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From the Cabinet of Curiosities: The misdirection of research and policy debates on small firm growth

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We would like to thank Professor Mark Hart, Dr Neha Prashar and Dr Anastasia Ri for compiling our Annual Review Article of 2020 which is dedicated to the memory of Michael Anyadike-Danes. Analyses of growth and scalability are of perennial interest given the centrality of this issue and the diverse range of debate it generates; it is clearly of even greater importance during the current pandemic given the disruption to markets and related economic volatility. This review papers offers a refreshing critique of axioms regarding scalability which have been latched onto by policy makers but are not supported by longitudinal evidence and instead, considers alternative pathways for future research. I would like to extend my thanks to the authors and to the referee who commented upon an earlier version of this article, for their valuable contribution to the ISBJ.

Abstract
Understanding business growth, and particularly the growth of small firms, has been the subject of academic enquiry for over 40 years. Yet, it still creates debate and controversy as academics and policy makers wrestle with a rich, complex evidence base. From a policy perspective, 'scaling' is an important dynamic to nurture in the UK economy, but we argue that current discussions about 'scale-ups' are profoundly unhelpful from a policy perspective and has misdirected research effort and public policy resources. We step away from growth rates as the central concern – the preoccupation of the Organisation for Economic Co-Operation and Development (OECD) High-Growth Firm metric – towards 'growth trajectories' which better captures the interplay between growth and survival. It provides a different approach to measuring the contribution of rapidly growing firms to job creation and economic growth.

Keywords
firm age, firm growth, firm size, small firm policy

Introduction

Understanding business growth, and particularly the growth of small firms, has been the subject of academic enquiry for over 40 years (Wright et al., 2015). Yet it still creates debate and controversy

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as academics and policy makers wrestle with a rich, complex evidence base. An excellent example of this is the ongoing debate over the original work of Birch (1979) who sought to answer the question: *what size firms create the most jobs*? This appears a simple enough empirical proposition, so it seems difficult to imagine how it could have become, and remained, so controversial. One of the factors that has played an important role in sustaining this debate was (according to one contributor): 'Birch's argument about the role of small business in job creation fit perfectly with the U.S. government's long tradition of supporting small businesses' (Neumark et al., 2011: 16). For that same reason Birch's answer would not have been welcomed by those more sceptical about government intervention in general and the desirability of assisting small businesses more particularly. In the 40 years since Birch's first publication, there have been a number of studies of the United States (by Birch himself and other authors: Birch, 1981, 1987; Davis et al., 1996; Haltiwanger et al., 2013) and of other countries (Coad et al., 2018; De Wit and de Kok, 2014; Lawless, 2014; Navaretti et al., 2014) looking at different dimensions of job creation, not just by size but also by sector and location; however, there is as yet no consensus on the answer to Birch's question.

In 2015, the newly formed Enterprise Research Centre (ERC) published a series of articles on small business growth in a special issue of the *International Small Business Journal* (Anyadike-Danes et al., 2015b; Carter et al., 2015; Fraser et al., 2015; Koryak et al., 2015; Love and Roper, 2015). In the editorial, Wright et al. (2015) argued that the understanding of the drivers of business growth remained partial at best due to the very low explanatory and predictive power of all the empirical models to see the light of day in the academic literature (Westhead and Wright, 2011). As a result, the ability to work with firms directly to help prioritise particular aspects of strategic development is weakened, management education is lacking direction and finally, there are implications for the design of effective policy support for small growing firms. The range of work undertaken by the ERC over the last seven years has sought to redress these weaknesses by developing a range of innovative projects on business demography, innovation, entrepreneurial finance, leadership and management and diversity using a range of methodological and conceptual approaches. We leave it for others to assess the degree of success that has been achieved through the impact of the portfolio of projects on the academy, small firm policy and outcomes for small businesses themselves.

One of the important limitations of almost all small firm growth research, including the evidence presented in this article, continues to be about the most appropriate measures of growth (McKelvie and Wiklund, 2010; Westhead and Wright, 2011). Indeed, the discourse about growth is problematic as across the globe tens of millions of small business founders and owners have, as their objectives, anything but growth in terms of employment and turnover. Individual survival, never mind business survival, financial independence from the state or indeed, a spouse as well as other household and personal motivations take us in a rather different research direction than that we present. These aspects of firm survival and growth have never been more important than in the global health and economic crisis that engulfed every nation state, household and individual in 2020.

