Entrepreneurship, Start-Up Costs and Employment

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Abstract

We study the effects of business start-up costs on employment, in a model with managers, workers and matching. We show that higher start-up costs discourage entrepreneurs and increase the fraction of the population who become workers. Job creation suffers and employment settles at a lower level. We illustrate with evidence from major OECD economies, where large variations in start-up costs are correlated with large variations in employment levels.

1 Introduction

The debate over the performance of the labour markets of countries in the European Union has recently shifted focus from the role of trade unions, welfare programmes and active labour market policies to "entrepreneurship".[1] By entrepreneurship we usually mean the willingness of individuals to take the initiative to set up their own businesses, work on their own account and create jobs for others. The shift in focus is partly due to the failure of the older debate to reach consensus about the causes and consequences of European unemployment; and partly the realisation that the failure of the European economy to create jobs is not in traditional manufacturing or public sector jobs but in services and the "new economy", where job creation is more in the hands of small entrepreneurs than in the hands of large corporations.

The contrast with the United States is striking. Whereas in 1965 the United States and major European economies had more or less the same ratio of employment to population of working age, about 65%, in 1998 the employment to population ratio in the United States was 75% and in the European Union 61%.[2] Table 1 shows the distribution

[1] See for example, OECD (1998) and Commission of the European Communities (1999).

[2] The average for Germany, France and UK was 65%, with Italy at 52%.

of employment by sector in the European Union and the Unites States, as a share of the total population of working age. The employment gap between EU on the one hand and the USA on the other is due entirely to the gap in service-sector jobs and is spread across all types of service activity.

Table 1. Employment by Sector, per cent of population of working age, 1998

Sector	EU	USA
Agriculture	3.0	2.0
Industry	17.8	17.7
Services	37.9	54.3
Horeca, distribution	11.6	17.5
Transport	3.6	4.1
Finance, business	6.7	11.2
Communal services	17.8	21.4
Non-employment	39.5	26.0

Source: European Commission Directorate for Employment and Social Affairs web-site.

Data of this kind do not of course confirm the importance of entrepreneurship in job creation. But they do point to policy towards business start-ups as a potential influence on job creation and employment. Our paper is devoted to this issue. How do start-up costs influence job creation and employment in theory and practice?

As a start, we develop a model of employment determination with entrepreneurs and workers. This model has independent interest as it is, to our knowledge, the first search equilibrium model where job creation is done by market participants ("entrepreneurs") who have the choice of giving it up and joining the pool of workers instead.[3] The choice of whether to become an entrepreneur or a worker is made to maximise payoffs, given a distribution of entrepreneurial abilities in the population. We interpret entrepreneurial ability as the ability to create and manage jobs. We show that as more market participants become entrepreneurs, job creation in the economy rises and unemployment falls (though national output does not necessarily increase, as an economy populated by managers and no workers cannot produce).

Business start-up costs influence the equilibrium outcome because an individual can become an entrepreneur only by paying the cost of setting up her business. Higher costs

[3] At the conference presentation of this paper Daron Acemoglu correctly pointed out to us that our model is close to Lucas's (1978) "span of control" model. Lucas addresses a different set of issues from the ones addressed in our paper and studies the implications of entrepreneurship in a competitive framework. It would be beyond the scope of this paper to address the kind of issues addressed by Lucas in his paper and compare our results with his, although it is hoped to return to this model in future work.

discourage potential entrepreneurs and so discourage job creation. We show that there is a monotonic relation between start-up costs and employment: countries with higher start-up costs should have a lower equilibrium employment rate. We restrict ourselves to equilibria with turnover in the number of jobs but not in the number of firms.

We then consider some preliminary data on business start-up costs in countries of the European Union, the United States and Japan. We find encouraging correlations between business start-ups, employment growth and start-up costs. There appears to be a strong correlation between business start-up costs and overall employment across the countries of our sample. Although our data do not allow firm conclusions at this stage, we believe that our preliminary investigation has unearthed potentially interesting correlations that merit further analysis.

