of shrinkage. Using regression analysis we further investigate the relation of firm’s growth prior and post a high growth phase.

We run the following regressions

- 1) $y_{it} = \beta + \beta_1 y_{it-1} + z'\delta + \tau_0 + \eta_{it}$
- 2) $y_{it+2} = \beta_0 + \beta_1 y_{it} + \beta_1 y_{it-1} + z'\delta + \tau_0 + \eta_{it}$

where y_{it} is the average annual growth during the high growth period for firm i , y_{it-1} is the average annual growth during the three years leading up to the high growth period and y_{it-2} is the average annual growth during the

three years following the high growth period. Z' is a vector of control variables such as industries, region, firm size and age. τ_0 is a year dummy for the year the firm started its high growth period and η_{it} denotes the error term.

Table 1: Regression of average annual growth rates post high growth on average annual growth rates before and during the high growth phase.

VARIABLES	(1) I Growth rates during phase of high growth	(2) II Growth rates post high growth	(3) III Growth rates post high growth	(4) IV Growth rates during phase of high growth	(5) V Growth rates post high growth	(6) VI Growth rates post high growth
Growth rates prior to high growth	0.00778** (0.00305)		0.00349 (0.00259)	-0.00141 (0.00337)		0.000884 (0.00276)
Growth rates during phase of high growth		-0.0313*** (0.00608)	-0.0314*** (0.00608)		-0.0360*** (0.00624)	-0.0360*** (0.00624)
Constant	0.356*** (0.00149)	-0.00695*** (0.00225)	-0.00767*** (0.00229)	0.365*** (0.00663)	0.00177 (0.00459)	0.00173 (0.00459)
Observations	36,453	36,453	36,453	36,453	36,453	36,453
R-squared	0.000	0.001	0.002	0.029	0.010	0.010
Controls	NO	NO	NO	YES	YES	YES

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results of equation 1) and 2) are shown in

VARIABLES	(1) I Growth rates during phase of high growth	(2) II Growth rates post high growth	(3) III Growth rates post high growth	(4) IV Growth rates during phase of high growth	(5) V Growth rates post high growth	(6) VI Growth rates post high growth
Growth rates prior to high growth	0.00778** (0.00305)		0.00349 (0.00259)	-0.00141 (0.00337)		0.000884 (0.00276)
Growth rates during phase of high growth		-0.0313*** (0.00608)	-0.0314*** (0.00608)		-0.0360*** (0.00624)	-0.0360*** (0.00624)
Constant	0.356*** (0.00149)	-0.00695*** (0.00225)	-0.00767*** (0.00229)	0.365*** (0.00663)	0.00177 (0.00459)	0.00173 (0.00459)
Observations	36,453	36,453	36,453	36,453	36,453	36,453

R-squared	0.000	0.001	0.002	0.029	0.010	0.010
Controls	NO	NO	NO	YES	YES	YES
<p>. Column 1 shows that firms experiencing rapid growth prior to the high growth phase grew faster during the high growth phase. Increasing growth in the period leading up to high growth by 100% increases growth during the high growth phase by 0.7%. However, the effect becomes insignificant once control variables are added, as shown in column 2. Column 3 shows a negative correlation between growth rates during and after the high growth period. Increasing growth in the period of high growth by 100% decreases growth in the period after the high growth phase by 3%. The effect remains significant to the level of 1% once control variables are added in column 4. Allowing for a possible correlation between growth rates prior to and post high growth, as shown in columns 5 and 6 does not change the results.</p> <p>The regression results are thus in line with the finding from the descriptive analysis. Going through a phase of high growth seems to pose considerable stress on the internal firm structures as well as on the management team.</p>						

The spread of growth trajectories varies across industrial sectors as shown in table 3. But the large share of shrinking and exiting firms is apparent across all industries. The sector that copes the least well with a high growth period is the hotel and restaurant sector of which 55% of firms decline or exit. At the other end is the wholesale, retail and repair service sector in which 42.2% firms decline or exit after a rapid growth period.

Table 3: Growth path across firm size

Industry	Pre high growth period				Post high growth period			
	entry	shrinking	stagnant	growing	exit	shrinking	stagnant	growing
Construction	13.0%	12.8%	29.5%	44.7%	4.8%	41.2%	18.5%	35.5%
Electricity, Gas, Water	40.5%	21.6%	8.1%	29.7%	24.3%	43.2%	5.4%	27.0%
Financial Intermediation	21.4%	12.9%	21.4%	44.3%	11.6%	33.5%	13.4%	41.5%
Hotels and Restaurants	31.4%	19.5%	18.9%	30.2%	5.6%	49.8%	16.6%	28.0%
Manufacturing	12.3%	16.5%	34.9%	36.3%	5.2%	41.2%	16.9%	36.7%
Other Community, Social & Personal Service Activities	20.3%	17.2%	16.7%	45.8%	5.2%	42.9%	16.0%	35.9%
Real Estate, Renting and Business Activities	26.2%	12.0%	18.7%	43.1%	7.2%	39.4%	15.6%	37.9%

Transport, Communication	Storage,	16.6%	13.2%	26.8%	43.3%	6.1%	37.1%	17.2%	39.6%
Wholesale, Retail, Repair		12.7%	13.1%	30.4%	43.8%	6.0%	36.6%	17.1%	40.3%

Notable is also the high share of financial intermediates that exit the market after a high growth period. The share amounts to 11.6% almost double the average across industries. The share of financial intermediates that continue to grow after a period of high growth is the highest across industries, indicating a larger variation in the ability to cope with high growth than in other sectors.

Growth trajectories for HGFs by size

We analyse the distribution of growth trajectories for firms of different sizes using the categories 10-19, 20-49, 50-99, 100-249 and 250 plus, shown in table 4. As expected the share of large firms entering the market in the period leading up to high growth is lower than for smaller firms. 10% of firms with 250 or more employees enter, the share increases to 15.2% for firms with 100-249 employees and lies around 20% for smaller firms. The pattern is reversed for firms that were already on a growth trajectory. Between 52.3% and 55.1% of firms with more than 100 employees are growing prior to the high growth period, whereas the shares of firms with between 50-99, 20-49 and 10-19 employees are much lower amounting to 45.4%, 37.7% respectively 41.3%.

