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Start-up Size and Subsequent Growth: English and Spanish New Businesses Compared¹

by

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ABSTRACT

The aims of this research are to determine and to compare the factors which influence start-up size and the subsequent employment change of new businesses over four years. A comparison between new firms started in selected areas of England and Spain is made. Data was collected by face-to-face interviews with 231 English and 182 Spanish firm founders using the same questionnaire in the two countries. In order to provide a full explanation of start-up size and employment change, explanatory variables are based on conditions observable at the pre-, at- and post-start stages. First, a multiple regression analysis is estimated to identify the determinants of initial size of the firm. Results show that start-up size is strongly influenced by the starting resources of the entrepreneur and industry effects. However, different human capital variables influence start-up size in the two selected countries. Second, four groups of firms are identified in terms of their employment change in both samples. Surprisingly, the biggest firms at start-up are those that have job losses. These firms converge over time with a group of slow growers. Neutral employment change is observed in a group of mainly sole owners and there is also a group of fast growers. The determinants of these four employment change patterns are then analysed using an ordered probit model. Results show that start-up size is highly significant in explaining all patterns of change. Fast-growing firms are reflected in the same factors in both countries, such as formal planning, workforce training and owner managerial skills. Different results are found regarding founder-specific characteristics, use of external advice and sources of finance. Findings indicate that new firms learn as they age and there is therefore an adjustment process of firm size over time. Findings also suggest that new firm growth will depend on the entrepreneur's ability to acquire skills through learning-by-doing.

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1. Introduction

The potential of new firms to create additional employment is of great interest both for policymakers and researchers. Since the pioneering work of Birch (1979) in which he found that new US firms create the majority of employment, there has been a public policy orientation that has very actively promoted new firm formation. However, the Birch studies have been criticised for methodological deficiencies. While it is acknowledged that large numbers of jobs are created in SMEs, it should also be recognized that many jobs are lost by closure of small firms (Davis et al., 1996). Moreover, for most start-ups employment growth is not an objective. For example, Storey (1994b) found that about 50 per cent of UK founders start their firm with no intention to grow. Looking at both the job creation potential and the relatively low propensity of new firms to grow, it is highly interesting to find the characteristics that determine new firm employment change.

Start-up size is one of the most prominent factors that have been shown to influence new firm growth. Gibrat's law theorizes that both small and large firms will on average have the same rates of growth (Gibrat, 1931)⁴. However, empirical evidence has not confirmed this theory (Evans, 1987, Wagner, 1992; Audrestch et al., 1999; Almus and Nerlinger, 2000). In general, the entry of new firms and its determinants have attracted considerable interest in the industrial economics literature (e.g. Mata, 1993; Audrestch and Acs, 1994; Wagner, 1994) but an issue that has received less attention is the determinants of start-up size of firms. More recently, Mata and Machado (1996) and Gorg et al. (2000) have examined some of these determinants.

In addition to firm size, previous research has shown that there are many factors of significance in explaining firm growth. Storey (1994b) asserts that firm growth is influenced by the interaction between three sets of variables relating to characteristics of the entrepreneur, nature of the firm and strategy. In particular, employment growth determinants have been the focus of much research (Storey, 1994a; Westhead and Birley, 1995; Almus and Nerlinger, 1999; Brixy and Kohaut, 1999; Davidsson et al., 2002). There is also a growing interest in the relatively small group of fast-growing firms (the so-called flyers or gazelles) within the population of new firms (Bruderl and Preisendorfer, 2000; Almus, 2002).

However, to the best of our knowledge, evidence with regard to causes of **both** start-up size and subsequent growth of the same new firms is still scarce. This research is aimed at determining and comparing the factors which influence start-up size and the subsequent employment change of new businesses. A multiple regression analysis is firstly estimated to identify the determinants of initial size of the firm. Then we analyse the determinants of all different post-entry behaviours in terms of new firm employment change. Four categories of firms are defined as decliners, statics, slow growers and fast growers. An ordered probit model is estimated to explain this employment ranking. Three main groups of explanatory variables are considered: pre-start factors, such as human capital, at-the-start factors, such as incorporation and sector, and post-start factors, such as strategy, to provide a full explanation of start-up size and subsequent growth.

⁴ According to Gibrat's law, the proportionate growth in firms is independent of size and age.

In this paper we use data gathered by face-to-face interviews with new firm founders. In order to provide ‘consistent’ results to our empirical analysis, a comparison between new firms located in selected areas of England and Spain is made. A study in three English counties was replicated in a Spanish area thus providing us two different databases of new firms that are used separately in the estimations. While empirical research has been extensively conducted on the subject in the UK, very limited research has been carried out in Spain to study start-up size and new firm growth⁵.

Moreover, comparative studies are particularly pertinent between countries with different regulatory frameworks. Djankov et al. (2002) show that to meet government requirements for starting to operate a business in Spain, an entrepreneur must complete 11 procedures taking at last 82 business days. To do the same, an entrepreneur in the UK can finish the process in four days and completing five procedures⁶.

The paper is organised as follows. Section 2 examines previous empirical research. Section 3 presents models and variables and describes samples. Section 4 shows the empirical results. Finally, section 5 concludes our findings.

2. Literature review

According to the theoretical model derived by Jovanovic (1982), firms learn about their efficiency as they operate in the industry: the efficient grow and survive and the inefficient decline and fail. This model assumes that new firms receive information about their effectiveness only after market entry, i.e. they operate in an unsure environment in the beginning. But they are able to learn from previous periods and experiences or can actively invest in gathering such information.

Baldwin and Rafiquzzaman (1995) found that learning is positively related to the post-entry growth of Canadian manufacturing firms that enter an industry by constructing new plant. Haltiwanger et al. (2000) provide empirical evidence on the adjustment process of US new businesses as they age. This adjustment process, in terms of earnings and productivity, is consistent with firms learning as they age as well as with the exit of ‘mistake’ prone firms. Since some aspects of firm type are arguably unobservable even to the firm itself initially, newly born firms learn and evolve towards their ‘long run’ type (or potentially exit). They found that new firms that make initial mistakes about their type, particularly those that are overly optimistic, are more likely to exit (or decline). Wagner (1994) found heterogeneity of growth patterns among surviving small new single firms in German manufacturing industries between 1979 and 1982 until 1990. One third of all survivors in his data set did not grow but had less employees and between 13 per cent and 26 per cent of new firms more than doubled in size in the period considered.

Size differences over time (e.g. between the start-up and first years of operation) may be related to an adjustment process. Prior to start the business, the entrepreneur has a

⁵ Correa et al. (2003) have recently analysed the influence of size, age and activity sector on the growth of SMEs, using data from a sample of firms in Canaries (Spain).

⁶ In addition, the cost of obtaining legal status to operate a firm as a share of per capita GDP is \$0.0143 in the UK while in Spain it is \$0.1730.

set of beliefs on the 'optimal' start-up size of the firm. Therefore, at the moment of the start-up the entrepreneur makes a decision on the initial firm size. After the start, new firm learns to adjust their size.