2 The economy

The economy consists of a continuum of infinitely-lived individuals in the unit interval. Each individual can be either a worker or an entrepreneur. Entrepreneurs create jobs and manage them; workers occupy them to make them productive. An entrepreneur can manage many jobs at the same time but a worker can only occupy one job at a time. The allocation of jobs to workers takes place according to a process of search and matching, with the frictions summarised in an aggregate matching function.

Individuals are identical in all respects except for their "entrepreneurship." They decide whether to become entrepreneurs or workers on the basis of their expected payoffs. No individual can be both a worker and an entrepreneur at the same time. Entrepreneurship is exogenous and represented by a single parameter α, which gives the maximum number of jobs that can be created and managed by the individual should she decide to become an entrepreneur. If the individual becomes a worker her entrepreneurship plays no role in her economic performance.

Each worker is born with an α and carries it for the rest of her life. Bill Gates and Richard Branson have very high αs, say $\alpha = A$. Vincent van Gogh, who never sold a painting in his lifetime, and Paul Erdos, who wrote 1475 papers but never managed to hold a job, had very low αs, say $\alpha = 0$. A worker's α is critical in her decision whether to become an entrepreneur or a worker. We assume that the distribution of α numbers in the population is some known $F(\alpha)$, which is continuous in the interval $[0, A]$.

The allocation of jobs is modelled as in the simplest case analysed in Pissarides (2000, chapter 1), with an important modification necessitated by the introduction of entrepreneurs. Suppose at some time t entrepreneurs have created and are managing a total of $n + v$ jobs, with n of them occupied by workers and v of them vacant. There are $n + u$ workers in this market, one in each occupied job and u unemployed. Each of the n occupied jobs produces a constant flow of output y and continues producing this output until a negative shock arrives. When the negative shock arrives, an event that takes place at a constant rate λ, the job is closed down, the worker becomes unemployed and the entrepreneur opens another job to replace it. Wages share the surplus from the job according to the Nash solution to an implicit wage bargain.

The v vacant jobs and u unemployed workers engage in a time-consuming process of search and matching. During search, entrepreneurs suffer a flow cost c for each vacant job and workers receive income b. We interpret c as the cost of creating a single job (or more accurately, a single productive match) and b as unemployment compensation net of search costs. The arrival of matches is governed by an aggregate matching function with constant returns to scale. It is shown in Pissarides (2000, chapter 1) that under these assumptions the arrival process can be summarised by a single parameter, the *tightness* of the market $\theta \equiv v/u$, such that: workers arrive to jobs according to a Poisson rate $q(\theta)$, which has elasticity in the interval $(-1, 0)$, and jobs arrive to unemployed workers according to a related Poisson rate $\theta q(\theta)$, with elasticity in the interval $(0, 1)$ and with

$$\lim_{\theta\to\infty} q(\theta) = \lim_{\theta\to 0} \theta q(\theta) = 0 \tag{1}$$

$$\lim_{\theta\to 0} q(\theta) = \lim_{\theta\to\infty} \theta q(\theta) = \infty \tag{2}$$

3 Choice of occupation

We let V be the expected present-discounted value of income of a vacant job to an entrepreneur and U the expected present-discounted value of income to an unemployed worker. Both V and U are independent of the entrepreneurship parameter α, but of course, they depend on job productivity, the wage sharing rule and market tightness. An α individual can either become an entrepreneur and create α jobs, or a worker and search for a vacancy. In the former case, the expected payoff to the individual is αV, the total expected profit from α new jobs. In the latter case the payoff is U. We assume that in order to become an entrepreneur, an individual has to pay a fixed cost K. We interpret K as the *start-up cost* of a new company and it is influenced by policy. An individual faced by the choice of whether to become an entrepreneur or a worker is faced with: expected return U from becoming a worker and expected return αV for a fee K from becoming an entrepreneur. Entrepreneurs are therefore those whose α satisfies the inequality

$$\alpha V - K \geq U. \tag{3}$$

Recall that V and U are independent of α, and K is a fixed cost. Therefore, the choice of entrepreneurship is governed by a *reservation entrepreneurial ability* S, such that an α individual becomes an entrepreneur if $\alpha \geq S$, otherwise she becomes a worker. The reservation ability satisfies

$$S = \frac{U + K}{V}. \tag{4}$$

Given the c.d.f. of α, $F(\alpha)$, a fraction $F(S)$ of the population are workers and a complementary fraction $1 - F(S)$ are entrepreneurs.