Table 4: Growth path across firm size

Size	Pre high growth period				Post high growth period			
	entry	shrinking	stagnant	growing	exit	shrinking	stagnant	growing
10-19	20.2%	11.5%	27.0%	41.3%	5.3%	39.0%	18.8%	36.9%
20-49	19.8%	16.3%	26.2%	37.7%	6.8%	41.5%	14.5%	37.2%
50-99	19.2%	23.8%	11.7%	45.4%	9.4%	44.8%	9.0%	36.8%
100-249	15.2%	24.9%	7.7%	52.3%	10.0%	44.7%	7.8%	37.5%
250+	10.0%	26.8%	8.1%	55.1%	10.1%	45.6%	7.0%	37.3%
Absolute numbers								
10-19	6168	3519	8256	12642	1622	11922	5747	11294
20-49	2289	1884	3031	4364	781	4798	1683	4306
50-99	555	689	338	1316	273	1298	260	1067
100-249	277	455	140	956	183	817	143	685
250+	112	300	91	617	113	511	78	418

The period after the high growth phase exhibits an interesting pattern. The larger the firm size the larger is the share of firms shrinking post high growth. The span reaches from 45.6% for firms with more than 250 employees to 39% for firms with 10-19 employees. The pattern is similar for exiting firms. 10.1% of HGF with more than 250 employees exit whereas only 5.3% of HGF with 10 to 19 employees exit during the three year period post high growth. Especially, the larger share of exiting firms is surprising, as large firms are generally thought of as better established in the market than small firms (citation).

Growth trajectories for HGFs by age

Firms are classified into different age groups according to their first year of appearance in the BSD. The exact age can thus only be determined for firms born from 1998 onwards, all other firms are attributed an age of 10 years. As we consider a three year long period prior to the high growth phase of a firm the share of firms aged one and two years entering the market equals 100%. The share of firms shrinking prior to high growth increases with the age of a firm, whereas the share of firms experiencing positive employment growth increases with the age of a firm with the exception of newly born firms. The share of firms exiting the market decreases with age. The highest exit rate of 9.5% exists for firms born two years before experiencing high growth.

Table 5: Growth path across firm age groups

age	Pre high growth period				Post high growth period			
	entry	shrinking	stagnant	growing	exit	shrinking	stagnant	growing
1	100.0%				9.5%	40.0%	14.7%	35.8%
2	100.0%				7.8%	38.9%	15.7%	37.5%
3		9.9%	48.7%	41.4%	6.2%	39.0%	17.4%	37.4%
4		15.1%	24.6%	60.4%	5.6%	39.7%	16.9%	37.8%
5		19.9%	10.7%	69.4%	5.1%	41.0%	15.0%	38.9%
6		21.4%	20.6%	58.0%	5.5%	39.5%	15.8%	39.2%
7		25.4%	13.5%	61.1%	4.9%	41.0%	17.6%	36.5%
8		30.6%	29.5%	39.9%	4.9%	42.4%	18.9%	33.9%
9		31.6%	24.4%	44.0%	4.8%	48.5%	15.5%	31.2%
10		29.5%	17.5%	53.0%	4.5%	42.7%	15.9%	36.9%

How do firms achieve high growth?

In recent years, there have been a number of empirical studies which have attempted to examine 'how' firms achieve rapid growth. As mentioned previously, whereas the literature on firm growth traditionally focused on 'how much' increasingly the literature is examining the question of 'how' firms grow (McKelvie and Wiklund, 2010) and the factors contributing to periods of rapid growth. Some of the key issues which have been investigated include, inter alia, the role of innovation, importance of human capital, the importance of firm internationalisation, product diversification,

strategic alliances and joint ventures, use of business models and the importance of customers and sales orientation¹. Some of the main empirical studies are highlighted in Table 1 below.

Table 6. Growth Modes in High Growth Firms

Authors	Research focus	Findings
Delmar et al. (2003)	Compares growth measures	Not all HGFs grow organically; approximately 10% of sample were “acquisition growers”, achieving growth by buying other firms
Barringer et al. (2005)	Compares growth-related attributes in rapid-growth and slow-growth companies	Founder characteristics, firm attributes and business practices, including knowledge of customers, are critical differentiators between rapid growth and slow growth.
O’Regan et al. (2006)	Examines the drivers of rapid organic growth (turnover)	HGFs are strongly sales and customer oriented, so a strong strategic orientation had more of an impact on sales growth than innovation and R&D activities.
Moreno and Casillas (2007)	Examines the differentiating characteristics between HGFs and non-high growth firms	HGFs have a lower asset turnover than non-high growth firms and also exhibit lower levels of solvency and liquidity. They have lower levels of financial resources available.
Goedhuys and Sleuwaegen (2010)	Examines the relationship between firm capabilities and characteristics and rapid growth.	Firms with available resources to develop markets and service customers are more likely to achieve growth.
Littunen and Niittykangas (2010)	Examines the impact of resources and firm strategy on rapid growth	Resource availability and usage was critical for growth, often stemming from the skills, experience and networks of the entrepreneur.
Hansen and Hamilton (2011)	Compares the growth processes in low growth and high firms	High growth firms exhibited opportunistic perceptions of the external environment; focus on controlled growth; business culture of innovation and flexibility; use of extensive private networks
Lockett et al. (2011)	Examines the impact of previous rates of organic and acquisitive growth	Previous organic growth acts as a constraint on current organic growth whereas previous acquisitive growth has a positive effect on current organic growth
Arvanitis and Stucki (2014)	Examines the impact of M&As on the growth of the acquiring firms	The study found positive statistically significant performance effects arising from M&As in terms of sales growth, value added per employee and sales of innovative products
Bamiatzi and Kirchmaier (2014)	Examines the strategies used by HGFs to sustain growth in declining markets	HGFs intentionally search for high-margin products, avoid cost competition and maintain a tight control of costs
Brown and Mawson (2014)	Examines the levels of internationalisation within HGFs	HGFs are no more likely to sell internationally than non-HGFs. However, HGFs were found to adopt

¹ The issue of the role of acquisition is covered in the next section.

		more aggressive forms of international expansion than non-HGFs, such as overseas acquisitions
Coad and Geunther (2014)	Examines the role of diversification and firm growth	Diversification is preceded by employment growth. While positively associated with subsequent asset growth diversification is negatively associated with employment growth
Hölzl (2014)	Examines the persistence, survival and growth of HGFs	HGFs show little difference in terms of their survival chances and are likely to encounter quite modest growth after a period of high growth
Mohr et al. (2014)	Examines the role of strategic alliances within HGFs	HGFs are more likely to be engaged in alliances than other firms, thereby obtaining access to resources and markets
Senderovitz et al, 2015	Examines the connection between rapid growth and profitability	The profitability of HGFs is stronger for firms pursuing a broad market strategy rather than a niche focused approach to markets

Innovation

Research on innovation and growth has produced very mixed results. One recent study examining Spanish firms found that firms investing in R&D are more likely to achieve high growth (Segarra and Teruel, 2014). Interestingly, this work found that manufacturing firms are significantly affected by R&D investments. On the other hand, the impact of R&D investments in service firms was much flatter. Using a quantile regression analysis, Coad and Rao (2008) show that the benefits of innovation are highly skewed, and of crucial importance for a handful is ‘superstar’ HGFs. This finding was largely endorsed by other empirical research examining Dutch firms which also found that only R&D efforts benefit only the fastest growing high-tech start-ups (Stam and Wennberg, 2009).

