

# Fast-growth firms in the UK: definitions and policy implications

**ERC Research Paper 63** 

October 2017

www.enterpriseresearch.ac.uk



# Fast-growth firms in the UK: definitions and policy implications

Jun Du Enterprise Research Centre and Aston Business School j.du@aston.ac.uk

> Karen Bonner Queens University, Belfast <u>k.bonner@qub.ac.uk</u>

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); Department for Business, Energy & Industrial Strategy (BEIS); 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.



# ABSTRACT

This research note aims to establish an evidence-based understanding about how fast-growth firm definitions differ and what they mean to policy. Employing the UK business population data over 1998-2013, we compare and contrast several popular fast-growth firm definitions based on their coverage in the business population, the contribution to the aggregate economy and their key characteristics, all discussed in context of the conceptual grounds of these definitions. The key message from our finding is that definition matters. Fast-growth definitions in terms of employment and productivity capture rather different sets of firms, indicating potential conflict in goals. It is possible that polices supporting fast-growth of employment may impair productivity growth, and likewise productivity-driving measures may lead to dwindling employment growth. On the whole, employment-based fast-growth firms generate lots of jobs but have mixed productivity records, while productivity-based fast-growth firms have lower job creation records but show productivity superiority.



# CONTENTS

AB	STRACT	3
1.	FAST-GROWTH FIRMS: DEFINITIONS	5
	Employment-based fast-growth firms	7
	Productivity-based fast-growth firms	7
	Top performers along firm distributions	8
2.	DEFINITION MATTERS	8
	Data	8
	The presence in the economy	9
	The contribution to the economy	10
3.	CHARACTERISTICS OF FAST-GROWTH FIRMS	13
	Firm age and size	13
	Industrial sector	14
	Region	15
4.	CONCLUDING REMARKS	15
RE	FERENCES	28



Fast-growth firms in the UK are prolific job creators (Anyadike-Danes et al., 2009; Du and Temouri, 2015; Bravo-Biosca 2016).<sup>1</sup> Yet their measurement has been controversial (Coad et al., 2014). There are various definitions of fast-growth firm, each of which has pros and cons and no agreement has been reached on which is the most appropriate definition for specific objectives. Applying different definitions captures different subsets of business populations and consequently carries varied policy implications. It is essential to establish a complete understanding about how these definitions differ and what each definition means. This report offers some insights based on our recent analysis.

# **1. FAST-GROWTH FIRMS: DEFINITIONS**

To define and identify fast-growth firms is in fact more challenging than it appears. There are several popular definitions of fast-growth firms used in the literature, and many debates have been undertaken. Apart from the most widely used OECD high-growth firms, the literature has seen, among others, high impact firms, gazelles, high-growth firms in turnover, growth heroes, high growth entrepreneurs, and high employment growth firms. It is inconclusive as to which one is the best in different contexts and for different purposes. For example, the popular notion of 'high-growth firms' is associated with job creation most of the time (quite rightly) and occasionally linked to small, entrepreneurial and even high-tech firms (which may not be true).<sup>2</sup> In the recent debate around the causes and solutions to the UK productivity conundrum, the relevance of the employment-based fast-growth firms is put to question. Some recent studies adopt productivity-based definitions of fast-growth firms (Mason and Brown 2013; Du and Temouri 2015), but it remains unclear how the productivity-based fast-growth firms relate to employment-based fast-growth firms, if at all.<sup>3</sup>

<sup>&</sup>lt;sup>1</sup> It is useful to note that this is not a unique UK experience. The current evidence suggests that high-growth firms are important job creators around the world (Coad et al 2014).

<sup>&</sup>lt;sup>2</sup> The recent review by Brown et al (2017) discusses the common misconceptions about the fast-growth firms embedded in the policy frameworks.

<sup>3</sup> Some reports that employment and sales growth were only modestly correlated (Shepherd and Wiklund, 2009) while recent work shows that it is negatively correlated (Anyadike-Danes and Hart, 2016, 2017).



From a policy-making point of view, undoubtedly, both job and productivity targets are important. It is hence necessary to understand the implications of applying policies that may not promote both goals at the same time, and more particularly when that may increase the likelihood of promoting one goal at the expense of another. To clarify this understanding, one must investigate carefully the conceptual grounds and empirical evidence of the different fast-growth firm definitions. This is what we aim to do in this research paper.

Focusing on differentiating the two definitions, conceptually, there is no clear rationale for postulating that fast-growth firms in terms of employment and productivity share prerequisites or imply similar effects. The relationship between employment growth and productivity growth can be mixed. On the one hand, the levers that managers can use to improve business performance and productivity relate to the characteristics of high employment growth firms, such as managerial practice and talent, human capital and inputs guality, information technology, R&D, product innovation, organizational structure and learning by doing (Syverson, 2011). This suggests that the factors driving high productivity growth firms, such as new products and processes, may also help them to increase their employment levels as well. On the other hand, one can expect a negative relationship between the two, because arithmetically in the definition of labour productivity (turnover per employee), increased labour inputs lead to lower productivity, holding other factors constant. More productive firms are more likely to stay lean or find ways to increase their capital-labour ratio. Unfortunately, the statistical evidence is extremely limited. Daunfeldt et al. (2010) find that Swedish high employment growth firms have a small and negative effect on productivity growth, while high productivity growth firms have an insignificant or even negative effect on employment and sales growth. This, they argue, suggests a short-term trade-off between employment and productivity (Daunfeldt et al., 2010), and it shows that a firm may grow in employment without much efficiency improvements, or experience slower employment growth in favour of capital investments for future efficiency gains (also see Anyadike-Danes and Hart, 2016).

Using the UK business population data contained in the ERC's longitudinal version of the Business Structure Database (BSD) based on annual abstracts of the Inter-Departmental Business Register (IDBR), we are able to analyse the incidence and distribution of fast-growth firms across regions and industries in the UK. We



consider several fast-growth firm definitions, based on both employment growth and productivity growth, as defined below.