However, a unique theoretical model that explains initial size and subsequent growth of new firms does not exist. In order to explain and compare the determinants of start-up size and employment change, Storey's (1994b) analytical framework is used in this paper. Storey (1994b) proposes a framework with three main factors that can be considered as a variety of different elements. These are the starting resources of the entrepreneur, the firm and strategy. The entrepreneur's background and the firm characteristics are likely to explain start-up size (Mata, 1996). Employment growth will depend not only on these factors, but also on the strategies employed by the businesses after the start-up (Romanelli, 1989). Storey (1994b) points out that all three components need to combine appropriately in order the firm achieve rapid growth. The three components may be considered as overlapping or intersecting circles and they cannot be considered as wholly independent influences. This paper divides these three factors into pre-start factors, such as human capital, at-the-start factors, such as incorporation and sector, and post-start factors, such as strategy.

Pre-start factors

The characteristics of the entrepreneur and his/her access to resources can be identifiable prior to the start of the business. Evidence suggests that new firm size increases with entrepreneurs' human capital. Mata (1996) found that start-up size increases with the age of the entrepreneurs, although at decreasing rates, and that education also increases the size of the new venture. Human capital is also an important factor that determines the speed of growth. The human capital endowment of the founder contributes to the explanation of fast growth (Almus, 2002). There looks to be some support for the view that the age of the entrepreneur when the business is established is an influence on the growth rate of that business. Age² of the founder has been found to have a negative effect on growth (Bruderl and Preisendorfer, 2000). A positive effect of education on firm survival and growth has been extensively reported (Cooper et al., 1994; Gimeno et al., 1997; Burke et al., 2000). Entrepreneurs with some managerial experience (normally in their previous job) tend to form firms, which grow faster than individuals without such experience (Storey, 1994b). If the founder is unemployed prior to starting a business, that firm is unlikely to grow as rapidly as where the founder is employed (Reid and Smith, 2000). Other factors prior to set up the business may positively influence growth, such as the use of external advice (Robson and Bennett, 2000).

At-the-start factors

These factors can be considered elements relating to the firm itself, such as sector and legal form, and reflect decisions observable immediately the business starts to trade. Studies have consistently shown that limited companies experience more rapid growth than sole proprietorships (Storey, 1994a, Almus, 2002; Davidsson et al., 2002). The sector in which the firm operates is also a very important factor for consideration when examining initial size and firm growth. Industry characteristics matter for the scale of entry. Evidence shows that larger firms are created in larger industries and in those with high minimum efficient scale (Mata and Machado, 1996; Gorg et al., 2000). Many studies report industry as a significant variable when examining firm growth (e.g. Almus and Nerlinger, 1999; Brixly and Kohault, 1999; Davidsson et al.,

2002). Size and age are other elements that refer explicitly to the characteristics of the firm and are not related to either the entrepreneur or the strategy. The size of the firm is the most studied factor as a determinant to growth. The general pattern observed in previous research is that smaller firms grow more rapidly than faster (Storey, 1994b). Age of firm is also widely used as an independent variable to explain firm growth. Evidence suggests that younger firms grow more rapidly than older firms (e.g. Almus and Nerlinger, 1999, Davidsson et al., 2002).

Post-start factors

Post-start factors are related to the strategy of the firm. 'Strategic' variables are considered actions taking by the business owner once in business, such as new product introduction, formal planning, workforce training and external equity. First, an important element to be considered is the introduction of new products. Evidence shows that the more rapidly growing firms are more likely to have made new product introductions (Bruderl and Preisendorfer, 2000). Second, although formal planning procedures appears to be more characteristic of larger businesses, Reid and Smith (2000) found that forward planning appears to enhance new firm performance. Delmar and Shane (2003) provide empirical evidence that business planning enhances new venture survival, product development and organising activity in new ventures. Growing firms might also be expected actively to encourage workforce training to a greater extent than slow-growth or no-growth firms. Evidence also suggests that entrepreneurs who are prepared to invest in training their employees are better equipped to compete in the market (Basu and Goswami, 1999). Finally, the sources used for financing a business are likely to be an influence upon its growth (Storey, 1994b).

As a summary, Appendices A, B and C present prior research findings of studies conducted in many countries. The tables in the appendices include fourteen multivariate studies. The most striking feature of the tables is the high number of blanks i.e. variables not used by the researchers in the reviewed article. Moreover, we can conclude that pre- and at-the-start variables have been more employed by researchers than post-start factors. Thus, very few studies have incorporate information on all three components together (the background of the entrepreneur, firm characteristics and strategy).

3. Data and methodology

Data

Data for this study were obtained from two surveys of wholly new independent firms conducted separately in selected areas of England and Spain. A first survey was conducted in 2001 in three English counties with high, medium and low firm entry. They were Buckinghamshire, Shropshire and Tees Valley (former county of Cleveland plus Darlington) [for more details see Greene et al. (2004) and Mole et al. (2004)]. This survey was based on previous studies undertaken in the UK into new firms founded in the county of Cleveland (Storey, 1982; Storey and Strange, 1993). Similar methodology was used to replicate this study in 2003 in the Spanish context. A geographical and administrative area (Western Valley) with comparable characteristics to the English counties by national standards was selected. It is

important to note that Western Valley exhibits a firm density which is similar to the Spanish national level (63.1 firms per 1,000 inhabitants)⁷.

The population of the selected areas in both countries is quite similar. The population of Western Valley was approximately 740,000 in 2001. The number of inhabitants in Tees Valley was 640,000 in the same year. Buckinghamshire had 480,000 inhabitants. In Shropshire this figure was 440,000. Western Valley has a lower GDP per head than the three English areas⁸ which may be reflecting national differences⁹. The unemployment rate is higher in the Spanish area than in the English ones (7.1 in Western Valley, 5.4 in Tees Valley, 1.9 in Shropshire and 1.4 in Buckinghamshire, all in year 2001). This difference may be explained by the proportion of unemployed persons in each country (5.1 in the UK and 13.0 in Spain for the year 2001).

Both countries do not have a single, comprehensive and publicly available list of new firms. Existing lists of limited companies exclude the numerous smallest start-ups. The databases were therefore constructed by the researchers in each country. The English study compiles a list of new firms in the same way as the previous Cleveland studies. A list of new firms was derived through comparisons of BT telephone directories for 2000 with those from 1995. Those firms in the directories for 2000 but not in for 1995 were considered to be 'in principle' new firms to the area. In the Spanish area an initial list of new firms was derived using three sources of information in order to include both limited and not limited companies. A list of new firms based on local tax payments, the Chambers of Commerce and Industry directory and a commercial database based on the Official Register of Enterprises were employed. A careful analysis of these lists was made and overlaps between the three databases were detected. From a cross-checking process, a list of 'potential' new firms, which were defined as those founded between 1998 and 2000, was obtained.

Identical procedures were used in England and Spain. A process of cleaning of the initial lists of new firms was made in both countries. Researchers contacted businesses by phone in order to determine whether they were wholly new independent firms. The study excluded firms that were 'in-moves' to the area, subsidiaries, affiliates and firms created just for reducing tax burdens. Face-to-face interviews were then conducted with new firm founders. The questionnaire was initially designed in English and was translated for the Spanish study. The Spanish questionnaire was tested through a series of extended interviews. During this process it became clear that the questions were applicable in the Spanish context. The questionnaire took around an hour to complete and was administered at the normal place of work of the respondent. The final sample consists of 231 new firms in England¹⁰ and 182 in Spain.