Coad et al. (2014) investigate the overlaps between HGFs and highly-innovative firms. Yet in contrast to what might be expected, they find little overlap: highly-innovative firms are no more or less likely to be innovative than other firms. They suggest that one reason for this might be that innovative firms create value in the market, but this value is often dispersed among other firms who ‘capture’ it and so achieve high growth. Innovations can only lead to growth, they argue, when “complementary assets” – such as marketing plans, managerial skills, economies of scale etc. - are available at the firm level (Teece, 1982 cited in Coad et al., 2014). These findings were endorsed by other research in the UK which found that

product development was negatively associated with becoming a HGF (Parker et al, 2010).

Our interview findings reflected these studies. Only a small share of interviewees could be described as genuinely innovative in the sense of developing disruptive new products or services. Instead, most were working in well-established areas of business and few seemed to be focused on R&D or innovation more generally. One company had developed an entirely new product for use the maritime industry and was experiencing commercial success by marketing this (see box). One was entirely focused on developing a single innovative product [company 7]. They had developed a new product which was being taken to market, but it was taking some time before the product was commercially successful.

Case study: Innovation as a growth trigger

One company was working in a highly-technical market making products for the shipping and off-shore energy industries. The company had been set up by someone working for a large company in the same market but who felt large companies tended to be too bureaucratic and difficult to work with. The company had worked with their customers to develop new products which had largely been commercialised via personal contacts and word of mouth. For this company, the principal reason for growth had been the development of these new products.

Product Diversification

Product diversification is very much connected with product innovation and firm growth but little work has investigated this issue (Moreno and Coad, 2015). What evidence that exists suggests that HGFs are more likely to diversify into new or ancillary product areas (Holzl and Friesenbichler, 2007). Another recent study of Danish gazelles also found that firms undertaking a broad market strategy outperform market-nichers (Senderovitz et al, 2015). This study claims that gazelles focused on a narrow market strategy may limit their profitability.

Other recent research contradicts these findings however. Coad and Guenther (2013) found a negative correlation between product diversification and employment growth after the diversification process has occurred. Another recent study found that firms who experience sustainable high growth are ones more likely to improve existing production processes rather develop new ones (Gabrielsson et al, 2014). A lack of empirical studies prevents any definitive conclusions being drawn on diversification and growth.

Our findings endorse the literature that product diversification and overall breadth of market strategy seem connected to their success. A number of firms viewed the speed to market with new products coupled with the breadth of their product range as important contributors to their overall success and growth.

For many companies, they had diversified but then – essentially a pivot where the core business model had changed. While they set out to offer one product or service, clients had expressed an interest in something else. This had sometimes led to new products, on the back of which growth had come. As one entrepreneur put it:

“Every product that we’ve developed has come from a request from a customer where they’ve said: ‘we’ve got a problem can you solve it?’” (Company 7)

Another company had realised that the core business was unlikely to experience growth and had used the development of a new website as their new business model. They were then able to offer more products to a wider range of companies.

Internationalisation

The relationship between internationalisation and firm growth has received surprisingly little attention in the growth literature, despite the fact that entering new markets obviously expands the market for new sales. Analysis of Austian HGFs found that export activities were strongly connected to high growth (Holzl and Friesenbichler, 2007). These findings

have been corroborated by studies in the UK which similarly found a positive relationship between exports and high rates of growth (Mohr et al, 2014). A comparative study examining the UK and Germany found that firms with international sales have higher overall sales growth than those who solely trade domestically (Burgel et al, 2000).

Other contradictory evidence remains however. While one recent study discovered that Scottish HGFs are often characterised by high levels of internationalisation (Mason and Brown, 2013), another study also conducted in Scotland examining Scottish HGFs and a sample of non-HGFs found no sizeable differences in levels of international orientation between the two sets of firms (Brown and Mawson, forthcoming). Plus, research in Sweden found that firms undergoing prolonged periods of high growth were less committed to overseas markets (Gabrielsson et al, 2014).

Most studies have failed to make distinctions between exports and other types of internationalisation such as licensing, opening overseas sales subsidiaries etc. One exception (Brown and Mawson, forthcoming) found that HGFs tended to adopt relatively aggressive international expansion strategies, for example by establishing overseas subsidiaries or undertaking overseas acquisitions, than their non-HGF counterparts. As a result of these complex growth processes, a large proportion of HGF employment growth is generated outside the country rather than domestically. Clearly, the importance of exporting and other forms of internationalisation will hinge on the size of the domestic market for product or service of different firms.

The findings in connection to internationalisation were ambiguous. Most of the firms interviewed were heavily domestically focused. Therefore, internationalisation had played a relatively small role in their success. One very rapidly growing financial services firm had become heavily internationalised partly due to the international connections of the entrepreneur involved. Another firm which had internationalised a new product expressed extreme caution about the activity (company 7). Their product was innovative but they were concerned that extending beyond European and US markets would risk the IP of their product line.

Human Capital and Managerial Skills

Surprisingly, given the importance of human capital as a fundamental driver of productivity, little research has specifically probed the role of human resources in the growth of HGFs. Using UK firm level data one recent study using estimates for labour productivity found that HGFs to have higher levels of productivity (Mason et al, 2009). However, this does little to explain what firms do to achieve this higher level of productivity.

The key area of the literature which speaks to this question concerns the role of management and managerial strategies and HGFs. A recent review of the literature claimed there had been a dearth of research examining the managerial challenges facing HGFs (Wennberg, 2013). However, one study found that HGFs have higher levels of formal human capital than non-HGFs (Almus, 2002). The literature also seems to take a common view that larger, more experienced management teams are more likely to run HGFs than less experienced managers (Barringer et al, 2005). A study of the UK's electronic and engineering sector found that the external networks of managers were a key aspect of HGFs (Sims and O'Regan, 2006).