This review article, however, focuses on one aspect of the small firm growth literature that continues to attract attention and, in our view, set back any understanding of the business growth process – the high-growth firm (HGF) as defined by the Organisation for Economic Co-Operation and Development (OECD) nearly 15 years ago (Anyadike-Danes et al., 2009; Du and Temouri, 2015; Mason, 2018; Mason and Brown, 2013; Mason et al., 2015). The topic of HGFs in numerous studies has become a veritable growth industry in its own right over this period (Brown et al., 2014, 2017). The reason for this is quite straightforward because underlying the discussion and debates over the decades on the drivers of small firm growth has been a challenge laid down to the research community by policy makers: to devise a way to 'pick winners' in order to ensure the more efficient and cost-effective delivery of business support schemes and initiatives. Since the Great Financial Crisis (GFC), there was an over-riding concern about HGFs, or rather 'scale-ups' as

many in the policy sphere now prefer to describe them,[1] and their seeming importance to economic recovery as policymakers took a renewed interest in firms which generate jobs on a large scale.

The stimulation of HGFs continues to be considered as a key element of enterprise policy and performance framework measure in the United Kingdom and throughout the OECD countries. Currently, as flagged in the United Kingdom's Industrial Strategy, the 'Scale-up agenda' is to have a prominent role in driving local growth, with the focus on the importance of identifying, targeting and supporting more HGFs or scale-ups (BEIS, 2019). As well as a major source of new jobs, they tend to be more innovative and act as a key driver of productivity growth (Mason et al., 2009). Globally, we observe the development of a large number of Scale-up Programmes in a range of national and regional settings, including in the United Kingdom funded by Goldman Sachs, with the propagation of the Babson model of building and sustaining a scale-up ecosystem.[2] At the core of this model is how to measure progress and as might be expected the OECD HGF metric is selected more often than not as a way of measuring progress but also in terms of celebrating these 'successful scale-ups' in the local economic setting.

The major challenge is not only to accurately identify potential HGFs in the wider business population but also to fine-tune the nature of business support and policy interventions to answer specific needs of these particular businesses. It is now well established that HGFs represent a heterogeneous group of businesses of different sectors, ages and sizes and that makes the task of developing a 'single offer' particularly difficult. However, the justification for the myopic focus on HGFs in small business policy and by extension into research lacks a strong conceptual foundation and as a result leaves the policy maker cut adrift from a business support policy which could actually be implemented. This is clear in the case of the UK Government's Business Growth DECA[3] project involving the Department for Business, Energy and Industrial Strategy (BEIS), HM Revenue and Customs (HMRC) and the Office for National Statistics (ONS) which had as its initial objective to develop a model using machine learning and AI techniques to identify HGFs, as defined by the OECD, in the UK economy. The results will eventually be used to help a range of stakeholders involved in the design and delivery of business support to identify those businesses with potential to achieve high growth.

It goes without saying that the contribution of firms to aggregate job growth is related to their survival and growth rates, which vary systematically with age and size. Yet, much of the literature on 'high-growth' has tended to focus on only one definition and that is the one devised by the OECD[4] although there have been some important exceptions which take as their starting point the age of the firm (Anyadike-Danes et al., 2015a; Anyadike-Danes and Hart, 2015, 2017, 2019; Coad et al., 2020). These studies adopt an analytical strategy that is a little different from most job creation studies. Instead of looking at the record of all firms over a particular period, the focus is on those set up in a particular year and then to observe growth over the life cycle of that business.

The main aim of this article is to challenge the rationale for the global preoccupation with a single measure of HGFs and to reset the research and policy agenda to a more robust analysis and understanding of business growth. We do this by reflecting on almost 15 years of research using firm-level data now available to researchers through the UK Business Demography database, or the ONS Business Structure Database as it is most commonly referred to, accessed through the ONS Secure Lab which allows us to build a longitudinal dataset for just over 20 years.[5] From these observations come the curiosities we bring to a discussion of small firm growth.

Laying false trails for policy makers

Over the last 30 years, considerable evidence has accumulated, albeit of widely varying quality, which supports a 'pareto-type' conjecture that a relatively small proportion of firms – disproportionately small firms – account for a relatively large proportion of job creation (Anyadike-Danes

and Hart, 2012). Recent evidence from international comparative studies and individual country studies show that a small share of all firms, which can be classified as HGFs, play a disproportionately large role in the economy in both recessionary periods and economic booms (Anyadike-Danes et al., 2009; Anyadike-Danes and Hart, 2012; Bravo-Biosca, 2011). Policy makers are thus, very keen on supporting these firms with various initiatives in order to sustain and expand this key source and potential driver of economic growth, innovation and wealth creation (Acs and Mueller, 2015; BERR, 2008; OECD, 1998, 2002).