Models and variables

The first model to be tested is a multiple linear regression analysis for start-up size. The number of jobs at the start was not used in this model because this variable has a

⁷ Unfortunately start-up rates are available in Spain only at national level. Firm density is therefore used as a measure of entrepreneurial activity at regional and county levels.

⁸ The GDP per head is higher in Buckinghamshire than in Shropshire and Tees Valley.

⁹ In 2001 the Spanish GDP per head was \$20,155 whereas this indicator was \$25,479 in the UK.

¹⁰ Although interviews were conducted with 624 firms in the three English counties, 231 cases are used in this study as start-up size is only available for these firms.

non-normal distribution that makes it unsatisfactory as a dependent variable in multiple regression analysis. The logarithm transformation of the initial number of jobs is therefore used as a dependent variable.

Table 1 provides means, standard deviations and the range (min, max) for employment variables in each sample. The table clearly shows that the firms examined are small. They had three jobs on average at the start-up. At the time when surveys were carried out, the firm size was around six in both samples. Although mean employment change values are not significantly different in the two samples, standard deviations are higher in the English sample than in the Spanish one for both start-up and 'current' size.

Table 1: Employment variables

Variable	English counties					Western Valley				
	N	Mean	Std. Dev.	Min.	Max.	N	Mean	Std. Dev.	Min.	Max.
Start-up size	231	3.39	4.37	1	44	182	3.26	2.65	1	16
Ln (start-up size)	231	.86	.76	0	3.78	182	.40	.31	0	1.20
'Current' size	231	6.11	10.00	1	109	182	5.87	5.16	1	34
Absolute change	231	2.72	8.03	-8	91	182	2.61	4.16	-6	26

The second model considers the factors that influence the probability of a firm having positive, neutral and negative employment change. The ordered probit model provides a method of estimating this probability. In order to look at the different patterns of employment change a categorical variable with ordinal outcomes was constructed. Absolute change was preferred to use for defining the categories instead of relative change because of the very small size of the businesses in both data sets¹¹. Within the group of businesses with job gains, a conscious decision was made to separate the fast-growing firms from the firms with a slow employment growth. A cluster analysis was employed to explore the cut point between slow and fast growers. Results showed that fast-growing firms were those with more than four jobs created since the start. This classification is consistent with previous studies trying to isolate rapidly growing firms from the rest of new businesses (e.g. Almus, 2002).

Therefore, a categorical dependent variable with four outcomes according to the absolute employment change is used in the second model. The four groups of firms are as follows:

1. Decliners. Firms with negative employment change i.e. firms with job losses.
2. Statics. Firms with no change in the number of jobs.
3. Slow growers. Firms which experience a positive employment growth but only with a small gain of jobs.
4. Fast growers. Firms which have created at least five additional jobs over time.

Table 2 presents descriptive statistics for these four categories of employment change. Perhaps surprisingly, the proportion of firms losing jobs (i.e. decliners) is exactly the same in the two samples (8.2 per cent). The group of fast growing firms represents about 16 per cent in the English sample and about 19 per cent in the Spanish one. The

¹¹ Obviously, observations with negative, zero and positive values are exactly the same using either absolute or relative change. Moreover, we found that these two variables have a very similar distribution.

group of statics has the biggest number of firms in the English dataset, whereas slow growers constitute the category with more observations in the Spanish case. Significant differences are found between the four groups of new firms regarding their employment change, as shown in table 2. We will turn to the characteristics of the four groups and especially to their patterns of change over time in the results section.

Table 2: Categories for employment change

Category	English counties ^a						Western Valley ^b					
	N	%	Mean	Std. Dev.	Min.	Max.	N	%	Mean	Std. Dev.	Min.	Max.
Decliners	19	8.2	-2.00	2.05	-8	-1	15	8.2	-2.13	1.77	-6	-1
Statics	99	42.9	.00	.00	0	0	50	27.5	.00	.00	0	0
Slow growers	75	32.5	2.06	1.08	1	4	83	45.6	2.24	1.16	1	4
Fast growers	38	16.4	13.42	15.71	5	91	34	18.7	9.47	4.57	5	26
Total	231	100.0	2.71	8.03	-8	91	182	100.0	2.61	4.16	-6	26

^a Anova F = 45.088 ***, ^b Anova F = 160.702***

According to the theoretical framework presented in the second section, regressors used in the two estimations can be separated into four main categories, as follows:

- Pre-start variables. Foundation age and age squared of the entrepreneur and three dummy variables for formal qualifications, previous managerial experience and unemployment prior to set up the business give us an insight into the human capital of the new firm founder. Moreover, dummies for using external advice and having a formal business plan before the start-up as well as sources of capital are included as pre-start independent variables.
- At-the-start variables. To consider the legal form of the business, we use a dummy for limited companies. In this paper there are nine industrial dummies that correspond to SIC sections (the omitted variable is other social and personal services). As three geographical areas were included in the English survey, we employ two dummies for the counties of Shropshire and Buckinghamshire.
- Post-start variables. We employ dummies for the introduction of new products, workforce training and formal planning. The ‘current’ sources of finance and the use of external advice during the first year of operation are also included as dummy variables in the estimation. We use a variable that is a self-reported measure of the owner managerial skills on a five-point scale.
- Firm age. To control for the different ages of the firms in the databases we introduce age of the firm as a control variable.

Table 3 provides mean values of all explanatory variables in the two samples. In terms of general features of the databases, the firms examined are not only small (see table 1), but also young: about five years in the Spanish sample and four years in the English one. The full range of sectors by SIC is represented at main section level. The best represented industries in both samples are wholesale and retail trade, manufacturing and business activities.

Significant differences between the two samples are found with regard to certain characteristics of the entrepreneur. There are more entrepreneurs with formal qualifications in the English sample. In addition, English surveyed entrepreneurs have a higher managerial experience than their Spanish counterparts. The use of external advice both before and after the start-up is also higher in new firms located in the

three English counties. The proportion of limited companies is significantly higher in the Western Valley data set than in the English one. Strategic variables such as introduction of new products and formal workforce training are also found to be different. Finally, it is observed that new firms in the Western Valley sample use more bank loans or overdrafts in financing the business than in the English counties.

Table 3: Characteristics of the samples

Variables	English counties	Western Valley
Pre-start variables		
Male	.76	.69
Foundage	39.14	38.24
Foundage2d	1629.51	1555.18
Formal qualification*	.89	.72
Manager***	.65	.40
Unemployed	.22	.24
Support***	.85	.70
Formal written business plan***	.58	.43
Start-up personal savings	.80	.78
Start-up clearing bank*	.27	.36
Start-up friends or relatives***	.20	.09
Start-up public organisations***	.12	.02
At-the-start variables		
Limited co***	.38	.77
Manufacturing	.19	.21
Construction	.08	.10
Wholesale and retail trade, motor repair **	.17	.26
Hotels and restaurants***	.10	.03
Transport, storage and communication	.02	.04
Financial intermediation	.02	.02
Real estate, renting & business activities	.25	.18
Education	.02	.03
Health and social work	.03	.03
Other social and personal services	.13	.10
Tees Valley	45.5	
Shropshire	30.7	
Buckinghamshire	23.8	
Age		
Firm age***	3.77	4.88
Post-start variables		
New products**	.64	.54
Formal plan now	.38	.37
Formal training for workers**	.55	.43
1st year support***	.68	.20
Lower prices***	3.33	2.99
Owners managerial skills***	4.09	3.18
Personal savings	.19	.17
Clearing bank***	.29	.43
Friends or relations***	.07	.01
Public organisations	.04	.02

Note: table shows mean values for each variable.