In terms of managerial strategies there is unlikely to be a "one-type-fits-all" solution for managerial structures in HGFs (Wennberg, 2013). A US study by Barringer et al (2005) found that planning and goal setting are not inextricably linked to achieving high growth whereas a focus on customers and employees were important. This endorses other recent work in Scotland which found that a key attribute of HGFs was a considerable focus on existing customers (Mawson, 2013).

One study on 13 rapidly growing firms in Canada suggested that new management capacities were important for managing high growth, particularly where formal structures and management systems were unable to keep up with the size of the firm (Nicholls-Nixon, 2005). This work showed that developing skills and capabilities is an iterative process which HGFs must undertake such as acquiring new resources (such as new IT systems) to absorb growth.

A key aspect of this resource formation process seems to be the ability to retain close customer contact whilst growing rapidly (Mason and Brown, 2013). For example, Parker et al (2010) found that HGFs are more likely to utilise a formal marketing department to enable this close customer engagement rather than the routine application of management 'best practice' strategies. Another recent study conducted in Belgium found that rapid growth was positively related to firms using outside board members to help advise new ventures (Vandenbroucke et al, 2014). This seemed especially relevant for high-tech start-ups who were often run by technical professionals with limited generalist managerial skills.

The findings from the interviews confirmed the importance of human capital. There seemed a very strong commitment to training and skills development in the firms'. Some had experienced challenges in this area, however, with well trained staff leaving firms to join larger, better paying competitors and providing a disincentive for firms to invest in training (company 9, 12).

Strategic Alliances

One aspect of HGFs which has only just started to be investigated is the role of strategic alliances in the growth of these firms. Alliances are said to support firm growth as they are implicit endorsements of quality, a particular issue in high-technology industries. One recent study examining alliances in high-tech firms in Cambridgeshire found HGFs particularly likely to enter into an alliance, with the result that they improved their access to markets and available resources. These studies have been supported by regression analysis which suggests that "market-oriented partnership.....and technology partnerships" are the alliances "most strongly associated with high growth" (Mohr et al, 2014, p. 253).

In the vast majority of cases, there was no use of strategic alliances as such. The only areas inter-firm relations seemed important was the role of having stable and long-term and stable supplier relations. One company had experienced strong growth on the back of a mutually beneficial relationship with a larger supplier (company 4) but most companies were not engaging in this area.

Business Models

Business models are increasingly viewed as a key source of competitive advantage which determine the success of firms (Teece, 2010) and which often lead to rapid internationalisation (Hennert, 2014). To date, no dedicated study has specifically examined the role of business models in HGFs. However, there appears to be some indicative evidence to suggest the importance of innovative business models as a beneficial factor promoting rapid growth.

An interview-based study conducted in the UK found that many HGFs adopted quite sophisticated business models (Mason et al, 2015). These business models seem to serve two important purposes. First, they cement relationships with existing customers. Second, a notable feature of these business models is the creation of recurring revenue streams from customers. These revenue streams therefore guarantee sales revenues and help to eradicate the lumpiness of revenues which are dependent on new customers. For example, these recurring revenue models often takes the form of the 'gillette' model where firms effectively give away their products and then charge customers a fee when they use the product on a recurring basis.

Other business models include strong after sales or service agreements where they offer customers a package which includes the product, product updates and access to their latest design features. This is a model often used in the computer software sector (Suarez et al, 2013).

Again, in line with the literature the business model of firms was a key factor behind their growth. Several firms used their business models to out-compete their rivals, via things like superior delivery-times, customised products etc. Therefore, a key differentiating factor between firms in similar sectors is often the effectiveness of their business model.

Organic versus inorganic growth

Research on high growth firms has focused on the assumption that they will achieve rapid, organic growth by developing new products or entering

new markets themselves. This matters as it helps assess whether high growth firms are genuine creators of new jobs, and so warrant the policy focus on them. However, an alternative interpretation is more favourable as the acquisition of a firm may help improve its productivity, if new owners can bring in investment, better management and new innovations (Henrekson & Johansson, 2010).

Despite this evidence, relatively few studies have considered the distinction between organic and inorganic growth in HGFs (Wright and Stigliani 2013; Daunfeldt et al. 2014). One reason is methodological, as it is difficult to separate out organic from inorganic growth in the quantitative studies which have dominated research onto HGFs (Mason et al, 2015). Yet studies suggest that firms growing by acquisition represent a small, but significant, group of high growth firms.

Studies of high-growth firms in the UK find that around a fifth had undertaken some form of acquisition as part of their growth processes, most of which were firms from overseas. Brown and Lee (2014) have a similar finding, with high growth SMEs four times more likely to be seeking finance to acquire other firms than other firms.

Firms in some sectors may be more likely to grow by acquisition than in others. Delmar et al. (2003) study high growth firms in Sweden in the 1990s and find that around 10% could be termed “Acquisition growers”, with firms in this category overrepresented in industries such as manufacturing, steel and pulp/paper, they tended to be larger and older. Acquisition growers tended to be in slower growing industries and looked like established, cash rich firms aiming to achieve growth through purchasing when opportunities for organic growth were weaker.

One study looked at the relationship between organic and acquisitive growth for Swedish firms (Lockett et al, 2011). They find that while organic growth in an earlier period may make growth harder in the subsequent period, but that firms which experience acquired growth are then more likely to achieve organic growth subsequently. They explain this as firms which experience organic growth may run out of market opportunities in

their sector of operation; acquisition offers them a set of new markets they can enter.

Given the small sample size, acquisition was not expected to feature prominently. Indeed, in only one of the firms has acquisition been used to grow their business.

Case study: Acquisition as a growth trigger

One of the firms' interviewed was a medical firm which had recently acquired another firm in a related field to itself, leading to the substantial growth of the firm. While the acquisition had made the enterprise larger it had also made the business more strategic in terms of its outlook. Going forward the firm wanted to grow organically, but was now exploring opportunities for diversification into new commercial areas such as clinical trials. The growth of the firm was also making the firm more focused on developing new networks with other types of actors to achieve this diversification process. In other words, growth was requiring the firm to become even more externally-focused than before.