This growing interest, in turn, motivated the OECD to initiate a programme of work[6] which aimed both to measure the contribution to job creation of these 'rapidly expanding firms' and to investigate their differentiating characteristics (see OECD, 2002; Schreyer, 2000). One of the by-products of this work was an internationally agreed definition of a HGF and a chapter dedicated to HGFs in the Manual of Business Demography (see EUROSTAT-OECD, 2007: Chapter 8). With respect to HGFs, it appears that policy makers have been running somewhat ahead of the evidence. HGF-oriented policy has been enthusiastically promoted, even though it is accepted that the evidence base is very weak (for a policy-oriented overview of the evidence, see Lilischkis, 2011; Mason, 2018).

The OECD HGF measure was a pragmatic solution to a practical problem. It was designed to assist in identifying the small group of firms which contributed disproportionately to job creation. This statistic could be used to inform national policy and to make comparisons across countries, since it could be readily replicated using business register data. The decade since the measure was first published has seen increasing dissatisfaction among the academics and policymakers seeking to make use of it. There are two important criticisms. First, it focuses attention on relatively short 'bursts' of growth rendering invisible the reality of growth for the majority of businesses, and second, it does not, in fact, capture some important members of its target group the 'relatively small proportion of firms that contribute disproportionately to job creation'.

NESTA[7] invited colleagues from the ERC to provide them with the first analysis of business growth in the United Kingdom. Underlying this project was some sort of notion of the 'exceptional firm' which is responsible for driving economic growth through extreme rates of growth (employment, sales and profits) and engagement in innovative behaviour. A central question for policymakers is to test the validity of this assumption and to arrive at some sort of justification for some sort of selective business support interventions which focuses on firms with growth potential. The overall aim of the project was simple in design and execution – to take one definition of an 'exceptional firm' in the United Kingdom (i.e. HGFs as defined by the OECD) and, within the context of an analysis of the growth profile of all businesses, arrive at some assessment of their relative contribution to the UK economy.

Through this project we determined the number of HGFs in the economy and their contribution to job creation (Anyadike-Danes et al., 2009; Mason et al., 2009; NESTA, 2009). Since the publication of the NESTA reports in 2009, their media friendly 'Vital 6%' term has played a prominent role in policy discussions on the drivers of growth in the UK economy and on how policy interventions might increase the number of HGFs. This small group of firms were seen as responsible for a disproportionate share of net job creation and as key drivers of innovation. Thus, the 'Vital 6%' was born and this somewhat simplistic metric has permeated policy documents across UK Government and eventually, in 2014, underpinned the rationale for the launch of the United Kingdom's Scale-up Institute (Coutu, 2014).

The OECD HGF metric has a very precise definition, but its policy relevance seems somewhat debatable. If we are measuring growth over a three-year period, for example, the first step requires that we consider only firms which are born before the beginning of the three-year period and are alive at its end. This implies that in each period we will have a 'balanced panel' of firms – the same

firms are always present, often referred to as 'continuing firms'. A HGF is a firm in this balanced panel with at least 10 employees at the beginning of the period and which records an annual average growth of 20% in employment over the three-year period. Finally, we define the HGF incidence rate as the number of HGFs divided by the number of firms in the balanced panel with 10+ employees.

Anyadike-Danes et al. (2009) observed that HGFs generated a majority of jobs created over a three-year period by continuing businesses employing 10 or more people; this observation, that HGFs create around half of net new jobs, seems now to be treated as a 'stylised fact' in policy discussions. While it may have been useful, originally, in underlining the importance of a small group of firms to the job creation debate it tells only part of the story. In particular, the choice of denominator for this calculation is obviously of considerable importance. Notice first, we are comparing job creation by HGFs with that by all other continuing firms with more than 10 employees. A more 'natural' comparison would be with all other continuing firms with more than 10 employees which create jobs, because, of course, a very large proportion of 10+ employees continuing firms do not create jobs. Second, it seems equally natural to extend the denominator of the job creation calculation to include all firms alive at the end of the three-year period and which have created jobs.

The ERC has been tracking this growth metric, along with others, for several years since the initial NESTA report in 2009 for the very simple reason we have been asked to produce it by BEIS. In summary, the incidence rate of HGFs averaged 7.2% over the period between 2002–2005 and 2007–2010 and then dipped to an average of 5.9% in the period of economic downturn before 'bouncing back' to 6.6% in 2010–2013. The absolute number has fallen year on year since 2015 although the incidence remains stuck at around 6%. So, in broad terms, the 'vital 6%' construct survived the most severe post-war economic shock. This should ring alarm bells about the methodology and its usefulness for consideration in policy discussions.

What is clear from the evidence is that there are a very small number of firms in the United Kingdom which can be classified as HGFs using the OECD definition. Furthermore, the HGF prevalence rates have remained largely unchanged although there has been a fall in their contribution to job creation. More importantly, the overall conclusion remains unchanged – there are a very small number of firms (HGFs) that account for a significant amount of job creation in the United Kingdom. Focussing specifically on small and medium-sized enterprises (SMEs) we find that although high growth SMEs represent less than 1% of established businesses, they generate 20% of all job growth among established businesses which grow (Anyadike-Danes and Hart, 2015). Again this proportion has remained virtually unchanged since the late 1990s and was not affected by the GFC.