Significance levels: *p<0.10, **p<0.05, ***p<0.01.

The first two sets of variables (i.e. pre- and at-start) are used as explanatory variables in the regression analysis for start-up size. The strategic factors are introduced in the ordered probit for employment change. It is important to note that firm size at the foundation is also included as independent variable in the probit estimation in order to

capture the potential effect of start-up size on subsequent growth. Initial size is measured as the logarithm transformation of the initial number of jobs, as it was in the first equation. Appendix D shows definitions and predicted signs with start-up size and subsequent growth for the independent variables employed in the empirical analysis. The econometric method followed in the estimations is that of a general-to-specific approach. This means that the first model is a very general one including all possible variables. Then the insignificant variables are gradually eliminated in stages in order to obtain a simpler model. In addition, given the interest in the international comparison, separate estimation results by country are reported.

4. Results

Determinants of start-up size

Results of the regressions for start-up size are shown in table 4. The explanatory power of the models is rather strong, especially in the regression analysis using the Spanish data. Different human capital variables explain start-up size in the two samples. Perhaps surprisingly, entrepreneurs without formal qualifications are more likely to establish larger firms at the start in the English sample. However, prior managerial experience has a positive effect on the initial size of the firm. Gender is significant in the Western Valley equation, indicating that firms created by female entrepreneurs are larger¹². Start-up size is negatively influenced by unemployment.

Other pre-start variables are significant in explaining start-up size. Location matters for the scale of entry in the English case: firms in Tees Valley are more likely to start bigger than in Shropshire and Buckinghamshire. It is observed that having a business plan prior to starting the business increases the size of the surveyed Spanish firms.

Consistent results across the two samples are found regarding the effect of legal form on start-up size. As expected, firms founded with a limited liability legal form start bigger than the remaining firms do. Industry sectors also appear to play a significant role in determining start-up size in the two samples. Regressors for manufacturing and for hotels and restaurants have a positive and significant influence on start-up size of both English and Spanish firms. It may reflect the need to reach a minimum efficient size in these industries at entry. Other specific significant industrial effects are found in each sample. In the English counties the dummy variable for the health sector is positively related to initial size, while financial intermediation and education sectors are negatively related to start-up size. Larger firms are also more likely to be created in construction in the Spanish area.

In sum, the size of new firms depends on industry characteristics as suggested in previous studies (Mata and Machado, 1996; Gorg et al., 2000), but also depends on entrepreneurs' attributes, legal form and other specific additional variables. Once we have analysed the determinants of initial size of new businesses, now we turn into the patterns of subsequent change in size and their determinants.

¹² This result may be explained by the fact that the two biggest firms of the sample were founded by women.

Table 4: Multiple regression analysis for start-up size

Variable	English Counties ^a				Western Valley			
	General model		Specific model		General model		Specific model	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
(Constant)	-.140	-0.16	.997	5.99***	.248	.750	.114	1.505
Male	.080	0.63			-.118	-2.333**	-.109	-2.538**
Foundation age	.038	0.96			-.003	-.174		
Foundation age2d	-.000	-0.81			.000	.042		
Qualification	-.363	-2.83***	-.392	-3.19***	.029	.265		
Manager	.112	1.25	.186	2.07**	.010	.198		
Unemployed	-.010	-0.19			-.099	-1.836*	-.124	-2.635***
Support	.122	0.93			-.031	-.565		
Formal written business plan	.007	0.08			.120	2.482**	.133	3.347***
Start-up personal savings	.130	1.00			-.051	-.998		
Start-up clearing bank	.222	1.98**			.043	.853		
Start-up friends or relatives	.115	0.92			-.023	-.302		
Start-up public organisations	-.130	-0.75			.105	.673		
Shropshire	-.241	-1.97*	-.253	-1.94*				
Buckinghamshire	-.311	-2.54**	-.319	-2.71***				
Incorporated new firm	.294	2.30**	.372	3.10***	.267	4.404***	.263	5.438***
Manufacturing	.277	1.45	.312	1.67*	.275	3.304***	.279	3.712***
Construction	.083	0.39	.068	0.34	.222	2.289**	.220	2.577**
Trade	-.250	-1.40	-.246	-1.65	.081	1.002	.093	1.278
Hotels & restaurants	.508	2.28**	.547	2.69***	.354	2.335**	.282	2.156**
Transport	-.250	-0.93	-.175	-0.61	.098	.797	.116	1.020
Financial intermediation	-.484	-2.21**	-.381	-2.07**	.022	.145	.033	.233
Business activities	.054	0.28	.025	0.14	.014	.171	.017	.219
Education	-.443	-1.61	-.487	-1.88*	.082	.577	.147	1.208
Health	.641	1.55	1.001	2.36**	.185	1.340	.165	1.270
R ²		.252		.252		.376		.369
Adjusted R ²						.280		.321
F		4.00***		5.89***		3.93***		7.57***
Ramsey RESET test: F		0.40		1.94		1.26		.51
Cook-Weisberg test: chi2(1)		3.32*		7.49***		1.65		1.07
Number of cases		214		218		174		182

^aNote: Regression with robust standard errors.

Significance levels: *p<0.10, **p<0.05, ***p<0.01.

Patterns of employment change

The first five rows of table 5 present employment variables of the groups of businesses which were defined according to the change in the number of jobs between the start-up and the time of the survey.

Results show the same patterns of employment change in both English and Spanish new firms. Surprisingly, the largest firms at start-up constitute the group of decliners. They have decreased from seven to five jobs in the Spanish case and from six to four in the English one. Thus, these firms have lost on average two jobs. They represent about 8 per cent of total sample in both countries. Decliners converge over time with the group of slow growers. These firms have grown from three to five jobs over time. They are the biggest group of businesses in Western Valley (46 per cent). Neutral employment change is observed in a group of very small businesses. These firms have on average about three jobs in the English sample and about two persons employed in the Spanish one. This group of statics is composed of 43 per cent of the businesses in the English sample, while they are about 32 per cent in the Spanish one. Finally, a specific group of fast-growing firms is also identified in both samples, representing between 19 per cent and 16 per cent. These firms started with less than five jobs and have about eighteen jobs over four years in the three English counties and fourteen over five years in the Western Valley.

To sum up, figure 1 presents the path of each group of new firms considering the number of jobs at the start-up and at the time of the survey, on average. The figure clearly shows that the four patterns of employment change are very similar in both samples of English and Spanish surveyed new firms. Many businesses start small and stay small over time. Others firms decline in size which may indicate that they were overly optimistic at the start. Employment growth is very slow for a significant number of new firms and only a small proportion of new firms grows fast.