Coping with growth and erratic growth trajectories

One of the few areas of genuine consensus with the high growth literature concerns the ephemeral nature of rapid growth. In other words, periods of high growth don't last (Garnsey et al, 2006). A major piece of research conducted on Austrian firms involving panel data examined HGFs 3 and 9 years after their period of fast growth and found that growth was only modest afterwards (Hölzl, 2014). However, the research did not find a "curse of high growth" (Hölzl, 2014, p. 225). While it is hard to replicate a period of high growth, fast growing firms were still more likely to become high growth firms than firms which had not done so.

Case study: S-shaped growth with trigger points

This digital company (company 12) had grown to over 30 staff over a ten year period. Yet, while they did not shrink at any point their growth was

never linear. Instead, it seems like two classic 's' curves with a period of relatively fast growth followed by relatively slower growth and a loss-making year. In both cases, the management was able to expand the company – in the first case by entering a new market, in the second case by expanding the management team with a new, experienced staff member. While the company made a loss in two years, this short period of consolidation was followed by a return to growth.

These findings have been corroborated in nearly all the other empirical studies which have examined the persistence of growth in HGFs. Indeed, in a similar study, Daunfeldt & Halvarsson (2014) consider the extent to which HGFs are “one-hit wonders” or are able to sustain growth in latter periods. They define HGFs as firms in the top 1% by growth rate for each three year period, but find that HGFs in one period have no greater chance of achieving HGF in the next period than other firms. Instead, many of the HGFs they studied had achieved high growth only after a prior period of employment loss.

Other recent research conducted in the UK found a similar erratic nature within their cohort of rapid growers (Mohr et al, 2014). They concluded that a high proportion of HGFs “experienced setbacks after periods of rapid growth” (Mohr et al, 2014, p. 253). The exact cause of this was not examined by this piece of work but other research on HGFs suggests that often periods of high growth lead to ‘managerial overstretch’ in firms (Brown and Mawson, 2013) (see case study below). For example, large increases in employees require firms to put in place new systems and processes to manage increased numbers of employees. Often there are knock-on effects from these changes such as the need for new IT systems. Often when putting in place these new systems firms become more internally focused which can reduce their ability to win or chase new orders. Overall, however little work has been done to pin down the exact reasons which cause problems for firms’ post-high growth.

Case study: The Exacting Nature of High Growth

It is often forgotten that firms are run by people and that firms undergoing periods of high growth often exact quite a heavy psychological toll on the people running these companies. One example was a firm interviewed in the veterinary medicine field. This was a family owned firm experiencing extremely rapid growth of 40% per annum. It was beginning to become a more professionally run firm organisation employing non-family members in senior management positions. However, the owner-manager was struggling to relinquish his desire to remain in control of all facets of the firm. A key challenge going forward for this firm was the need for more effective management systems so that the original management team can become more focused on the strategic growth of the company whilst ensuring the operational side of the business continued to operate effectively. This type of managerial overstretch is one of the key “growing pains” within HGFs.

Finally, researchers have examined the issue of mortality rates of HGFs but the evidence on this issue is mixed. The above mentioned study on the growth of Austrian firms found that being a HGF does not increase the likelihood of survival in future periods compared to control firms (Hölzl, 2014). A UK study contradicts this evidence and found that HGFs exhibit higher survival rates than other firms (Mohr et al, 2014). However, given the lower levels of liquidity prevalent in HGFs (Moreno and Casillas, 2007), we could speculate that firm survival post-high growth may be problematic for some companies. Indeed, the quantitative analysis undertaken as part of this study strongly corroborates the destabilising impact of high growth for nearly 50% of firms.

Barriers to firm growth

Few studies have taken a systematic view on barriers faced by high growth. In a study for the National Endowment of Science, Technology and the Arts (NESTA), Lee (2014) considers the case of UK HGFs, defined by employment growth, over the period 2007/8 – 2012. He uses a propensity

score matching technique to identify a second set of firms – potential high growth firms – which are similar to those firms which achieve high growth but which have not actually managed to grow at these rates. He is then able to assess the extent to which ‘actual’ and ‘potential’ high growth firms perceive different barriers to growth to ‘normal’ firms. The results suggest that there are six main problems which HGFs are more likely to perceive than others: recruitment of suitable staff, shortages of skills, obtaining finance, cash flow, the skills of the management and finding suitable premises to accommodate growth. Potential high growth firms faced four particular barriers: the economy (although this is likely to be a perception due to their lack of growth), access to finance, cash flow and managerial skills, although they were less likely to perceive regulation was an issue.

Lee (2014) suggests that many of these barriers are classic “**Penrose effects**”. Named after the business economist Edith Penrose (1959), Penrose effects arise as firms experience growth when it becomes harder and harder for their existing management to cope with the challenges of managing and growing a larger company. Thus, the experience of growth over a short time period will actually slow growth in subsequent periods as the management team – which is hard to change in the short term – struggles with new challenges and increased complexity of the new firm.

There has recently been considerable discussion on the role of **finance** as a potential barrier for HGFs, yet there remains controversy on this point and few definitive answers (Vanacker & Manigart, 2010). Two key distinctions can be made: obtaining growth finance versus cash flow as a barrier to growth, and; between equity finance or debt finance as a potential source of funding. Both sources of finance are likely to be important for high growth firms: growth finance is likely to be related to the need for equity finance; cash flow is likely to be more closely related to debt. But the extent to which firms these different types of finance may follow a ‘pecking order’ (Myers & Majluf, 1984). The first preference of firms is internal funders, which offer flexibility, control and minimised risk. If these are not available, firms will move to debt finance from banks which do not mean giving away equity. If internal finance or bank debt finance is not available, firms seek the equity finance only in exceptional circumstances as it dilutes ownership of the business. Many entrepreneurs are,

understandably, reluctant to cede even partial ownership of any business they have founded and invested in.

Equity finance has been seen as particularly important for high growth SMEs, although actually only around 1 -2 percent of SMEs seek risk capital (BIS, 2012) and empirical evidence suggests that most high growth firms are more reliant on debt finance from banks (Vanacker and Manigart, 2010; Brown & Lee, 2014; Lee & Brown, 2016). Risk equity finance such as business angel funding and venture capital is seen as important in enabling firms to create new innovations, commercialise these new products, and export or allow entry into new markets. In the main, this is channeled towards technology-based firms.