#### **Employment-based fast-growth firms**

The most well-known definition of fast growth is the OECD definition of a High-Growth Firm (HGF) based on employment growth (Eurostat-OECD, 2007). Specifically, they are firms with more than 10 employees in the base year experiencing an annual average growth in employment of 20% or more in a 3-year period. To also include smaller firms into the statistics, we follow Clayton et al. (2013) by slightly modifying the OECD definition to include firms with less than 10 employees whose employment grows by at least 8 employees in a 3-year period. Defining fast-growth incidence based on a growth period to avoid one-off growth spikes is a widely adopted practice. But it is controversial at the same time because of this exact issue – the smoothing strategy does not deal with the characteristic that most high growth firms experience high growth only in one year (Holzl 2014, Daunfeldt and Halvarsson, 2012). Hence, we rely on rolling periods, instead of discrete three-year periods, to define fast-growth firms in order to obtain a relatively smooth distribution and comparable statistics over time.<sup>4</sup>

#### Productivity-based fast-growth firms

ww.enterpriseresearch.a

We define fast productivity growth firms in two ways. First, following Du and Bonner (2015), Growth Heroes (GHs) are the firms that increase labour productivity in a three-year period by increasing both turnover and employment, which implies that turnover grows faster than employment. This excludes the firms that experience a boost in labour productivity records by primarily shedding jobs proportionally more than increasing turnover. Further, we devise a stricter fast-growth definition by setting a productivity level threshold, to ensure that the firms included are not those lagging well behind the productivity frontier and experiencing productivity catch-up. This leads to the second definition – Growth Super Heroes (GSHs) –firms that have experienced growth in labour productivity in a 3-year period, by increasing

<sup>&</sup>lt;sup>4</sup> However, in this exercise we do not consider the possibility that a HGF in one 3-year period may have repeat high-growth episodes in subsequent 3-year periods. See Anyadike-Danes, M and Hart, M (2017a) "The UK's high growth firms and their resilience over the Great Recession", ERC Research Paper No. 62



both turnover and employment, and with labour productivity level above the SIC 3digit industrial average productivity level in the base year.

#### Top performers along firm distributions

Top percentiles of a single growth distribution are often seen in statistics, even though a single measure of a distribution may prove partial. To compare and contrast with other fast growth definitions, we also define a set of indicators to capture high performing firms along the distribution of single firm growth measures. More specifically, these are the top 10% firms along the growth distributions in employment, turnover and labour productivity (we call these our 'top 10%' firms henceforth). All definitions are summarized in Table 1.

# 2. DEFINITION MATTERS

One of the purposes in identifying fast-growth firms from a policy-making point of view is to understand firm's potential growth trajectory, and identify the targets for public support (European Commission, 2010; OCED, 2010). To aid the decision-making, the earlier academic debates have centered on whether policies should focus on new start-ups or established SMEs, which then moved on to considering whether to support the small number of high-potential firms in the economy (for example, Shane, 2009) or assisting firms with growth ambition (Levie and Autio, 2013; Mason and Brown, 2013). These discussions, to a large degree, hinge on the magnitudes of the economic contributions the range of fast-growth firms may make to the economy. Turning to the analysis in this paper we seek to set out the various groups of fast-growth firms we use, the incidence in the economy, their contribution to job creation, value creation and productivity.

#### Data

The dataset used in the analysis is the ONS Business Structure Database (BSD), which is based on annual abstracts from the IDBR. As the IDBR holds information on all firms registered for VAT and/or PAYE in the UK as well as from other ONS business surveys, such as Business Register and Employment Survey (BRES) and the Annual Business Survey (ABS), the BSD is the most comprehensive dataset available to academic researchers in terms of business coverage in the UK, information on employees, turnover, age, sector, ownership and geographical



location. The BSD represents the snapshot of the IDBR taken each year in March and contains over two million records annually. The ERC has constructed a longitudinal version of the BSD by linking the individual years from 1997 onwards thus enabling rolling three-year growth periods used in this analysis to be generated.

#### The presence in the economy

We first calculate the average number and share of different types of fast-growth firms in the UK economy over all three-year periods combined, ranging from 1998-2013; and separately for each three-year period. The calculated statistics are reported in Table 2. In general, fast-growth firms account for a relatively small proportion of the stock of all firms. Both employment-based high-growth firms (OECD-HGFs and small HGFs) and GSHs account for around 1-2% of all surviving firms in a three-year period. GHs account for around 7-8% of all firms, whilst those with the highest 10% growth rates, in terms of employment, turnover or productivity, account for around 15-20%. The Great Recession period during 2008-2012 registered lower incidences of fast-growth firms than other periods and the figures return to the pre-recession levels over 2010-2013. In comparison with GSHs (about 1.6% in the economy), GHs seem a much looser definition of a fastgrowth firm as there are significantly more of them in the economy (about 7.2%). This also shows that although quite a few firms exhibit labour productivity growth, there are considerably fewer that grow fast while remaining equal or above the average productivity level.

Having investigated the overall picture of fast-growth firms, we now refine the comparison by firm size. Given that much of the existing analyses of fast growth largely focuses on larger firms (with at least 10 employees), this allows a comparison between our results and the previous findings, as well as discussing the much less known statistical characteristics of the smallest firms. Table 3 summarizes fast-growth incidence in the economy among larger firms and micro-enterprises (firms of less than 10 employees). OECD-HGFs constitute 1.2% of larger surviving firms and HGFs 1.7% of smaller surviving firms. Therefore, these two definitions of fast employment growth lead to a reasonably similar estimate of fast growth incidences among bigger firms and micro firms. This is in contrast with the gap between the top 10% performers among larger firms (1%) and micro-



enterprises (18%) in the employment growth distribution. It means that on average, smallest firms are over-represented among top employment growth firms in a given 3-year period. In comparison, to a lesser extent micro firms are more likely to experience fast productivity growth than larger ones. There are twice as many GHs and GSHs among micro-enterprises as among larger firms.