Figure 1: Four groups of new firms according to employment change over time

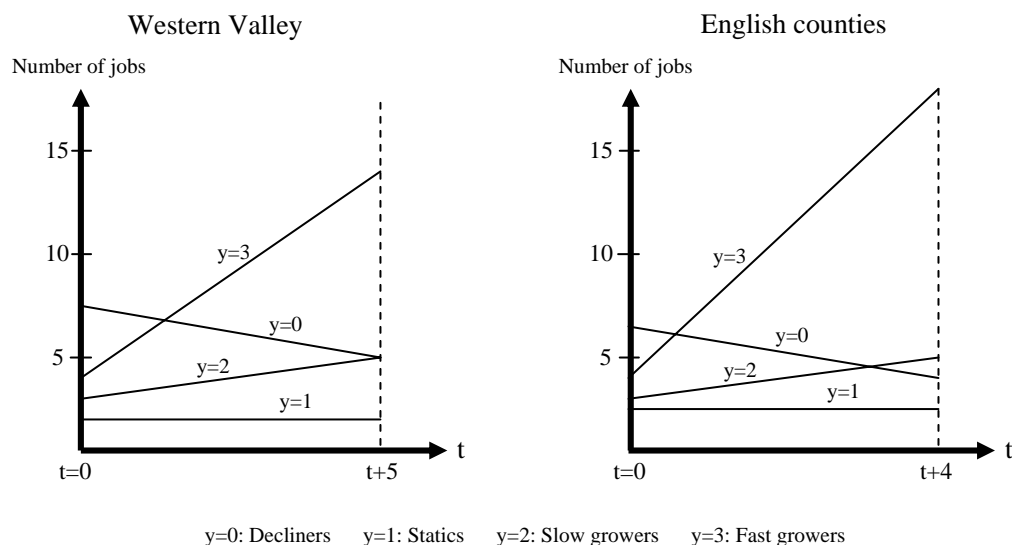


Table 5: Characteristics of the four groups of firms according to employment change (mean values)

Variable	English counties					Western Valley				
	Decliners	Statics	Slow growers	Fast growers	F-test	Decliners	Statics	Slow growers	Fast growers	F-test
N (%)	19 (8.2)	99 (42.9)	75 (32.5)	38 (16.4)		15 (8.2)	50 (27.5)	83 (45.6)	34 (18.7)	
Employment variables										
Start-up size	6.16	2.71	3.03	4.53	4.568***	7.33	1.92	2.89	4.32	26.232***
Ln (start-up size)	1.58	.71	.73	1.16	10.991***	.82	.19	.38	.57	29.532***
'Current' size	4.16	2.71	5.09	17.95	30.572***	5.20	1.92	5.13	13.79	94.685***
Absolute change	-2.00	.00	2.06	13.42	45.088***	-2.13	.00	2.24	9.47	160.702***
Pre-start variables										
Male	.74	.73	.75	.87	1.039	.53	.68	.73	.68	.848
Foundage	40.42	39.48	38.88	38.11	.299	33.47	39.52	39.16	36.26	2.286*
Foundage2d	1735.47	1660.86	1613.78	1525.05	.373	1170.53	1636.80	1624.16	1438.50	2.004
Formal qualification	.89	.89	.88	.89	.024	.73	.64	.74	.79	.917
Manager	.50	.61	.67	.81	1.931	.33	.29	.43	.53	1.721
Unemployed	.37	.17	.35	.42	1.154	.27	.36	.19	.15	.083*
Support	.78	.86	.85	.86	.285	1.00	.62	.65	.82	3.984***
Business plan	.42	.63	.57	.53	.896	.73	.28	.46	.44	3.636**
Start-up personal savings	.79	.78	.83	.82	.234	.67	.74	.81	.82	.768
Start-up clearing bank	.21	.22	.29	.37	1.189	.40	.24	.42	.35	1.544
Start-up friends/relatives	.21	.23	.15	.24	.751	.20	.02	.12	.09	1.996
Start-up public organisations	.11	.10	.15	.13	.302	.07	.00	.02	.03	.867

Table 5 (cont.): Characteristics of the four groups of firms according to employment change (mean values)

Variables	English counties					Western Valley				
	Decliners	Statics	Slow growers	Fast growers	F-test	Decliners	Statics	Slow growers	Fast growers	F-test
At-the-start variables										
Limited co	.58	.24	.40	.63	7.702***	.87	.52	.81	1.00	11.326***
Manufacturing	.37	.18	.16	.16	1.578	.33	.12	.18	.35	2.895**
Construction	.05	.07	.09	.11	.258	.13	.14	.05	.18	1.851
Trade	.16	.18	.17	.13	.171	.27	.24	.32	.12	1.866
Hotels and restaurants	.05	.12	.07	.13	.769	.07	.00	.04	.03	.479
Transport	.00	.02	.01	.03	.891	.00	.04	.05	.03	.831
Financial intermediation	.00	.02	.03	.00	.474	.00	.06	.00	.03	.131
Business activities	.21	.22	.25	.32	.477	.07	.20	.24	.06	2.328*
Education	.05	.01	.01	.03	.643	.07	.06	.02	.00	.390
Health and social work	.00	.03	.03	.08	1.033	.00	.00	.01	.12	4.535***
Other services	.11	.13	.17	.03	1.698	.07	.14	.08	.09	.719
Tees Valley	.53	.41	.51	.45	1.821					
Shropshire	.26	.36	.21	.37	.472					
Buckinghamshire	.21	.23	.28	.18	.742					
Age										
Firm age	3.58	3.33	3.97	4.60	3.768**	5.13	4.70	5.05	4.62	.578
Post-start variables										
New products	.47	.60	.67	.76	1.952	.47	.36	.59	.71	3.985***
Formal plan now	.32	.30	.41	.55	2.016	.20	.18	.45	.56	6.023***
Workforce training	.39	.35	.68	.79	11.001***	.47	.08	.53	.71	16.142***
1st year support	.71	.62	.69	.79	1.080	.13	.14	.22	.26	.858
Lower prices	3.29	3.28	3.43	3.26	.363	2.73	3.18	3.02	2.76	.721
Owners managerial skills	3.61	4.03	4.19	4.26	2.418*	2.73	2.94	3.22	3.64	3.483**
Personal savings	.26	.24	.11	.18	1.952	.00	.22	.19	.09	2.018
Clearing bank	.37	.22	.28	.45	2.498*	.60	.26	.45	.59	3.885**
Friends or relations	.05	.10	.00	.13	3.245**	.07	.00	.00	.03	2.309*
Public organisations	.05	.05	.03	.05	.245	.07	.00	.02	.00	1.345

Note: table shows mean values for each variable.
Significance levels: *p<0.10, **p<0.05, ***p<0.01.

Table 5 also shows the characteristics of each group of new firms in terms of the pre-, at- and post-start factors, classified by employment change rank. Variables representing characteristics of the entrepreneur are found to be very similar, on average, between the four groups. There are no significant differences regarding human capital variables in the English sample and weak significant differences are observed in the Spanish one with regard to age of the founder and unemployment.

Turning to the at-the-start variables, legal form appears to be highly significant. Statics are the group with less proportion of limited companies, both in England and Spain. In other words, this group has a majority of sole owners and partnerships. No sectoral differences are found in the three English counties. However, manufacturers represent 37 per cent of firms in the group of decliners, while they are between 16 and 18 per cent in the other three groups. Spanish firms in the health sector are mainly found in the group of fast growers.

Several post-start variables appear to be significantly different between the four groups. In the English sample decliners and statics provide less training to their workforce than slow and fast growers. Similarly, only a low proportion of the static firms provides such training in the Spanish sample. In both samples, it is found that the greater the employment growth, the greater the self reported measures of owner managerial skills and the greater the introduction of new products since founding. Moreover, the proportion of firms with formal planning is higher in growing firms than in the rest of businesses. In both samples the two financial variables that are significantly different between the four clusters are loans or overdrafts from bank and loans from friends or relations.