Cash flow is also a potential problem particularly if, as evidence suggests, high growth is erratic and sometimes short-term. Instability may make it harder for companies to plan their inputs and cash flow in future, particularly where new sales require intermediate inputs or staff to be in bought in if these new sales are to be delivered. Building on this, the historic view of high growth firms is that their problems in matching rapidly growing, but often lagging, revenues to immediate costs means that “high-growth firms are typically cash starved” (Hambrick & Crozier, 1985: 41). In this case, **debt finance** is likely to be the solution for the vast majority of HGFs.

Brown and Lee (2014) study this in the UK. Using qualitative interviews, they showed high levels of caution amongst entrepreneurs running high growth businesses: fitting with the pecking order hypothesis, they were not keen on ceding equity in their firms and focused instead on debt or internal finance when necessary. They also used quantitative analysis and find that, even when controlling for objective factors such as credit score, there is no evidence that firms achieving high growth find it harder, or easier, to access finance than other firms.

The firms we interviewed reflected this. There were some exceptions, with one firm receiving multiple rounds of financing from larger companies in the same sector, but most focused on debt finance from banks. Yet this had caused some challenges for the firms, with one experiencing the

withdrawal of a loan in the late 2000s following a revaluation of the firms' property (company 2). Smaller firms were often funded by the entrepreneur. Our results on finance for innovation were mixed. The common portrayal is that it is harder for innovative companies to access finance, but empirical evidence on this point is mixed (Mina et al., 2013; Lee et al., 2015; Rostamkalaei & Freel, 2016). Our results differed by sector, with firms in some capital-intensive sectors finding it easy to raise capital, yet others more cautious about their ability to raise funding. But they suggest that new policies, such as the Northern Powerhouse investment fund (see Lee, 2016), need to be carefully targeted.

An additional burden of growth is accessing sufficient **human capital**. Particularly where high-growth is defined as additional employment, rapid growth is inevitably associated with new recruitment. Yet the challenges of both recruitment and integration of new staff will inevitably cause problems. Swedish evidence suggests that high growth firms are particularly likely to hire from groups who are sometimes disadvantaged in the labour market – less educated workers, immigrants and those with recent experience of unemployment (Coad, Daunfeldt, Johansson, & Wennberg, 2014). They may instead be more reliant on internal training and serve an additional economic role as allowing certain groups to assimilate into the labour market. This may reflect the high level of service-sector firms in the overall cohort of HGFs which often require basic levels of human capital for cleaning, hotel and catering and fast food sectors.

Related to this, high-growth firms may face a challenge of **management** ability. Rapid growth is associated with challenges: management structures need to change as firms expand; new obstacles will develop for each firm which will require problem-solving on behalf of the management; new staff and clients need to be coped with capably. Yet, while the founder of a company or the management team of a start-up may be well suited to managing a small firm, expansion will create challenges they must overcome (Fischer & Reuber, 2003; Parker, Storey, & Witteloostuijn, 2010). The inability of a management team to cope with growth may worsen the quality of decisions made within the firm, lead to logjams in production and friction between new and old staff (Hambrick & Crozier, 1985). Lee (2014) found that 41% of British high-growth firms suggested management quality

was a significant barrier they faced to their growth relative to 27 percent of other firms.

Other studies have pointed to more prosaic barriers, each of which may make growth harder for HGFs. In particular, availability of premises may be a challenge for firms achieving rapid expansion. The difficulty of planning for rapid, erratic and sometimes unexpected growth can make it harder for companies to grow (Levy et al. 2011), particularly in some congested inner-city areas where new office accommodation is expensive and hard to obtain. Yet while this wasn't a problem for all of our interviewees, some did express concern about the availability of specialist accommodation making it hard for them to balance their desire to live in particular areas with their need to be close to the business (companies 9, 2).

In terms of the interviews undertaken, there was no single growth constraint which dominated. However, there were recurring themes which seemed to stand out as particularly important. First, a number of firms stressed the need for support around access to further rounds of growth capital. Many suggested that assistance on this matter could help short-circuit some of the problems they were having obtaining funding. However, in common with other work by Brown and Lee (2014), for the most part the majority didn't appear to have strong financial constraints and were using internal sources of funding to grow. The key issue faced was cash flow. As noted by one company (8)

“That’s the only challenge if you’re a small growing company, suck in cash because you’re growing fast and spending it out the other side to keep on growing.”

The second main issue raised was the need for additional managerial support to help these firms sustain their high growth episodes. Second, and related to this point, is the need for follow-on management support to help navigate their growth process. Many firms were founded by entrepreneurs who were experienced in the sector before they had started the company. In one case, the company was a joint-venture between a new entrepreneur and a more experienced manager.

Case study: Partnership with a successful entrepreneur

This events company (company 8) was a spin-off from an already successful company. The managing director of that company had partnered with a then-member of his management team to start a new company which offered services in a related field. For the already successful entrepreneur, this was a way of starting a company in an area in which he wanted to expand his business. For the newer entrepreneur, this was a really important way to develop her day-to-day management skills without jeopardising the business:

“He’s good at things I’m not good at, finds scary decisions exciting – its taught me to be more cut throat”.

While still small, the company had experienced relatively rapid growth in the period since.

CONCLUSIONS AND POLICY RECOMMENDATIONS

This study has considered the “how” of firm growth, both in terms of the trajectories followed by firms before and after high growth. Traditional models of firm growth portray it as a linear process, with firms growing consistently over time in a life-cycle process. This viewpoint is being increasingly challenged by researchers. Indeed, our results strongly suggest that growth is more likely to be erratic, characterised by short-term bursts of rapid growth followed by periods of low or no growth and even decline.

We identify an important challenge of sustainability faced by high growth firms. The process of firm growth can create challenges for the firm itself and a substantial minority of high growth firms do not manage to sustain their growth and, following a successful high growth spell, experience shrinkage and even failure. This often occurs due to managerial overstretch in firms following a period of rapid growth. Achieving high

growth is difficult but important; sustaining the newly achieved scale is a second and even greater challenge.

We also identify a series of ‘triggers’ which can change firm’s growth trajectories. Our interviews show that these can be both positive, such as the introduction of a successful new product, or negative, such as a failed product launch or financial pressures. Focusing on these triggers can help understand why firms move from one growth path to another. These include new product development, collaboration with customers or supplier, or exporting. However, they can also be exogenous to the firm such as regulatory changes. Our interviews suggest that these triggers are often interlinked with a change in the growth mindset of the entrepreneur.

We now turn to the policy implications arising from this analysis. What seems increasingly well established is that financial support alone is unlikely to be of significant value for most HGFs (OECD, 2013) and indeed could be deleterious in some instances (Brown and Mawson, forthcoming). There appears to be a number of issues raised by the research which merit consideration within policy circles in connection to developing the business growth agenda. Four issues which seem particularly pertinent concern: 1) overarching objectives 2) strategic focus 3) timing of interventions.