Some 'mechanics' underlying the OCED HGF definition in the United Kingdom serve to illustrate the problems with using it in a policy forum. First, the arbitrary time period of three years, chosen for very practical reasons to enable international comparisons, is no longer appropriate. When we looked closely at the approximately 11,000 HGFs in the 2012–2015 period, just over a third (37%) met the criteria to be a HGF for the first time in 2012–2015 and 63% were categorised as a HGF in previous periods and indeed, some had scaled long ago (pre-1998). Second, the chance of being categorised as a HGF in any three-year period declines dramatically with time since the first time the firm was categorised as a HGF. Third, when we re-visited the NESTA 'Vital 6%' in 2005–2008 – two-fifths (40%) of them had exited the market through closure and not acquisition within the next eight years begging the question how vital were they? What is clearly missing from these observations is an understanding of where on the life cycle these HGFs are and simply counting them and describing their characteristics does not take us very far in terms of a research contribution and policy perspective.

Gradually, after the GFC, the attention of Government and researchers began to shift away from job creation to address the emergence of the United Kingdom's productivity crisis which saw the economy lag 23% behind the United States and 15% behind the G7 average (BEIS, 2019). This gap increased over the last 10 years and remained a feature of the UK economy as it struggled to cope with the uncertainty over the United Kingdom's departure from the EU and now the national emergency associated with COVID-19. As a result, there was a further reason why HGFs or 'scale-ups' became the focus of attention. Indeed, the Coutu (2014) Report, and the subsequent creation of the Scale-up Institute in the United Kingdom, was heralded as providing an agenda whereby the United Kingdom's productivity 'puzzle' could be resolved by increasing the number of HGFs across the country. The assumption, according to Coutu (2014), was that because 'A small group of rapidly expanding "scale-up" companies create a significant proportion of the UK's economic growth . . .' and that there are fewer of them in the United Kingdom then reversing that trend will solve the United Kingdom's productivity puzzle. Coutu (2014: 9) argued that, 'If we manage to close the scale-up gap, we will secure significant economic value and the competitive advantage of Britain for generations to come'.

The United Kingdom's HGFs matter because they outperform other enterprises in terms of turnover growth and job creation. Productivity growth is desirable because it makes the allocation of resources more efficient and thereby boosts the potential growth of the economy in the long run. At the same time, as we have seen above, HGFs account for a very small proportion of the United Kingdom's total surviving business population but they are prolific creators of jobs. So, what does the evidence tell us about the role of HGFs in helping resolve the United Kingdom's productivity problem? Research by the ERC has shown that HGFs could be detrimental to labour productivity gains due to the focus on job creation by many policy makers especially at local level (Hart and Roper, 2016). There were approximately 11,500 enterprises in the United Kingdom that can be categorised as HGFs under the OECD-HGFs metric (employment-based definition) but only 575 (0.5%) of these HGFs had demonstrated positive productivity growth over the three years they were called a HGF (i.e. 2014–2017).

ERC analysis, using the ONS firm-level dataset (2008–2015), suggests that, in a population of around 250,000 survivor firms in the United Kingdom, most firms struggled to significantly increase turnover, jobs and productivity simultaneously (growth 'sweet spot'), with only 9% managing to do so (British Business Bank, 2018: 45). Furthermore, only 20% of the firms in the 'sweet spot' were HGFs (turnover-based definition) and only 5% were HGFs (employment-based definition). Finally, those local or regional economies with a greater number of HGFs are not necessarily those which benefit most from it as there was evidence of competition-led crowding out effects for skills and labour for other firms in the local economy – a net job destruction effect (Du and Vanino, 2019). So, from a productivity perspective, HGFs, as defined by the OECD, are not an important group of firms at all.

In understanding the nature and characteristics of HGFs, the literature has identified a number of 'stylized' facts which these exceptional firms appear to have in common (see review by Henrekson and Johansson, 2010). While much is known about the characteristics of HGFs from business demography datasets in terms of firm size, industry activity, business age and where they are located (Anyadike-Danes et al., 2009; BERR, 2008; Bravo-Biosca, 2010), less attention has been paid to the relationship between HGF incidence and locational determinants. Given the multifaceted nature of HGFs, the identification of local factors impacting upon the environment that gives rise to HGFs has not been explored in any great detail, despite the significant investments by sub-national local government and organisations to make regions more attractive to businesses.