Next, we conducted correlation analysis for the fast-growth indicators, to look for patterns of their distributions. Given these indicator series are dichotomous (i.e. not continuous), we opt for the pairwise estimates of the tetrachoric correlation that is specifically appropriate statistical tool to derive correlation estimate for latent variables.<sup>5</sup> Between the period of 1998-01 and 2010-13, as reported in Table 4, employment-based fast-growth measures show high positive correlations, unsurprisingly, while the correlation between productivity-based fast-growth and others remains unclear. The correlation between employment-based fast-growth measures and the top 10% in the turnover growth distribution remains positive but the magnitudes of the correlation vary. There is also strong positive correlation between top performers in turnover growth distribution and in labor productivity distribution. Yet the correlation between top performers in labour productivity and employment growth is negative or statistically insignificant. Further, interestingly the positive, albeit low, correlation between GHs or GSHs and employment-based fast-growth firms between 1998-2001 turns to negative and statistically significant in the three-ear period over ten years later (i.e., 2010-2013). The upshot of these patterns show that the growth patterns of the fast-growth firms defined by employment and productivity could capture rather different firms, reinforcing our emphasis here that definitions do matter when used in a policy context. It also highlights that statistics derived from an arbitrarily chosen periods could be unstable in the short run and hence misleading.

#### The contribution to the economy

w.enterpriseresearch.ac.

We turn to the calculation of the employment contribution of fast-growth firms, as described in Table 5. Despite forming a small proportion of firms (1.2% of the stock

<sup>&</sup>lt;sup>5</sup> Tetrachoric computes pairwise estimates of the tetrachoric correlations by the (iterative) maximum likelihood estimator obtained from bivariate Probit without explanatory variables by using the Edwards and Edwards (1984).



of surviving firms), the direct contribution of fast-growth firms in the economy is disproportionately higher. In terms of job creation, OCED-HGFs account for 4.6% of all jobs created over the whole period, and on average in any three-year period they add almost twice as many jobs as they had at the beginning. Due to the small size, small HGFs account for 1.7% of all surviving firms but only 0.5% of all jobs created. However, the net job creation by small HGFs is extremely high. To be more exact, they increase net employment almost five times in any three-year period. The data shows that HGFs are clearly very active in creating new jobs in the UK, as reported elsewhere (Anyadike-Danes et al 2013).<sup>6</sup>

GHs account for 17% of all jobs in surviving firms, which is more than double their contribution to the economy in terms of the number of firms. GSHs' contribution of total numbers of jobs is on par with the OECD-HGFs, but the net job creation by these productive firms is less important. The expected pattern of employment changes in the course of productive efficiency improvements could be due to technological progress (Mortensen and Pissarides, 1998) or management practice.

Similarly, the top 10% of firms in terms of labour productivity growth represent 13.5% of all employment. On average, they experience negative net job creation in any given three-year period, suggesting that for these firms the growth in productivity is being driven by shedding jobs rather than increasing turnover. This implies a somewhat unsurprising negative correlation between productivity improvement and employment growth.

The top 10% of firms in terms of employment growth account for a smaller proportion of jobs than they do the number of firms, at just 5.6%, but they increase net employment by two and a half times in a three-year period. The top 10% of firms in terms of turnover growth contribute about the same as their numbers in the economy, represent 10% of employment in the economy and generate a moderate amount of net jobs.

<sup>&</sup>lt;sup>6</sup> Due to the sample construction and data cleaning undertaken for this analysis, and occasional revisions to the data by the ONS, there may be slight variations to previous metrics on HGFs.



Table 6 reports fast-growth firms' contribution to revenue and to aggregate labour productivity in the economy. On average, all fast-growth firms contribute less than one tenth of the total UK turnover amongst all surviving firms in a three-year period, with GHs being an exception, contributing about 14% of total UK turnover. What is impressive is the rate of turnover growth amongst fast-growth firms, greatly exceeding the average level of all survivors. The top 10% of firms in terms of turnover growth have the highest average turnover growth at over 300% in a three-year period, followed by the top 10% of firms increasing productivity and small HGFs, both of which at least double their turnover. The remaining groups increase turnover by between 80-90% within the three years.

Turning to labour productivity, we rely on two measures to capture the contribution of fast-growth firms to the economy: average labour productivity and aggregate labour productivity, following Du and Bonner (2016). In brief, the averageproductivity is the average labour productivity of all surviving firms, which can be considered the unweighted average contribution of individual surviving firm's productivity to aggregate productivity. This measure, however, may fall short because firm scale is not considered when calculating its contribution. To this end, we also apply aggregate-productivity that does. Using Melitz and Polanec (2012) aggregate productivity decomposition method, aggregate productivity measures the overall contribution of average technology in surviving firms, resource reallocation among surviving firms, and of exit and entry to aggregate productivity, each calculated based on the weighted productivity level by firm market share. The key differences between average-productivity and aggregate-productivity are whether a firm's market share (the weight) is considered when calculating its contribution, for which the latter does, and how effective is the resource reallocation ability among firms.<sup>7</sup> Aggregate labour productivity follows a similar pattern to average labour productivity. The difference between the two metrics reflects the relative market shares in turnover of different fast-growth firm groups

<sup>7</sup> In this analysis, we adopt the aggregate labour productivity estimates obtained in Du and Bonner (2016) for the UK over the same period, which is an application in the UK using the Melitz and Polanec (2012) approach. Du and Bonner (2016) can be found at <u>https://www.enterpriseresearch.ac.uk/wp-content/uploads/2016/07/ERC-ResPap48-</u> <u>DuBonner-final.pdf</u>.



in the economy and the level of the resource reallocation within these groups.<sup>8</sup> Hence we observe that the groups consisting of smaller firms end up with lower aggregate labour productivity than average labour productivity, such as small HGFs.