First, this work has strongly highlighted the fact that few firms can sustain rapid growth for a long period of time. This suggests that policy that is targeted at improving the performance of high growth firms may want to consider the sustainability of growth rather than simply “growth for growth’s sake”. Indeed, by promoting rapid growth, there could be a danger that some businesses are encouraged to run before they can walk. This seems particularly true for start-ups who have the highest post growth attrition rates. While this will be feasible for a small number of extremely adept firms, it will not be achievable for many. Therefore, the expected growth levels targeted by some policy interventions should perhaps focus on long-term, sustainable growth. Furthermore, while quite a number of firms can undergo a period of high growth – so-called “one-hit-wonders”- far fewer can sustain rapid growth and upscale their business.

Second, in the terms of the *strategic focus* of firm support what this report highlights is the need for recognition of the inherent complexities of growth. Being a sporadic and discontinuous process engendered by critical growth triggers, firm growth should be viewed as “temporary episodes” firms experience rather than being a “type” of company. Helping firms acknowledge important growth triggers can help firms exploit these opportunities and mitigate the negative repercussions which might accompany them, such as time pressures on management and difficulties of developing new organisational systems.

Finally, a final issue raised by the work relates to the timing of business support interventions designed to promote business growth. In the main, most support is given to firms who are just about to embark on rapid growth and/or those who are experiencing growth. This temporal inflexibility has been criticised by some (Brown et al, 2014). Perhaps the focus of mentoring or other business support programmes should consider how the impacts of support can be sustained over the long-term and how more protracted growth issues can be overcome beyond the initial provision of support.

References

Achtenhagen, L., Naldi, L., and Melin, L. 2010. "Business growth"—Do practitioners and scholars really talk about the same thing? *Entrepreneurship theory and practice*, 34(2), 289-316.

Anyadike-Danes, M., K. Bonner and M. Hart. 2009. *Measuring Business Growth: High Growth Firms and their Contribution to Employment in the UK*. Research Report MBG/35. London: National Endowment for Science, Technology and the Arts (NESTA).

Anyadike-Danes, M., M. Hart and J. Du. 2015. "Firm dynamics and job creation in the United Kingdom: 1998–2013." *International Small Business Journal* 33(1): 12-27.

Arvanitis, S. and Stucki, T. (2014) "Do mergers and acquisitions among small and medium-sized enterprises affect the performance of acquiring firms?" *International Small Business Journal*, 33 no. 7 752-773

Barringer, B. R., F. F. Jones and D. O. Neubaum. 2005. "A quantitative content analysis of the characteristics of rapid-growth firms and their founders." *Journal of Business Venturing* 20(5): 663-687.

Bamiatzi, V. C. and Kirchmaier, T. 2014. Strategies for superior performance under adverse conditions: A focus on small and medium-sized enterprises. *International Small Business Journal*, 32 (3), 259-284.

Bianchini, S., Bottazzi, G., and Tamagni, F. (2015). What does (or does not) determine persistent corporate high-growth? LEM Working Paper Series, 11.

BIS. 2012. *SME Access to External Finance*. BIS Economics Paper No 16.

BIS. 2015. *Business Growth Ambitions amongst SMEs - changes over time and links to growth*, BIS Research Paper No 215.

Brown, R., and Lee, N. 2014. *Funding issues confronting high growth SMEs in the UK*. Edinburgh: ICAS.

Brown, R., and Mawson, S. 2013. Trigger points and high-growth firms: A conceptualisation and review of public policy implications. *Journal of Small Business and Enterprise Development*, 20(2), 279-295.

Brown, R., Mason, C., and Mawson, S. 2014. Increasing 'the Vital 6 Percent': Designing effective public policy to support high growth firms. *NESTA Working Paper*.

Brown, R. and S. Mawson. (2016). The Geography of Job Creation in High Growth Firms: The Implications of 'Growing Abroad'. *Environment and Planning C: Government and Policy*.34 (2): 207-227.

Brown, R. and Mawson, S. (Forthcoming) Targeted support for high growth firms: Theoretical constraints, unintended consequences and future policy challenges. *Environment and Planning C: Government and Policy*, doi:10.1177/0263774X15614680

Burgel, O., Fier, A., Licht, G., and Murray, G. C. 2000. Internationalisation of high-tech start-ups and fast growth-evidence for UK and Germany. *ZEW Discussion Paper*, 00-35.

Coad, A., Frankish, J., Roberts, R. G., and Storey, D. J. 2013. Growth paths and survival chances: An application of Gambler's Ruin theory. *Journal of Business Venturing*, 28(5), 615-632. doi:10.1016/j.jbusvent.2012.06.002

Coad, A., Daunfeldt, S. O., Johansson, D., and Wennberg, K. 2014. Whom do high-growth firms hire? *Industrial and Corporate Change*, 23(1), 293-327. doi:10.1093/icc/dtt051

Coad, A. and Rao, R. 2008. Innovation and firm growth in high-tech sectors: a quantile regression approach. *Research Policy*, 37(4), 633-648

Churchill, N.C. and Lewis, V. 1983. The five stages of small business growth. *Harvard Business Review*, 61(3), 30-50.

Coutu, S. 2014. *The Scale-Up Report on UK Economic Growth, An independent report to the UK government.*
<http://www.scaleupreport.org/scaleup-report.pdf>

Daunfeldt, S. O., and Halvarsson, D. 2014. Are high-growth firms one-hit wonders? Evidence from Sweden. *Small Business Economics*. doi:10.1007/s11187-014-9599-8

Deakins, D. and Freel, M. 1998. Entrepreneurial learning and the growth process in SMEs. *The Learning Organization* , 5(3), 144 – 155

Delmar, F., Davidsson, P., and Gartner, W. B. 2003. Arriving at the high-growth firm. *Journal of Business Venturing*, 18(2), 189–216.

Fischer, E., and Reuber, A. R. 2003. Support for Rapid-Growth Firms: A Comparison of the Views of Founders, Government Policymakers, and Private Sector Resource Providers. *Journal of Small Business Management*, 41(4), 346–365.

Gabrielsson, J., Dahlstrand, Å. L., and Politis, D. 2014. Sustainable high-growth entrepreneurship: A study of rapidly growing firms in the Scania region. *The International Journal of Entrepreneurship and Innovation*, 15(1), 29-40.