Let us explore the role of locational determinants of HGFs more closely and in so doing provide another example of why the preoccupation of policymakers with HGFs is misplaced. Scottish

Enterprise (SE) recently commissioned data analysis to explore the high-growth dynamics of Scotland's business base, benchmarking this against other regions of the United Kingdom and, where possible, other countries (Hart et al., 2020). The objective was to focus on the level to which Scottish businesses achieve and then sustain levels of high-growth, ultimately reaching the definition of becoming a HGF as defined by the OECD, and how this compares with elsewhere. The study found that Scotland has a 'high-growth deficit' based on the OECD definition of a HGF (employment-based definition) compared to other parts of the United Kingdom. We need to be mindful, of course, that turning this into a simplistic 'closing the gap' type of analysis ignores the obvious fact that we highlighted above that having more of these firms may well have negative effects on the performance of other established firms, including HGFs – a potential zero-sum game.

The lower HGF incidence rate in Scotland can be, at least in part, explained by macroeconomic conditions. Indeed, the HGF incidence rate is correlated with real growth rate in the United Kingdom. It is also correlated with oil prices fluctuation which arguably was one of the most important factors affecting business dynamics in the Aberdeen area during the last 10 years as well as uncertainty and investment caution over Scottish independence in the lead up to 2014. There was then a further period of uncertainty resulting from the Brexit referendum in 2016. In addition, there is a clear positive trend between growth ambition and the HGF incidence rate. In 2015, Scottish businesses showed the least ambition to grow sales in the Longitudinal Small Business Survey and it resulted in one of the lowest HGF incidence rates when compared with the rest of the United Kingdom, London being the clear outlier, in the 2015–2018 period. Thus, a lack of ambition could directly affect the performance of firms and could help explain why we see low levels of HGFs in Scotland.

The OECD HGF definitions and its variants are less than optimum when trying to understand the dynamics of the business base. New analysis of a cohort of all start-ups in Scotland in 2008 using the ONS Business Structure Database (BSD) longitudinal dataset over the next 10 years placed the concept of 'high-growth' within the life cycle of the business and it showed quite clearly that 'high-growth' can occur at any stage over that period but rarely. This focus on high-growth annual episodes (i.e. 10% or 20% growth in annual employment, turnover or productivity) showed quite clearly the weakness of the arbitrary OECD definition, which measures growth over just three years, as it would have ignored the growth spurts of many firms as their rapid growth was not consistent year on year and took place in discrete one- or two-year episodes over the decade. Overall, despite the compelling evidence throughout the descriptive analysis of Scotland having a lower proportion of HGFs as defined by the OECDs, this econometric analysis indicates that when we control for the nature of the business population (size, age, sector, prior growth), together with environmental variables such as education, ethnicity and other macro variables such as growth and new venture formation, the case for a 'high-growth deficit' in Scotland is severely weakened (Hart et al., 2020).[8]

To summarise, the disproportional contribution of HGFs to job creation is an established and well-documented fact. However, it is only one side of the story. There is a simple research question with important implications which has been much ignored by the policy agenda: Does a HGF continue to experience high growth in subsequent years? If high-growth is predictable and sustainable over time, then identifying and supporting 'exceptional firms' is a useful tool for policy makers; if, on the contrary, high-growth is random and hardly predictable, then a 'picking winners' strategy to support job creation is less meaningful.

UK evidence on the episodic nature of high-growth is now also supported by a growing international knowledge base on high-growth persistence. In summary, research shows that firm growth is complex, HGFs represent an heterogeneous group and HGF prediction is at least

very challenging exercise even when using the most up-to-date big data and machine learning techniques (Coad and Srhoj, 2020; Daunfeldt and Halvarsson, 2015; Erhardt, 2020; Holzl, 2014; Satterthwaite and Hamilton, 2017; Van Witteloostuijn and Kolkman, 2019). Consequently, the OECD definition of a HGF and the preoccupation with it in Government circles has misdirected the policy agenda for many years. This leads neatly into the next section which looks in more detail at the importance of tracking cohorts of firms over their life cycle to understand the process of business growth more clearly.

Firm growth – from the cradle to the grave

It is probably fairly clear by now that we are not convinced that the OECD HGF definition provides a useful metric to inform policy discussions and wish to suggest a different approach to measuring the contribution of rapidly growing firms to job creation. Here, we step away from growth rates as the central concern towards 'growth trajectories' – our shorthand term for the dynamics of job creation over a firm's life – which better captures the interplay between growth and survival. It provides a different approach to measuring the contribution of rapidly growing firms to job creation and economic growth.