Comparing the average labour productivity level across the range of fast-growth firms with that of the national average reveals some interesting patterns. First of all, it appears that fast employment growth firms (both OECD-HGFs and small HGFs) are relatively productive. Their levels of labour productivity for any given three-year period exceed that of all survivors and the top 10% of employment growth firms. However, they also experience a decrease in average productivity growth over the three years, which is likely to be associated with a faster expansion in employment compared to turnover. Unsurprisingly, the top 10 productivity growth firms have the highest average labour productivity growth at over 400%, although starting from a relatively low productivity level of around £78,100 per employee. Productivity-based fast-growth firms also enjoy positive labour productivity growth, but there is clear difference in productivity levels between GHs and GSHs – GSHs are twice as productive as the national average, while GHs have lower than average productivity, indicating that they include some unproductive but catching-up firms.

# 3. CHARACTERISTICS OF FAST-GROWTH FIRMS

#### Firm age and size

Age has been recently singled out to define the extraordinary job creating ability of fast-growth firms. For example, Haltiwanger et al. (2013) provide evidence based on US firms that it is young firms, rather than small firms, that are responsible for job creation, by providing evidence that controlling for firm age seems to eliminate systematic relationship between firm size and growth. Similar findings are also reported in Lawless (2014) using Irish data. For the UK, Anyadike-Danes and Hart (2017b) show that age is a key factor in unravelling the relationship between firm

<sup>&</sup>lt;sup>8</sup> For details of the methodology of aggregate productivity decomposition see Du and Bonner (2016).



dynamics and job creation.

In our data, the average age of all fast-growth firms is relatively young, ranging from 3-5 years old. Comparing fast-growth firms of different definitions, we find the percentage of firms aged 0-5 years is very high. Above two-thirds of all groups, except HGFs, are aged 0-5 years. The HGFs has a broader mix of age, with 38% aged 6 or over, and an average age of 5 (Table 7). The top 10% of both employment and turnover growth firms are relatively younger with an average age of 3 years and just one-fifth aged over 6 years.

The fast-growth firms encompass a range of average sizes; by definition, the small HGFs are the smallest with an average of just 4 employees per firm. The top 10% employment and turnover growth firms are also, on average, very small firms with 5 and 10 employees respectively. Productivity-based fast-growth firms are larger; GHs have an average firm size of 37 employees whilst GSHs are slightly bigger at 50 employees. The OECD-HGFs are biggest with an average of 63 employees. Overall, the majority of these firms have fewer than 50 employees in total; only GHs, GSHs and OECD-HGFs have more than 5% of firms with 50 or more employees.

In summary, although the assumptions about fast-growth firms being small and young do not always hold true (Brown et al 2017), the statistics show that the fast-growth phenomena are more relevant to SMEs and firms in their first five years of life. Comparing the fast-growth definitions, we find OECD-HGFs tend to be larger and older firms.

#### Industrial sector

Fast-growth firms are present in all sectors of the economy. Table 9 shows they are distributed across manufacturing sectors (high-tech and non-high-tech sectors), business services and other services sectors. The first thing to note is that the percentage of fast-growth firms is much higher in the service sectors compared to the manufacturing sectors, which is consistent with other UK research (Coad et al 2014).

We find that, in general, fast-growth firms are more prevalent in Business Services sectors than in Manufacturing; the share is usually twice as high in the former.



GSHs are the exception with around 12% in Manufacturing and 16% in Business Services; the lower share is due to the fact that around half of all GSHs are in Other Services. Within Manufacturing, employment-based fast-growth firms are more likely to be in high-tech sectors, while productivity-based fast-growth firms are more likely to be in non-high-tech sectors. It may be the case that rising demand for high-tech products has resulted in increased levels of employment whilst non-high-tech sectors may be becoming more innovative and so are increasing productivity. The fact that less than 10% of all fast-growth firms are in high-tech manufacturing is consistent with the recent evidence-backed view that a typical fast-growth firm is not a high-technology firm (Coad et al 2014), and fast-growth is not linked with high-technology industries (Holzl, 2009).

#### Region

As with the sectors, fast-growth firms are distributed across all the UK regions (Table 10) and there is little difference in the regional composition. On average, around 7% of surviving firms in any region are OECD-HGFs; London has a slightly higher share at 9%. GHs also constitute around 7% of surviving firms in a region, although the share in Northern Ireland is marginally higher at 10%. GSHs and small HGFs are much less prevalent, accounting for around 2% of all surviving firms in a region. The data indicates that fast-growth is not concentrated in any particular area of the UK and all regions have a combination of firms with either fast employment or productivity-based growth.

# 4. CONCLUDING REMARKS

Employing the UK business population data over 1998-2013, we show that the different fast-growth firms have a varied presence in the business population and make rather different contributions to the UK economy. The evidence suggests that the likelihood for a firm to be a fast productivity growth firm decreases with its likelihood to be a fast employment growth firm for overall sample. On the whole, employment-based fast-growth firms generate lots of jobs but have mixed productivity records, while productivity-based fast-growth firms have lower job creation records but show productivity superiority (see Figure 1). This is consistent with the recent evidence that around 10% of OECD-HGFs in the 2008-15 period



had actually recorded a positive change in labour productivity (Anyadike-Danes and Hart, 2016).

These findings suggest that applying policies on different types of fast-growth firms will affect different business populations which will result in different outcomes. It is possible that polices supporting fast-growth of employment may impair productivity growth, and likewise productivity-driving measures may lead to dwindling employment growth. Hence, it is important for policy makers to avoid making assumptions about the potential intervention outcomes based on evidence that may have been collected using a different fast-growth firm definition, and to make a measured choice about the definition, and design policy interventions accordingly. This is particularly important in attempting to identify lead indicators for firms with the potential to scale.