We have identified four patterns of employment change since founding and we have presented the characteristics of each group of new firms. Now we turn into the factors that determine negative, neutral, slow and fast growth of new firms.

Determinants of employment change

Tables 6a and 6b show marginal effects for our preferred specification of the ordered probit estimation in each sample. Results indicate that almost all signs of the significant variables are the same for decliners and statics, while opposite signs are found in the estimations of the two remaining groups (slow and fast growers). Therefore, these results suggest a basic split between the determinants of new firms with job gains and new firms with neutral or negative employment change.

In both samples same results are observed regarding a number of variables. First of all, start-up size is highly significant in explaining employment change, thus providing evidence on the previously discussed patterns of change over time. For firms with negative or no change in employment, initial size has a positive effect and a negative and significant effect is found for growing firms. These results agree with other researchers' findings regarding the influence of size on business growth.

Turning to the strategic variables, the second same result in both samples is observed in the human resource strategy variable relating to workforce training. This variable is significant with a high coefficient and is positively associated to a positive change in employment. This may indicate that firms who invest in training their employees are better prepared to grow.

Table 6a: Ordered probit model, marginal effects. English Counties

Variable	Decliners (y = 0)		Statics (y = 1)		Slow growers (y = 2)		Fast growers (y = 3)	
	dy/dx	z	dy/dx	z	dy/dx	z	dy/dx	z
Male ^a	-.043	-1.43	-.108	-1.83*	.078	1.54	.073	1.91*
Manager	-.036	-1.99**	-.113	-2.10**	.065	2.05**	.083	2.19**
Formal written business plan	.035	1.98**	.110	2.15**	-.055	-1.79*	-.078	-2.17**
Shropshire	-.002	-0.12	-.008	-0.12	.005	0.12	.006	0.12
Buckinghamshire	.028	1.04	.076	1.23	-.052	-1.08	-.052	-1.27
Incorporated new firm ^a	-.013	-0.72	-.043	-0.72	.016	.52	.031	0.71
Manufacturing ^a	-.028	-1.22	-.108	-1.05	.051	1.61	.085	0.95
Construction ^a	-.027	-1.26	-.115	-0.98	.052	2.80***	.093	0.86
Trade ^a	-.018	-0.73	-.066	-0.65	.051	1.78*	.050	0.61
Hotels & restaurants ^a	-.025	-1.15	-.101	-0.94	.041	1.25	.080	0.84
Transport ^a	-.047	-3.24***	-.375	-5.10***	-.145	-.79	.567	2.21**
Financial intermediation ^a	-.037	-1.88*	-.209	-1.12	.001	.01	.204	0.80
Business activities ^a	-.011	-0.42	-.038	-0.39	.040	1.00	.028	0.38
Education ^a	.033	0.34	.078	0.46	-.001	-.01	-.051	-0.49
Health ^a	-.044	-3.00***	-.278	-2.46**	.034	.62	.307	1.56
Training ^a	-.093	-3.28***	-.246	-4.67***	.136	3.51***	.183	4.49***
New products ^a	-.036	-1.66*	-.101	-1.96*	.054	1.55	.070	1.99**
Plan now	-.031	-1.85*	-.100	-1.97*	.054	1.80*	.071	1.98**
Owner managerial skills	-.019	-2.00**	-.062	-2.12**	.030	1.79*	.044	2.14**
Firm age	-.009	-2.05**	-.029	-2.23**	.017	2.17**	.020	2.24**
Start-up size	.034	2.52**	.109	2.75***	-.066	-2.56**	-.077	-2.79***

^a dy/dx is for discrete change of dummy variable from 0 to 1
Significance levels: *p<0.10, **p<0.05, ***p<0.01.

Table 6b: Ordered probit model, marginal effects. Western Valley

Variable	Decliners (y = 0)		Statics (y = 1)		Slow growers (y = 2)		Fast growers (y = 3)	
	dy/dx	z	dy/dx	z	dy/dx	z	dy/dx	z
Support ^a	.036	2.41**	.142	2.68***	-.054	-2.19**	-.124	-2.32**
Incorporated new firm ^a	-.151	-2.70***	-.261	-4.78***	.255	3.35***	.157	4.65***
Manufacturing ^a	-.028	-1.50	-.116	-1.39	.041	1.90*	.103	1.16
Construction ^a	-.018	-0.93	-.075	-0.81	.028	1.34	.065	0.69
Trade ^a	.022	0.69	.067	0.79	-.043	-0.69	-.046	-0.84
Hotels & restaurants ^a	-.032	-2.20**	-.174	-1.72*	-.013	-0.12	.219	1.01
Transport ^a	-.010	-0.32	-.037	-0.28	.017	0.36	.030	0.26
Financial intermediation ^a	.093	0.73	.169	1.41	-.173	-0.86	-.090	-1.83*
Business activities ^a	.064	1.22	.151	1.81*	-.123	-1.33	-.091	-2.09**
Education ^a	.175	1.14	.217	3.82***	-.281	-1.61	-.111	-3.54***
Health ^a	-.040	-2.86***	-.273	-6.98***	-.365	-1.69*	.678	2.97***
1 st year support ^a	-.027	-2.01**	-.113	-1.97**	.039	2.01**	.102	1.65*
Training ^a	-.058	-2.66***	-.196	-3.55***	.092	2.56**	.161	3.23***
Plan now ^a	-.036	-2.20**	-.131	-2.48**	.059	2.21**	.108	2.22**
Owner managerial skills	-.020	-2.49**	-.070	-2.92***	.039	2.35**	.052	2.92***
Public organisations ^a	.352	1.25	.196	1.81*	-.427	-2.40**	-.121	-4.48***
Firm age	-.002	-0.47	-.005	-0.47	.003	0.47	.004	0.47
Start-up size	.102	2.73***	.049	3.75***	-.193	-2.47**	-.259	-3.28***

^a dy/dx is for discrete change of dummy variable from 0 to 1
Significance levels: *p<0.10, **p<0.05, ***p<0.01.

Third, formal planning has a positive and significant marginal effect on employment growth. Moreover, new firms with business plan are more likely to be decliners in the English sample. As suggested in previous research, merely writing a business plan has little implication for growth and what counts is how you use that plan to look ahead (Reid and Smith, 2000).

Fourth, the variable measuring owner managerial skills is also positively and significantly related to growth. This result may indicate that an entrepreneur's skills and competencies are an important form of expert power that facilitates the implementation of the entrepreneur's vision and strategy (Baum et al., 2001). In general, these entrepreneurial skills may serve as sources of competitive advantage that rivals find difficult to identify and imitate.

Results show that there are sector-related differences for the probability of having negative, neutral and positive growth. Strong significant effects are observed in a number of industries in each sample. However, different industries are found to have a significant effect. Construction firms are more likely to be slow growers, while businesses in transport and business activities are less likely to be decliners in the English counties. Health sector has a positive effect and education sector a negative effect in the specification for fast growing firms in the Western Valley.