The 'growth trajectories' or 'growth paths' is a concept deeply rooted in a rich theoretical base which views the firm as a dynamic system and growth as an evolutionary process where 'history matters' back to works by Penrose (1959, 1960), Greiner (1972) and Garnsey (1998). It is also supported by recent qualitative case studies. Thus, Blackburn et al. (2008) explored factors affecting firm growth by interviewing the 20 fastest growing over three years in the UK (London and the South East Region) and US (Massachusetts) contexts. The results reveal that the growth of these fastest growing firms in each spatial setting was episodic and irregular and growth trajectories were neither linear nor uni-directional. The interviewed firms often reported downturns in performance between years and even quarters. The 'reverse hockey stick' path is far from a singular possibility. Many businesses describe their growth as being incremental (Mason et al., 2015) and setbacks during the early stages of firm development are not unusual (Garnsey et al., 2006; Garnsey and Heffernan, 2005).

At this point we step back into the 'Birch controversy' and note that Haltiwanger et al. (2013) argued very forcefully that age and size were 'confounded' and that when appropriate age controls are introduced, the small size effect disappears. What was not appreciated at the outset, and indeed, was largely responsible for the controversy, was the confounding of size and age in the discussion about the most important contributors to job creation. Two points are of note: first, it is now better understood that firm job growth is significantly age-dependent – fast growth typically occurs at younger ages; and, second, that it is size-dependent too – fast growth typically occurs in smaller firms. There is, however, an important qualification. Most young small firms do not grow at all, a large proportion die and of those that do survive for relatively long periods, say, between 0 and 15 years, the majority do not grow. Clearly, there is a problem of seeing the wood for the trees in the start-up population data.

We take issue with the conclusion that the size effect disappears once age is controlled for and to illustrate this argument, we present analysis of a cohort of start-ups in 1998 in the United Kingdom which has featured in a number of ERC research articles in recent years (see, for example, Anyadike-Danes and Hart, 2018). We have found a simple but effective method for understanding firm dynamics and identifying small groups of exceptionally performing firms. The strategy rests on analysing birth cohorts of firms, that is, all firms born in a particular year, and then following their evolution over relatively long periods of time. Before we do that, it is worth remembering that a chapter in the initial NESTA report in 2009 which prompted the term the 'Vital 6%'

did present early analysis of a 1998 cohort of start-ups but was mostly ignored in subsequent debates (Anyadike-Danes et al., 2009). One of the key findings of that analysis was that of the 1998 cohort of almost a quarter of a million start-ups in the United Kingdom shows that relatively few firms record multiple instances of 'high-growth' (i.e. a 20% increase in employment in any one year). Indeed, few firms record more than two instances of high-growth over a 10-year period. When we look at the relationship between business growth and survival, the picture that emerges is dramatic. Firms recording at least one year of 'high-growth' in the cohort of 1998 start-ups are significantly more likely to survive than those firms not having any occurrence of high-growth.

If we focus on a cohort of start-ups in 1998 and follow them over 15 years (1998–2013), we find that just 11% of the 240,000 start-up firms born in 1998 survived until 2013 (Hart and Anyadike-Danes, 2014a, 2014b). By 2014, these firms had about 400,000 employees, up from about 160,000 at birth. Although, taken together, the survivors have added about 240,000 jobs, this is a 'net' figure. Some firms will have added jobs; some shed jobs; others will have exactly the same number as they had at birth. In fact, about 60% of these surviving firms are job creators and the bulk of these job creators, like the bulk of firms, were born very small, with fewer than five employees and most of them remain very small and create very few jobs. Within the class of very small firm start-ups (those with fewer than five employees in 1998), there is, however, a small group, by coincidence 6% of them: 1230 firms, which are *extraordinary prolific job creators (EPJCs)*. Between them they accounted for 94,500 added jobs, about 40% of all job creation, and they can be found in all sectors of the economy. Even within this small group of firms, we find an even smaller number of 100 or so firms who are major employers with notable expansion since 2005.

Taking the same longitudinal approach, but looking at revenue generation as opposed to employment growth, we have also identified another group of 1131 firms who started out with sales of less than £100 K in 1998 (aggregate turnover in 1998 was £83 m) and by 2014 their sales were around £6.5bn. These *extraordinary prolific revenue generators (EPRGs)* come from all sectors of the economy and they employed 44,000 people in 2014 – and we know that 40% of EPJCs are also in this group. Despite their obvious importance to economic growth, these long-lived EPJCs and EPRGs are likely to have been excluded at times from the OECD definition of high growth due to the episodic nature of their growth over a 15-year period! There were 412 firms in this surviving group of fast-growing firms that belonged to both groups generating 77 times the number of jobs they had in year one and 137 times the amount of first years sales. Overall, in 2014, these c. 2000 fast-growing firms, excluding those in both groups, employed c. 110,000 people and generated around £16bn sales in 2014: on average each firm now employed roughly 55 people and generates annual sales of around £8.5 m.