Moving forward, considering that job creation and productivity are both important policy goals, we recommend considering both employment and productivity-based measures in any future research and carefully examining the policy implications of potential business support policy instruments. Further, when analyzing the economic impact, we need to evaluate not only the direct impact of promoting fast-growth firms, but also investigate more broadly the indirect and the wider economic impact of fast-growth firms (see Du and Vanino, 2017).<sup>9</sup>

<sup>&</sup>lt;sup>9</sup> See the ERC II Project 3 Report, "Fast-growth firms and their wider economic impact: the UK evidence" at <u>https://www.enterpriseresearch.ac.uk/people/dr-jun-du/</u>.



Table 1:	Definitions	of fast	growth firms
----------	-------------	---------	--------------

Definition	Feature	Shorthand	Normal (≥10 emplovees)	Micro (<10 employees)
High Growth Firms (HGFs)	Employment criterion	HGFs	OECD definition- OECD 2007 definition: more than 10 employees and annual average growth in employment of 20% or more in 3 year period	Clayton OECD- matching definition for smaller firms Firms with fewer than 10 employees whose employment grows by at least 8 in 3 years (Clayton et al 2013)
Growth heroes	Productivity criterion	Growth Heroes (GHs)	Increase product period by increa employment (Du	tivity in a 3 year sing turnover and and Bonner 2015)
		Heroes (GSHs)	productivity in bas	se year
Top 10s	Top performers along	Top 10% employment growth	Firms with emplo within top 10 per period	oyment growth lies centile in a 3 year
	distribution	Top 10% turnover growth	Firms with turnove top 10 percentile	er growth lies within in a 3 year period
		Top 10% productivity growth	Firms with produ within top 10 per period	uctivity growth lies centile in a 3 year



	Avg over all year periods 2013)	three (1998-	1998-01		1999-02		2000-03		2001-04		2002-05		2003-06	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
HGFs	10,347	1.2	8,302	1	13,502	1.7	12,848	1.6	12,449	1.5	9,728	1.2	10,153	1.2
Small HGFs	15,145	1.7	9,568	1.2	23,178	ω	22,673	2.8	21,465	2.7	10,039	1.2	11,579	1.4
GHs	64,811	7.2	41,924	5.4	52,452	8.7	59,136	7.4	67,581	8.4	66,068	<u>.</u>	66,027	7.8
GSHs	14,658	1.8	7,598	_	11,212	1.4	12,701	1.6	14,314	1.8	13,413	1.8	14,484	1.7
Top 10% emp growth	170,850	19	111,271	14.4	060'96	12.3	181,864	22.8	179,403	22.3	130,307	15.9	142,111	16.7
Top 10% turn growth	142,167	15.8	92,979	12	95,826	12.3	109,999	13.8	113,974	14.2	118,122	14.4	136,649	16.1
Top 10% prod growth	142,827	15.9	92,979	12	95,683	12.3	110,022	13.8	113,959	14.2	118,116	14.4	137,158	16.2
National Total Survivors	898,150		775,256		778,399		799,096		805,229		818,860		848,933	
	2004-07		2005-08		2006-09		2007-10		2008-11		2009-12		2010-13	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
HGFs	10,258	1.1	10,132	1.1	10,453	1.1	9,770	-	8,655	0.9	8,545	0.8	9,718	-
Small HGFs	14,209	1.5	15,222	1.8	16,276	1.7	13,364	1.4	11,909	1.2	11,957	1.2	15,448	1.5
GHs	75,717	8.2	75,437	60	73,940	7.7	71,535	7.3	64,643	6.4	64,379	6.3	63,704	6.3
GSHs	17,880	1.9	19,173	2	18,113	1.9	17,332	1.8	16,087	1.8	17,725	1.7	17,356	1.7
Top 10% emp growth	177,292	19.3	191,530	20.2	209,993	21.7	215,084	22	192,506	19.1	194,721	19.1	198,877	19.7
Top 10% turn growth	161,147	17.5	182,469	19.3	191,326	19.8	213,688	21.9	146,734	14.5	143,998	14.1	141,266	14
Top 10% prod growth	161,266	17.5	182,668	19.3	191,329	19.8	213,686	21.9	144,729	14.3	144,592	14.2	150,560	14.9
National Total Survivors	920,045		947,169		966,350		977,195		1,009,527		1,020,283		1,009,614	

#### Table 2 Fast growth firms in the UK: the presence in the economy

Note: National total survivors represents the number of firms surviving over the three year period. Each category's share of this total is presented to provide an indication of their relative contribution. The actual denominator for each category may differ depending on the subset of the BSD from which they are drawn.



Definition/ Feature		Overall firms	Larger firms (≥10 employe es)	Micro- enterprises( <10 employees)
Employment-based definition/High Growth Firms (HGFs)	HGFs	1.2	1.2	-
	Small HGFs	1.7	-	1.7
Productivity-based definition/ Growth heroes	Growth Heroes (GHs)	7.2	2.1	5.2
	Growth Super Heroes (GSHs)	1.6	0.5	1.2
Top 10s/Top 10% performers along distribution	Employm ent growth	19.0	1.0	18.1
	Turnover growth	15.8	1.6	14.2
	Productivi ty growth	15.9	2.5	13.4

#### Table 3: Fast-Growth Firms: Presence in the economy by firm size

Note: % relates to share of national total survivors, as per Table 2.