Garnsey, E., E. Stam and Hefferman, P. 2006. New Firm Growth: Exploring processes and paths, *Industry and Innovation*, 13 (1): 1-24.

Goedhuys, M. and Sleuwaegen. L. 2010. High-growth entrepreneurial firms in Africa: a quantile regression approach. *Small Business Economics* 34: 31-51.

Greiner. 1972. Evolution and revolution as organizations grow. *Harvard Business Review*, July-August.

Hambrick, D. C., and Crozier, L. M. 1985. Stumblers and stars in the management of rapid growth. *Journal of Business Venturing*, 1, 31–45.

Hansen, B. and Hamilton, T. 2011. Factors distinguishing small firm growers and non-growers. *International Small Business Journal* 29 (3), 278-294.

Henrekson, M., and Johansson, D. 2010. Gazelles as job creators: a survey and interpretation of the evidence. *Small Business Economics*, 35(2), 227–244.

Hölzl, W. 2014. Persistence, survival, and growth: a closer look at 20 years of fast-growing firms in Austria. *Industrial and Corporate Change*, 23(1), 199-231.

Lee, N. 2014. What holds back high-growth firms? Evidence from UK SMEs. *Small Business Economics*, 43, 183–195.

Lee, N. and Brown, R. 2016. Innovation, SMEs and the liability of distance: the demand and supply of bank funding in UK peripheral regions. *Journal of Economic Geography*. DOI: 10.1093/jeg/lbw011

Lee, N., Sameen, H. and Cowling, M, 2015. Access to finance for innovative SMEs since the financial crisis. *Research Policy*, 44 (2). pp. 370-380

Lee, N. 2016. Powerhouse of Cards? Understanding the Northern Powerhouse. *SERC Policy Paper* 14.

Levie, J. and B. Lichtenstein. 2010. A Terminal Assessment of Stages Theory: Introducing a Dynamic States Approach towards Entrepreneurship. *Entrepreneurship Theory and Practice* 34: 317-350.

Levy, C., Lee, N. and Peate, A. 2011. *Ready, Steady, Grow?: How the Government Can Support the Development of More High Growth Firms*. London: The Work Foundation.

Lockett, A., J. Wiklund, P. Davidsson and S. Girma. 2011. Organic and Acquisitive Growth: Re-examining Testing and Extending Penrose's Growth Theory. *Journal of Management Studies* 48: 48-74.

Mason, C., and Brown, R. 2014. *Entrepreneurial ecosystems and growth oriented entrepreneurship*. Final Report to OECD, Paris.

Mason, C., Brown, R., Hart, M., and Anyadike-Danes, M. 2015. High growth firms, jobs and peripheral regions: the case of Scotland. *Cambridge Journal of Regions, Economy and Society*, rsu032.

McKelvie, A., and Wiklund, J. 2010. Advancing firm growth research: A focus on growth mode instead of growth rate. *Entrepreneurship Theory and Practice*, 34(2), 261-288.

Mina, A., Lahr, H. and Hughes, A. 2013. The demand and supply of external finance for innovative firms. *Industrial and Corporate Change*, 22(4): 1-33

Mohr, V., Garnsey, E. and Theyel, G. 2014. "The role of alliances in the early development of high growth firms." *Industrial and Corporate Change* 23: 233-259.

Moreno, A. M., and Casillas, J. C. 2007. High-growth SMEs versus non-high-growth SMEs: a discriminant analysis. *Entrepreneurship and Regional Development*, 19(1), 69-88.

Moreno, A. M. and Coad, A. (2015), High-Growth Firms: Stylized Facts and Conflicting Results, in Corbett, A. C., Katz, J., Mckelvie, A. (ed.) *Entrepreneurial Growth: Individual, Firm, and Region (Advances in Entrepreneurship, Firm Emergence and Growth, Volume 17)* Emerald Group Publishing Limited, 187 - 230

Myers, S. C., and Majluf, N. S. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*. doi:10.1016/0304-405X(84)90023-0

Nicholls-Nixon, C. L. 2005. Rapid growth and high performance: The entrepreneur's 'impossible dream?' *The Academy of Management Executive* 19(1): 77-89.

OECD, 2013, *An International Benchmarking Analysis of Public Programmes for High Growth Firms*, Organisation for Economic Cooperation and Development, Paris.

Office for National Statistics. (2016). *Business Structure Database, 1997-2015: Secure Access*. [data collection]. 6th Edition. UK Data Service.

O'Regan, N., Ghobadian, A., and Sims, M. 2006. Fast tracking innovation in manufacturing SMEs. *Technovation*, 26(2), 251-261.

Parker, S. C., Storey, D. J., and Witteloostuijn, A. 2010. What happens to gazelles? The importance of dynamic management strategy. *Small Business Economics*, 35(2), 203–226.

Penrose, E. T. 1959. *The Theory of the Growth of the Firm*. New York: John Wiley and Sons.

Rostamkalaei, A and Freel, M.S. 2016. The cost of growth: small firms and the pricing of bank loans' *Small Business Economics*, 46(2), 255-272

Segarra, A. and Teruel. M. 2014. "High-growth firms and innovation: an empirical analysis for Spanish firms." *Small Business Economics* 43(4): 805-821.

Senderovitz, M., Klyver, K., and Steffens, P. 2015. Four years on: Are the gazelles still running? A longitudinal study of firm performance after a period of rapid growth. *International Small Business Journal*, 0266242614567483.

Sims, M. A. and O'Regan, N. 2006. In search of gazelles using a research DNA model. *Technovation*, 26 (8). 943-954.

Stam, E. and Wennberg, K. 2009. The roles of R&D in new firm growth. *Small Business Economics*, Springer, 33(1), 77-89

Vanacker, T. R., and Manigart, S. 2010. Pecking order and debt capacity considerations for high-growth companies seeking financing. *Small Business Economics*, 35(1), 53–69.

Wennberg, 2013. *Managing High-Growth Firms: A literature review*, OECD: Paris.

Wright, M. and Stigliani, I. 2013. Entrepreneurship and growth. *International Small Business Journal*, 31 (1), 3-22.



Centre Manager
Enterprise Research Centre
Warwick Business School
Coventry, CV4 7AL
Enquiries@enterpriseresearch.ac.uk

Centre Manager
Enterprise Research Centre
Aston Business School
Birmingham, B1 7ET
Enquiries@enterpriseresearch.ac.uk