In summary, the preferred approach, which tracks the growth performance of cohorts of start-ups, reaches a similar conclusion but avoids the intricacies of the HGF definition and the attendant difficulties in interpreting the job creation record. Both EPJCs and EPRGs are most certainly an easy to identify small group of firms within the wider business population which make a notably disproportionate contribution to job creation, and that, after all, was the rationale for having distinguished HGFs in the first place. Coad et al.'s (2020) contemporary article is a welcome addition to this literature adopting a start-up cohort perspective to investigate the relationship between fast growth and survival.

Taking stock and looking forward

Anyadike-Danes and Hart (2018) have recently argued that the theory of firm growth is in a rather unsatisfactory state. To summarise, albeit somewhat crudely, one view is that firm growth, certainly in a firm's early years, can be regarded as essentially 'random' (see Coad et al., 2013a,

2013b, 2015). The alternative view is that a firm's characteristics and its choices in terms of utilisation of internal resources can have a systematic effect on its growth. The majority of research on SME growth has focused on the latter explaining firm-level drivers and barriers to growth. While these competing views provided the motivation for this article, our starting point was rather different. Making use of a comprehensive longitudinal firm-level dataset for the private sector in the United Kingdom, presented in the previous section, we use an evidence base which, by providing a detailed picture of growth across the UK firm population, might be used to underpin the development of a more satisfactory approach to the theory of firm growth. It has harnessed essentially descriptive data on the whole population of firms born in a particular year – a birth cohort – and followed it over 15 years. Coad et al. (2020) have provided another excellent analysis of this genre by using bank business account records to address the issue of fast growth and survival on a cohort of start-ups in the United Kingdom. They found that firms with moderate positive growth had the highest survival rates while firms with the fastest growth did not – suggesting that rapid growth is not survival enhancing.

From a policy perspective 'scaling' is an important dynamic to nurture in the UK economy. But, the verb not the noun needs to be deployed across each stage of the growth pipeline and not just measured by an arbitrarily defined HGF metric: that is, from nascent entrepreneurs or start-ups growing; accelerating the growth of businesses already showing signs of ambition and growth; getting scaled businesses to scale again and more quickly. Current discussions about 'scale-ups' are profoundly unhelpful from a policy perspective. Having started the ball rolling a decade ago with our work for NESTA (i.e. the Vital 6%), we are now clearly of the view that: 'There's no such thing as a High-Growth Firm (or "scale-ups") only firms that have high-growth episodes'. Tracking cohorts of start-ups over time, and other groups of established firms as they begin to engage in a range of activity which prepares them for future growth, would be a more meaningful focus for business support policy and demands richer data. This will be disappointing news for policy makers as they are still prone to ask the question 'which firms should we focus on in our business support policy?' Sometimes that gets translated into 'who creates the jobs?' in the job creation debate, as in other long-lived controversies, much turns on the interpretation of terms. When we ask, 'who creates the jobs?' do we mean: in which firm size-band are most employees to be found? Or, do we mean: which firm size-band contributed most to the growth of jobs over time? For the cohort of 240,000 UK private sector firms born in 1998, discussed above, the answer to the first question is: relatively large firms (20+ employees); while the answer to the second is: firms which were born very small (fewer than five employees), but grew over the decade.

Let us return to our EPJC group of firms to illustrate some arithmetic on the business demography data that might help those designing business support to answer the question 'which firms should we focus on in our business support policy?' We know that two-thirds of the 'born' very small (i.e. 1–4 employees) remain very small but among the 9266 firms which grow, and have five jobs or more by age 15, there is an even smaller group, just 1230 firms, which have grown quite spectacularly (i.e. EPJCs). These EPJCs taken together accounted for 40% of all jobs added between birth and age 15 by all cohort98 survivors. Choosing an EPJC from the cohort of firms born in 1998 firms with fewer than five jobs requires considerable luck: the chance is 1230 out of 212,427 – about 0.5%. However, the odds of choosing an EPJC if you select from firms which started life with five jobs and have 20 or more employees by age five years is about 10%, and the chosen firm has a better than 50% chance of surviving to age 15. This is certainly preferable to the 0.5% chance of choosing an EPJC from start-ups with fewer than five jobs. Of course, it is not being suggested that this an appropriate way to frame policy: selecting firms for support based on a very specific number of jobs at age five years as a criterion might have unwanted side-effects. Nonetheless, the arithmetic does provide some context

for the design of policy and highlights the key role of firm age in accounting for firm survival and growth.

Armed with this kind of data, it is possible to try to assess the determinants of an upcoming high-growth episode in a firm's life cycle and what interventions could be tailored to help other businesses reach this stage. It may also highlight the shortcomings of the sustainably of achieving rapid high growth. Hambrick and Crozier (1985) looked at 30 rapid-growth companies with more than 50% growth per year and found a number of challenges that arise from choosing growth over sustainable growth, including inadequate skills, internal communication issues and cash starvation. Looking at high-growth episodes over time can narrow down the group of firms that experience more than one episode – a sign of more sustainable growth or 'scale up'.