Table 4: Tetrachoric	<b>Correlation</b>	Matrix	1998-01
----------------------	--------------------	--------	---------

	OECD-HGFs	Small HGFs	GHs	GSHs	Top 10%Emp growth	Top 10% Turn growth	Top 10% Prod growth
1998-2001							
OECD-HGFs	1						
Small HGFs	-	1					
GHs	0.2224*	0.1445*	1				
GSHs	0.2998*	0.0474	0.2345*	1			
Top 10% Emp growth	0.4560*	0.977	0.0650*	-0.0082	1		
Top 10% Turn growth	0.1444*	0.6272*	-0.0741*	-0.1504	0.7794*	1	
Top 10% Prod growth	-0.0571	- 0.0750*	0.0886*	-0.0493	0.021	0.8363*	1
	OECD-HGFs	Small HGFs	GHs	GSHs	Top 10% Emp growth	Top 10% Turn growth	Top 10% Prod growth
2010-2013	OECD-HGFs	Small HGFs	GHs	GSHs	Top 10% Emp growth	Top 10% Turn growth	Top 10% Prod growth
<b>2010-2013</b> OECD-HGFs	OECD-HGFs	Small HGFs	GHs	GSHs	Top 10% Emp growth	Top 10% Turn growth	Top 10% Prod growth
2010-2013 OECD-HGFs Small HGFs	OECD-HGFs 1 -	Small HGFs	GHs	GSHs	Top 10% Emp growth	Top 10% Turn growth	Top 10% Prod growth
2010-2013 OECD-HGFs Small HGFs GHs	OECD-HGFs 1 - -0.0609*	Small HGFs 1 0.0261	GHs 1	GSHs	Top 10% Emp growth	Top 10% Turn growth	Top 10% Prod growth
2010-2013 OECD-HGFs Small HGFs GHs GSHs Hero	OECD-HGFs 1 - -0.0609* -0.1211*	Small HGFs 1 0.0261 0.1157	GHs 1 0.2354*	GSHs 1	Top 10% Emp growth	Top 10% Turn growth	Top 10% Prod growth
2010-2013 OECD-HGFs Small HGFs GHs GSHs Hero Top 10% Emp growth	OECD-HGFs 1 - -0.0609* -0.1211* 0.9490*	Small HGFs 1 0.0261 0.1157 0.8814*	GHs 1 0.2354* -0.0686*	GSHs 1 -0.0603	Top 10% Emp growth	Top 10% Turn growth	Top 10% Prod growth
2010-2013 OECD-HGFs Small HGFs GHs GSHs Hero Top 10% Emp growth Top 10% Turn growth	OECD-HGFs 1 - -0.0609* -0.1211* 0.9490* 0.6018*	Small HGFs 1 0.0261 0.1157 0.8814* 0.2890*	GHs 1 0.2354* -0.0686* -0.1028*	GSHs 1 -0.0603 -0.1159	Top 10% Emp growth 1 0.6154*	Top 10% Turn growth	Top 10% Prod growth

Note: We calculate Tetrachoric correlation between the fast-growth firms' indicators, for that is a special case of the polychoric correlation applicable when both observed variables are dichotomous. \* p<0.05.



	Average Total jobs: Number	Average Total jobs : % in the economy	Average Total net jobs created, number	Index of jobs created (avg total=100)
OECD- HGFs	642,952	4.6	1,128,096	175
Small HGFs	66,100	0.5	301,206	456
GHs	2,378,693	17.1	770,569	32
GSHs	766,569	5.5	199,114	26
Top 10% Emp growth	780,752	5.6	1,961,210	251
Top 10% Turn growth	1,362,068	9.8	1,036,286	76
Prod growth	1,871,790	13.5	-602,062	-32
National Total Survivors	13,888,004		1,172,608	8

#### Table 5: Job contribution of fast-growth firms in the economy

Note: this table shows the job creation indicators of fast-growth firms as an average over 3-year periods covering 1998-2013.



	Tu	Irnover			Labour	productivity	
	Average Total turnover (000s)	Averag e Total turnov er (% in econo my)	Averag e Turnov er growth	Averag e labour producti vity (£000s)	Average labour productivit y growth	Aggregate labour productivit y (£000s)	Aggregate labour productivit y growth
OECD-HGFs	126,822,068	7.1	81.9	248.7	-37.4	203.5	-33.7
Small HGFs	21,004,712	1.2	103.2	473.5	-73.1	317.3	-63.6
GHs	241,585,569	13.6	78.3	90.1	54.2	100.2	35.6
GSHs	148,963,407	8.4	66.2	210.5	39	205.7	30.7
Top 10% Emp growth	163,840,308	9.2	91.9	228.7	-50.4	209.4	-45.1
Top 10% Turn growth	130,641,804	7.3	308.7	102.6	235.6	94.5	130.7
Top 10% Prod growth	152,338,344	8.6	183.5	78.1	448.4	80.9	315.5
National Total Survivors	1,779,119,2 60		20.7	139.9	8.5	127.1	11.2

Table 6: Turnover and labour productivity of fast-growth firms in the economy

Note: This table shows the value creation indicators and labour productivity of fastgrowth firms as an average over 3-year periods covering 1998-2013. Total turnover represents average of total turnover at start of each three-year period. Average labour productivity represents average of labour productivity at start of each three-year period. Aggregate labour productivity represents average of aggregate labour productivity at start of each three-year period. Average turnover growth represents growth over each three-year period. Average labour productivity growth represents growth over each 3year period.



# Table 7: Fast-growth firm characteristics: age

	Average Age	% aged 0-5 years	% aged 6+ years
HGFs	5	62	38
Small High Growth Firms	4	77	23
Growth Heroes (GHs)	4	73	27
Growth Super Heroes (GSHs)	4	68	32
Top 10% in employment growth	3	79	21
Top 10% in Turnover Growth	3	78	22
Top 10% in productivity growth	4	71	29
National Total Survivors	4	70	30



# Table 8: Fast-growth firm characteristics: size

	Average Employment Size	% single employee	% 2-9 employee	% 10-49 employee	% 50-249 employee	% 250+ employee
High Growth Firms	62.6	0	0	84.2	12.7	3.1
Small High Growth Firms	4.4	15.7	84.3	0	0	0
Growth Heroes (GHs)	37.1	21.2	50.2	21	6	1.6
Growth Super Heroes (GSHs)	49.9	20.8	47.4	22.2	7.3	2.2
Top 10% in employment growth	4.8	60.2	34.8	4.3	0.6	0.1
Top 10% in Turnover Growth	9.9	44.3	45.5	8.3	1.5	0.4
Top 10% in productivity growth	13.7	24.3	60.1	12.9	2.2	0.5
National Total Survivors	15.5	31.1	52.5	13.4	2.4	0.6