Turning to the starting resources of the entrepreneur and pre-start factors, results show that employment growth is positively correlated with previous managerial experience of the founder only in the English Counties. Male entrepreneurs are more likely to create fast-growing businesses and less likely to become statics, but the effect of this variable is only at a 90 per cent level of confidence. Founder-specific characteristics don't appear in the specific model for Western Valley.

In the English case there is no significant relationship between employment change and the use of external advice, as previous findings in the UK indicate (Westhead and Birley, 1995). On the contrary, those Spanish founders establishing either a fast or slow growing business (i.e. positive employment change) are more likely to use external advice once the firm operates in the market, while decliners and statics are more likely to use advice prior to start-up.

We find that new firms introducing new products more often advance to fast flying businesses in the English sample. Interestingly, location is not significant for employment change (i.e. dummies for the English counties are not significant), while this variable has appeared in the start-up size model. No effects are found with regard to sources of finance.

As expected, firms with limited liability realise higher growth than firms in which the founder is liable with their private fortune. This result is observed only in the Spanish sample of new firms. Finally, findings of special interest for public institutions are found in the Spanish case regarding sources of finance used by new firms. Those firms which 'currently' use finance from public organisations are more likely to be statics and less likely to become fast growers.

5. Concluding remarks

This study focuses on the determinants of both initial size and employment change during initial years of the same new businesses. The analytical framework that has been employed to explain the two dependent variables is based on conditions observable at the pre-, at- and post-start stages. We have used data gathered by face-to-face interviews with new firm founders in selected English and Spanish areas. The same questionnaire has been applied in the two countries.

Two main conclusions can be drawn from our empirical analysis. First, we confirm previous findings regarding industry effects, but our results also show that initial size is strongly influenced by human capital variables. In effect, estimations have shown that the background and starting resources of the entrepreneur are more important in determining start-up size than employment change. However, different human capital variables appear to influence start-up size in the two selected countries. Another interesting result is that limited liability legal form has a significant and positive effect on start-up size across the two samples. These results add more knowledge to our understanding of the determinants of start-up size and provide empirical evidence in an issue that has received less attention in the literature.

Second, we have identified four patterns of employment change (i.e. decliner, static, slow grower, fast grower) in both countries. The identification of these four types of patterns and their determinants constitute an addition that we make to the literature. Results seem to indicate that new firms learn as they age and therefore there is an adjustment process of firm size over time. It is interesting to note that start-up size is highly significant in explaining these four patterns. The largest firms at start-up constitute the group of firms with job losses. This group represents about 8 per cent of total sample in both countries. There is a group of fast-growing firms, representing about 18 per cent, reflected in the same strategic factors in both countries, such as formal planning, workforce training and owner managerial skills. Planning and training are variables that are frequently associated with greater size. However, we have found that these variables are an influence upon growth and are not exclusively associated to the fast growers (i.e. firms with the biggest 'current' size on average). Positive effects found with regard to the self-reported measure of skills suggest that firm growth may depend on the entrepreneur's ability to acquire skills through learning-by-doing. In sum, we have found that all three sets of variables: pre-start, at-the-start and post-start, are significant predictors of employment change within the first few years but that the post-start and at-the-start factors are the 'better' sets of variables to influence subsequent growth.

Several differences are found between the two samples with regard to the determinants of start-up size and subsequent employment change. Founder-specific characteristics, some industrial sectors, use of external advice and sources of finance have a different impact in each country. Different regulatory frameworks and public policy measures can play a role to explain these differences. For example, we have found that finance from public organisations is a significant variable to explain employment change in the Spanish area. The use of external advice by the Spanish businesses, which is provided mainly by public agencies, is also significantly related to employment change. On the contrary, the use of external advice and finance from

public organisations don't have any influence on the growth of English businesses surveyed firms.

Future research should explore the role played by regulation in explaining start-up size and subsequent growth. It is also important to use longitudinal data for new firms to monitor their employment change. Efforts should continue to further study the growth of new firms using data sets and methods that are as comparable as possible across a set of countries.

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Appendix A: 'Pre-start' variables affecting start-up size and employment growth: prior research findings

Study	Dependent variable	Firm age	Male	Age of founder	(Age of founder)²	Educa-tion	Prior managerial experience	Unemplo yment	Use of external advice
Cooper et al. (1994), USA	Relative employment growth	Not given	+			+	n.s.		n.s.
Storey (1994a), UK	Employment size per year of life	Mean of 4 years		+	-	+	n.s.	-	+
Westhead and Birley (1995), UK	(Present employment-employment size when firm received first order)/age	Not given				n.s.			
Mata (1996), Portugal	Log of start-up size	Not given	+	+		+			
Almus and Nerlinger (1999), Germany	$G_i = \ln E_{i2} - \ln E_{i1} / (t_{i2} - t_{i1})$ where E is employment and t_i is time	Firms up to 7 years old	+						
Basu and Goswami (1999), UK	$\log y_i = (Y_t / Y_s)^{1/(t-s)} - 1$ where Y_t is the i th firm's sales turnover in period t and Y_s is the sales turnover in the first year after start-up	Mean of 19 years				+	n.s.		n.s.
Brixy and Kohault (1999), East Germany	Log of 1996 employment less employment when first registered	Up to 6 years old							
Bruderl and Preisendorfer (2000), Germany (B)	Fastest growing 4% of start-ups. Growth is >100% and at least 5 jobs	4 years	n.s.	n.s.	n.s.	n.s.	+		
Pfeifer and Reize (2000), Germany	Employment growth	Between 2 and 3 years old	n.s.	n.s.	n.s.			n.s.	

Appendix A (cont.): 'Pre-start' variables affecting start-up size and employment growth: prior research findings

Study	Dependent variable	Firm age	Male	Age of founder	(Age of founder)²	Educa-tion	Prior managerial experience	Unemplo yment	Use of external advice
Reid and Smith (2000), UK	3 clusters of firms reflecting performance in profitability, productivity and employment change	Mean of 2 years				n.s.		-	-
Baum et al. (2001), USA	Factor obtained using sales, employment and profit growth	Not given							
Almus (2002), Germany	Firms in the upper 10% of employment growth distribution, firms in the upper 10% of the Birch Index distribution	Between 6 and 9 years				+			
Davidsson et al. (2002), Sweden	1996 employment minus initial employment divided by the average of 1996 and initial employment	Some are more than 25 years of age							
Wiklund and Sheperd (2003), Sweden	An index composed of four variables (relative change in sales and employment, self-reported rate of sales and employment growth compared to competitors)	Not given				n.s.	+		

Source: Greene et al. (2004) and own preparation.