At the very least, it is perhaps a more robust metric for use in business support policy that encouraging more HGFs or scale-ups which, by their very construction, tell us little about the growth process and how best to support it. These results move us beyond simply modelling the spatial variation in the incidence of HGFs and bring us closer to more nuanced measures of fast growth that model not just spatial variation but spatial variation over time and the number of fast growth episodes that can occur at any stage in the life cycle.

Authors' note

The title of this article is in memory of our dear colleague Michael Anyadike-Danes (1951–2018) who sadly passed away on 21 October 2018. Michael taught us many things and the most important of which was look at the data before you run your econometric models. Every Friday evening Michael would email a short note entitled 'From the Cabinet of Curiosities' on a different aspect of the ONS longitudinal firm-level database the construction and analysis of which he made his own. We miss those notes and associated insights. This article is dedicated to him.

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Notes

1. Although there is no formal definition of a scale-up, the conflation of high-growth firm (HGF) and 'scale-up' is characteristic of policy discourse. Coutu (2014) employs the following definition: 'Scale-ups are enterprises with average annualised growth in employees (or in turnover) greater than 20 per cent a year over a three-year period, and with 10 or more employees at the beginning of the observation period' highlighting that it is the same definition as the one used by Organisation for Economic Co-Operation and Development (OECD) for HGFs (Coutu, 2014: 18). Monteiro (2019) discusses in length the connection of HGFs and scale-ups, coming to the conclusion that 'a scale-up can be defined as an HGF whose accelerated cycle of growth and wealth creation is fundamentally based on the scalability of its business model' putting a scale-up as a type of HGF. Furthermore, Isenberg and Onyemah (2016) connect the concept of the scale-up to regional economic growth by arguing that it is the stimulus of more and more indigenous companies scaling more rapidly and that to achieve this objective a 'scale-up ecosystem' is needed to systemise and sustain that growth.
2. A programme led by Dan Isenberg (Babson College, USA) providing practical tools and an action plan to stimulate economic growth – see https://www.babson.edu/academics/executive-education/open-enrollment-programs/driving-economic-growth-through-scale-up-ecosystems/.

3. DECA stands for Data Enabled Change Accelerator. The DECA project has yet to be completed. See the following Office of National Statistics (ONS) website for an overview of the ONS contribution to the DECA project: https://datasciencecampus.ons.gov.uk/projects/understanding-the-characteristics-of-high-growth-companies-using-non-traditional-data-sources/.
4. OECD sought to achieve some international consistency by proposing that high-growth enterprises are defined as those with an average employment or sales growth rate exceeding 20% per annum over a three-year period and with 10 or more employees at the start of the period (EUROSTAT-OECD, 2007). This definition, therefore, includes three criteria: (1) growth rate, (2) employment/sales as the measure of growth and (3) minimum start size (to avoid the arithmetic problems associated with growth from a very small base). However, the US Bureau of Labor Statistics (BLS) has argued that the OECD measure was too narrow and was concerned with the exclusion of firms with less than 10 employees in the first year of the three-year growth period. The BLS alternative measure extended the definition of a high-growth firm to include firms with less than 10 employees if the firm added eight or more employees during the three-year growth period. Here, we refer to these as small high-growth firms (SHGFs). The 'eight or more' figure in the BLS definition was arrived at by multiplying the lower threshold of the OECD measure, 10 employees, by the compound growth ratio, 1.728: if a firm with less than 10 employees added eight jobs, it would have contributed about the same amount to job creation as would a firm with 10 jobs which grew by a factor of 1.728 and therefore satisfied the OECD criterion (Clayton et al., 2013).
5. The statistical data used throughout this article relating to the UK firm level database is from the ONS and is Crown copyright and reproduced with the permission of the controller of HMSO and Queens Printer for Scotland. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. The analysis upon which this report is based uses research datasets which may not exactly reproduce National Statistics aggregates.
6. See https://www.oecd.org/sti/dynemp.htm.
7. National Endowment for Science, Technology and the Arts (NESTA).
8. The work on a cohort of start-ups in Scotland in 2008 showed that the statistically significant determinants of a high-growth episode were age (younger) and size (larger); prior growth (employment and turnover); higher levels of total early-stage entrepreneurial activity (TEA) as measured by the Global Entrepreneurship Monitor (GEM) in the local area; sector (ICT; Business and Professional Services) and finally in the early years after recession (i.e. 2011–2013) and most recently in 2018 (Hart et al., 2020).

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