		High-tech Manufacturi ng	Non-High tech Manufacturing	Business Services	Other Service s
	HGFs	9.3	6.3	30.4	44.7
	Small HGFs	6.2	4.5	31.8	44.7
	GHs	3.8	10.6	26.2	39.4
	GSHs	4.2	7.5	16.4	49.7
	Top 10%				
	Employment	4.5	3.5	33.7	45.2
Overall	growth				
	Top 10%				
	Turnover	4.8	3.5	41.7	37.3
	growth				
	Top 10%				
	Productivity	4.9	3.8	37.2	42.2
	growth				
	HGFs	9.3	6.3	30.4	44.7
	GHs	7.6	17.9	22.5	38.4
	GSHs	8.4	13	12.9	52.9
	Top 10%				
Larger firms	Employment	8.4	5.9	32.6	43.8
(≥10	growth				
employees)	Top 10%		5.0	00.4	
,	Turnover	9.3	5.9	33.4	41.1
	growth				
	TOP 10%	0 5	6.0	20.2	47.0
	Productivity	8.5	0.2	28.3	47.Z
		6.2	1 E	21.0	447
		0.2	4.3	31.0 27.7	44.7 20.0
		2.2	1.1	27.7	39.9 10 1
	US⊓S Top 100/	2.2	4.9	10.1	40.1
Micro-	Fmploymont	12	2.4	22.0	15 2
enternrises	arowth	4.5	5.4	33.0	45.5
(<10	$T_{00}$				
emplovees)	Turnover	43	33	42 7	36.9
0.1121030000)	arowth	ч.5	0.0	74.1	00.0
	Top 10%				
	Productivity	4.2	3.4	38.8	41.3
	growth			2010	

# Table 9: Fast-growth firm characteristics: industrial sector



#### Table 10: Fast-growth firm characteristics: location

	NE	NN	Yks & Humber	East Midlands	West Midlands	Eastern	London	South East	South West	Wales	Scotland	N
HGFs	8.8	6.8	6.3	6.6	6.2	6.9	9.3	7.5	7	6.8	6.9	5.7
Small HGFs	2.1	2	2.1	2.1	1.9	1.9	2.3	1.9	2.1	2	2.1	2.1
GHs	7.5	7.2	7.5	7.5	7.2	7.1	7.1	7.1	7.2	6.8	7	9.6
GSHs	1.4	1.8	1.7	1.7	1.7	1.8	2	1.8	1.3	1.4	1.4	2.1
Top 10% Employment growth	18.7	18.4	18.5	18.6	18.1	18.5	20.8	18.5	18.9	19.1	19.1	17.4
Top 10% Turnover growth	14.1	15	14.7	14.8	14.5	15.3	19.4	18.2	14.4	13.4	14.2	14.8
Top 10% Productivity growth	14.6	15.3	15	14.9	15.1	15.4	18	18.2	14.7	14.8	15	15.3
HGFs	8.8	6.8	6.3	6.6	6.2	6.9	9.3	7.5	7	6.8	6.9	5.7
GHs	12.7	12.7	12.9	13.1	12.2	12.9	11.8	12.6	12.7	13	12.8	18.7
GSHs	2.5	3.1	3.3	3.2	3.1	3.6	3.8	3.7	2.8	2.7	2.7	4.3
Top 10% Employment growth	5.4	5.8	5.1	5.3	5	5.6	8.2	6.2	5.5	5.4	5.8	4.4
Top 10% Turnover growth	9.5	9.6	9	8.9	8.6	9.5	13.2	10	9.1	8.8	9.3	9.4
Top 10% Productivity growth	14.1	15	14.2	14.2	13.9	14.8	19.2	15.5	14.3	14.7	14.9	13.3
Small HGFs	2.1	2	2.1	2.1	1.9	1.9	2.3	1.9	2.1	2	2.1	2.1
Growth Heroes	6.2	5.9	5.7	6.3	8	5.9	8	6.3	7	6.5	5.3	.0. 1
Growth Super Heroes	11	1.2	1.2	1.3	1.3	1.3	1.8	1.4	1.4	1.3	1.1	1.8
Top 10% Employment growth	21.9	20.9	21.6	21.4	20.9	20.8	22.7	20.5	21.4	21.7	22.1	21.1
Top 10% Turnover growth	15.3	16.1	16	15.8	15.7	16.3	20.4	17.3	15.4	14.3	15.3	16.4
Top 10% Productivity growth	14.7	15.3	15.2	15	15.3	15.5	17.8	16.3	14.8	14.5	15	15.9

Note: these are presented as a share of surviving firms in the region, as an average over 3-year periods covering 1998-2003.



#### Figure 1: Summary of productivity-based fast-growth firms and employmentbased fast-growth firms

	Employment based		Productivity based			
	Bigger firms	Micro firms	Bigger	r firms	Microf	īrms
	OECD-HGFs	Small HGFs	GHs	GSHs	GHs	GSHs
Jobs (stock)	ŔŔ		ŔŔŔŔŔ			
Jobs (net job creation)	<u>ŘŘ</u>	RRAR				
Turnover (stock)	££	£	££££	££	££	££
Turnover (growth)	££	£££	££	££	££££	£££
Productivity (level)			0 0		0 0	
Productivity (growth)	¥	<b>44</b>				

Note 1: Employment-based fast-growth definitions include: **OCED-HGFs** (OECD, 2007, more than 10 employees and annual average growth in employment of 20% or more in 3 year period), **Small HGFs** (Clayton et al 2013, Firms with fewer than 10 employees whose employment grows by at least 8 in 3 years). Productivity-based fast-growth definitions include: Growth Heroes (**GHs**, Increase productivity in a 3 year period by increasing turnover and employment, used in Du and Bonner (2015)) and Growth Super Heroes (**GSHs**, Growth Heroes with above average productivity in base year).