Appendix B: ‘At-the-start’ variables affecting start-up size and employment growth: prior research findings

Study	Dependent variable	Firm age	Sector	Limited company	Firm age	Start-up size
Cooper et al. (1994), USA		Not given	Retail and personal services -			
Storey (1994a), UK	Employment size per year of life	Mean of 4 years	Manufacturing +	+	n.s.	
Mata (1996), Portugal	Log of start-up size	Not given	Log of industry size + Log of MES + Suboptimal scale -			
Westhead and Birley (1995), UK	(Present employment-employment size when firm received first order)/age	Not given				
Almus and Nerlinger (1999), Germany	$G_i = \ln E_{it2} - \ln E_{it1} / (t_2 - t_1)$ where E is employment and t_i is time	Firms up to 7 years old	High tech +	+	-	-
Basu and Goswami (1999), UK	$\log y_i = (Y_t / Y_s)^{1/(t-s)} - 1$ where Y_t is the i th firm's sales turnover in period t and Y_s is the sales turnover in the first year after start-up	Mean of 19 years	Wholesale -			-
Brixy and Kohault (1999), East Germany	Log of 1996 employment less employment when first registered	Up to 6 years old	Energy/mining, manufacturing, construction, transportation, business service +	+	-	-
Bruderl and Preisendorfer (2000), Germany (A)	Fastest growing 4% of start-ups. Growth is >100% and at least 5 jobs	4 years		+		+
Pffeifer and Reize (2000), Germany	Employment growth	Between 2 and 3 years old	Data processing +	+		-

Appendix B (cont.): ‘At-the-start’ variables affecting start-up size and employment growth: prior research findings

Study	Dependent variable	Firm age	Sector	Limited company	Firm age	Start-up size
Reid and Smith (2000), UK	3 clusters of firms reflecting performance in profitability, productivity and employment change	Mean of 2 years				
Baum et al. (2001), USA	Factor obtained using sales, employment and profit growth	Not given				
Almus (2002), Germany	Firms in the upper 10% of employment growth distribution, firms in the upper 10% of the Birch Index distribution	Between 6 and 9 years	Construction, transport and communication, bus. rel. services (not-knowledge based) +	+		-
Davidsson et al. (2002), Sweden	1996 employment minus initial employment divided by the average of 1996 and initial employment	Some are more than 25 years of age	Healthcare, technical consultants, knowledge intensive services +	+	-	-
Wiklund and Sheperd (2003), Sweden	An index composed of four variables (relative change in sales and employment, self-reported rate of sales and employment growth compared to competitors)	Not given	n.s.		n.s.	n.s.

Source: Greene et al. (2004) and own preparation.

Appendix C: 'Post-start' variables affecting employment growth: prior research findings

Study	Dependent variable	Firm age	New products	Formal planning	Workforce training	'Current' sources of finance	Owner managerial skills
Cooper et al. (1994), USA							
Storey (1994a), UK	Employment size per year of life	Mean of 4 years					
Mata (1996), Portugal	Log of start-up size	Not given					
Westhead and Birley (1995), UK	(Present employment-employment size when firm received first order)/age	Not given				Personal savings -	
Almus and Nerlinger (1999), Germany	$G_i = \ln E_{i2} - \ln E_{i1} / (t_2 - t_1)$ where E is employment and t_i is time	Firms up to 7 years old					+
Basu and Goswami (1999), UK	$\log y_i = (Y_t / Y_s)^{1/(t-s)} - 1$ where Y_t is the i th firm's sales turnover in period t and Y_s is the sales turnover in the first year after start-up	Mean of 19 years			+		
Brixy and Kohault (1999), East Germany	Log of 1996 employment less employment when first registered	Up to 6 years old	+				
Bruderl and Preisendorfer (2000), Germany (A)	Fastest growing 4% of start-ups. Growth is >100% and at least 5 jobs	4 years	+				
Pffeifer and Reize (2000), Germany	Employment growth	Between 2 and 3 years old					

Appendix C (cont.): 'Post-start' variables affecting employment growth: prior research findings

Study	Dependent variable	Firm age	New products	Formal planning	Workforce training	'Current' sources of finance	Owner managerial skills
Reid and Smith (2000), UK	3 clusters of firms reflecting performance in profitability, productivity and employment change	Mean of 2 years		+		Bank loan n.s.	
Baum et al. (2001), USA	Factor obtained using sales, employment and profit growth	Not given	+				+
Almus (2002), Germany	Firms in the upper 10% of employment growth distribution, firms in the upper 10% of the Birch Index distribution	Between 6 and 9 years					
Davidsson et al. (2002), Sweden	1996 employment minus initial employment divided by the average of 1996 and initial employment	Some are more than 25 years of age					
Wiklund and Sheperd (2003), Sweden	An index composed of four variables (relative change in sales and employment, self-reported rate of sales and employment growth compared to competitors)	Not given					

Source: Greene et al. (2004) and own preparation.

Appendix D: Variable definition and predicted sign

Variable	Definition	Predicted sign
Pre-start		
Male	= 1 if male; 0 if female	+
Age of founder	= age of founder in years when started the business	+
Age ² of founder	= (age of founder in years when started the business) ²	-
Formal qualification	= 1 if founder has formal qualifications; 0 otherwise	+
Manager	= 1 if founder was a manager prior to the business starting; 0 otherwise	+
Unemployed	= 1 if founder was unemployed prior to the business starting; 0 otherwise	-
Support	= 1 if founder used external advice before start-up; 0 otherwise	+
Business plan	= 1 if founder had a formal written business plan prior to the business starting; 0 otherwise	-
Start-up personal savings	= 1 if firm used personal savings to establish the firm at start-up; 0 otherwise	+
Start-up clearing bank loan	= 1 if firm used loans or overdrafts to establish the firm at start-up; 0 otherwise	+
Start-up friends or relations	= 1 if firm used loans from friends/relations to establish the firm at start-up; 0 otherwise	+
Start-up public organisations	= 1 if firm had finance from public organisations to establish the firm at start-up; 0 otherwise	+
At-the-start		
Start-up size	= ln (number of persons employed at start-up, including founder)	-
Limited co	= 1 if firm is a limited company; 0 otherwise	+
Manufacturing	= 1 if firm is in manufacturing; 0 otherwise	
Construction	= 1 if firm is in construction; 0 otherwise	
Trade	= 1 if firm is in wholesale and retail trade; 0 otherwise	
Hotels and restaurants	= 1 if firm is in hotels and restaurants; 0 otherwise	
Transport	= 1 if firm is in transport and communication; 0 otherwise	
Financial intermediation	= 1 if firm is in financial intermediation; 0 otherwise	
Business activities	= 1 if firm is in renting, real state or business activities; 0 otherwise	
Education	= 1 if firm is in education; 0 otherwise	
Health	= 1 if firm is in health and social work; 0 otherwise	
Shropshire	= 1 if firm is in the county of Shropshire; 0 otherwise	
Buckinghamshire	= 1 if firm is in the county of Buckinghamshire; 0 otherwise	
Age		
Firm age	= number of years the firm has been trading	-

Appendix D (cont.): Variable definition and predicted sign

Variable	Definition	Predicted sign
Post-start		
New products	= 1 if firm has introduced new products since founding; 0 otherwise	+
Formal plan now	= 1 if firm has a formal written business plan; 0 otherwise	+
Formal training for workers	= 1 if firm conducts formal training for employees; 0 otherwise	+
1st year support	= 1 if firm has used external advice during first year of operation; 0 otherwise	+
Lower prices	= from 1 (much worse than competition) to 5 (much better than competition)	-
Owner managerial skills	= from 1 (much worse than competition) to 5 (much better than competition)	+
Personal savings	= 1 if firm uses personal savings as a 'current' source of finance; 0 otherwise	-
Clearing bank loan	= 1 if firm uses bank loans or overdrafts as a 'current' source of finance; 0 otherwise	+
Friends or relations	= 1 if firm uses loans from friends/relations as a 'current' source of finance; 0 otherwise	-
Public organisations	= 1 if firm uses finance from public organisations as a 'current' source of finance; 0 otherwise	+