Note 2: Jobs (stock) scoring is based on the percentage of total jobs in the economy, while Jobs (net job creation) is based on the index of job created. Turnover (stock) scoring is based on average total turnover in the economy, while Turnover (growth) is based on average turnover growth. Productivity (level) scoring is based on average labour productivity, while Productivity (growth) is based on average productivity growth.  $\downarrow$  and  $\downarrow\downarrow$  indicate negative contribution, i.e. productivity decline.



# REFERENCES

Anyadike-Danes, M., Bonner, K., Hart, M., Mason, M. (2009) Measuring Business Growth – High growth firms and their contribution to employment in the UK, edited by NESTA, London.

Anyadike-Danes, Michael and Hart Mark (2016) "Seeing the trees for the wood: going with the grain of the extraordinary heterogeneity of firm-level productivity" *Research Paper, Aston University, Birmingham*, at https://www.researchgate.net/publication/316684966\_Seeing\_the\_trees\_for\_the\_ wood\_going\_with\_the\_grain\_of\_the\_extraordinary\_heterogeneity\_of\_firmlevel\_productivity

Anyadike-Danes Michael and Hart Mark (2017a) "The UK's High Growth Firms and their resilience over the Great Recession " Research Paper, Aston University, Birmingham, at

https://www.researchgate.net/publication/316684497\_The\_UK%27s\_High-Growth Firms and their resilience over the Great Recession

Anyadike-Danes Michael and Hart Mark (2017b) "Firm and job dynamics in the United Kingdom before, during and after the global financial crisis: Getting in under the hood," in OECD ed. Business Dynamics and Productivity, Paris: OECD, Chap. 4, pp. 87–109.

Anyadike-Danes, Michael, Mark Hart, and Jun Du. "Firm dynamics and job creation in the UK." *Enterprise Research Centre, Aston University, Birmingham* (2013).

Brown, Ross, Suzanne Mawson, and Colin Mason. "Myth-busting and entrepreneurship policy: the case of high growth firms." *Entrepreneurship & Regional Development* 29.5-6 (2017): 414-443.

Clayton, Richard L., et al. "High-employment-growth firms: defining and counting them." *Monthly Lab. Rev.* 136 (2013): 3.

Coad, Alex, et al. "High-growth firms: introduction to the special section." *Industrial and Corporate Change* 23.1 (2014): 91-112.

Daunfeldt, Sven-Olov, Daniel Halvarsson, and Dan Johansson. *A cautionary note on using the Eurostat-OECD definition of high-growth firms*. No. 65. HUI Research, 2012.

Daunfeldt, Sven-Olov, Niklas Elert, and Dan Johansson. "The economic contribution of high-growth firms: Do definitions matter." *Ratio working papers* 151 (2010).



Du J. and Bonner K. (2016), Decomposing UK aggregate labour productivity and growth: 1998-2013 using the ONS business structure database data, ERC Research Paper No. 48.

Du, Jun, and Yama Temouri. "High-growth firms and productivity: evidence from the United Kingdom." *Small Business Economics* 44.1 (2015): 123-143.

Du Jun and Vanino Enrico. (2017), ERC II Project 3 Report, "Fast-growth firms and their wider economic impact: the UK evidence", forthcoming at <u>https://www.enterpriseresearch.ac.uk/people/dr-jun-du/</u>.

Edwards, J. H., and A. W. F. Edwards. 1984. Approximating the tetrachoric correlation coefficient. Biometrics 40:563

ERC, (2015), "New ERC report in partnership with Goldman Sachs and British Business Bank, Unlocking UK Productivity", Goldman Saches, ERC and BBB: <u>http://www.enterpriseresearch.ac.uk/wp-</u>

content/uploads/2015/11/Internationalisation-and-Innovation-Report-web-

pages-.pdf

Eurostat-OECD. (2007). *Eurostat-OECD manual on business demography statistics*. Paris: OECD.

Haltiwanger, John, Ron S. Jarmin, and Javier Miranda. "Who creates jobs? Small versus large versus young." *Review of Economics and Statistics* 95.2 (2013): 347-361.

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

Lawless, Martina. "Age or size? Contributions to job creation." *Small Business Economics* 42.4 (2014): 815-830.

Levie and Autio "Growth and growth intentions. White Paper No. 1", Enterprise Research Centre 2013

Mason C. and Brown R. (2013), Creating good public policy to support high-growth firms, Small Business Economics, vol. 40(2), pp. 211-225.

Mason, Colin, and Ross Brown. "Creating good public policy to support highgrowth firms." *Small Business Economics* 40.2 (2013): 211-225.

Melitz, Marc J., and Sašo Polanec. "Dynamic Olley-Pakes productivity decomposition with entry and exit." *The Rand journal of economics* 46.2 (2015): 362-375.



Mortensen, Dale T., and Christopher A. Pissarides. "Technological progress, job creation, and job destruction." *Review of Economic dynamics* 1.4 (1998): 733-753. Mortensen, Dale T., and Christopher A. Pissarides. "Technological progress, job creation, and job destruction." *Review of Economic dynamics* 1.4 (1998): 733-753. Shane, Scott. "Why encouraging more people to become entrepreneurs is bad public policy." *Small business economics* 33.2 (2009): 141-149.

SYVERSON, C. (2011): "What Determines Productivity ?" *Journal of Economic Literature*, 49, 326–65.

Wiklund, Johan, Holger Patzelt, and Dean A. Shepherd. "Building an integrative model of small business growth." *Small Business Economics* 32.4 (2009): 351-374.



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

Centre Manager Enterprise Research Centre Aston Business School Birmingham, B4 7ET CentreManager@enterpriseresearch.ac.uk