It is shown in Pissarides (2000, chapter 1) that under the assumptions of this paper about matching and wage sharing the payoffs U and V can be expressed as single-valued functions of tightness, with $U'(\theta) > 0$ and $V'(\theta) < 0$. Intuitively, the argument is that because of the frictions which imply that the probability of hiring depends on the relative number of jobs and workers in the market, unemployed workers are better off when there more vacant jobs for each unemployed worker and entrepreneurs are better off when there are more job applicants for each open position. The Appendix reworks the argument for the modification introduced in this paper by the existence of entrepreneurial skills and occupational choice. Moreover, in the limit, as θ becomes a large number, V may become zero or negative, but U always takes finite positive values, bounded from below by the present discounted value of unemployment income and from above by the present discounted value of income from work. The implication for the reservation condition (4) is that S can be expressed as a monotonically increasing function of θ, with a low but positive value at $\theta = 0$ and tending to infinity as θ becomes large and $V(\theta)$ approaches 0. We ignore the range beyond which θ is large enough to turn V negative, i.e. we denote by $\bar{\theta}$ the value defined by $V(\bar{\theta}) = 0$ and restrict ourselves to values of θ in the interval $[0, \bar{\theta})$.[4] The relation between S and θ implied by (4) is shown by the upward-sloping curve in figure 1. We refer to this curve as "entrepreneurship." The intuition behind it is that when tightness is higher, entrepreneurs find it harder to fill their jobs and workers easier to find a job vacancy. Consequently, fewer individuals choose to become entrepreneurs and more become workers.

4 Job creation

Given now the split between workers and entrepreneurs, how is employment determined? The employment condition is easy to derive because of our assumption that there are constant returns to scale in each and every job and that the number of jobs under single management does not influence entrepreneurial performance. It follows that entrepreneurs will create jobs up to the maximum that they can manage. With distribution of entrepreneurial abilities $F(\alpha)$, and number of entrepreneurs $1 - F(S)$, the total number of jobs created in this economy is

$$\begin{aligned} n + v &= [1 - F(S)]E(\alpha \mid \alpha \geq S) \\ &= \int_S^A \alpha dF(\alpha). \end{aligned} \tag{5}$$

[4] In Pissarides (2000) the equilibrium value of θ is determined by the condition $V(\theta) = 0$, i.e. in the notation of this paper, equilibrium is given by $\theta = \bar{\theta}$.

The total number of workers is $F(S)$. We make use of the fact that matching is pairwise to derive an equation for the determination of θ.

We have argued that workers arrive to vacant jobs at rate $q(\theta)$ and filled jobs break up at rate λ. Therefore, the evolution of employment in terms of the firm's transition rates is

$$\dot{n} = \left(\int_S^A \alpha dF(\alpha) - n \right) q(\theta) - \lambda n. \tag{6}$$

But since jobs arrive to unemployed workers at rate $\theta q(\theta)$ it must also be true that, in terms of the workers' transition rates,

$$\dot{n} = (F(S) - n)\theta q(\theta) - \lambda n. \tag{7}$$

It follows from (6) and (7) that for any level of employment n

$$\int_S^A \alpha dF(\alpha) - n = (F(S) - n)\theta. \tag{8}$$

We solve (8) for the steady-state value of n implied by either (6) or (7). The most convenient expression to work with is the one that substitutes the steady-state n implied by (6) into the left-hand side of (8) and the steady-state n implied by (7) into the right-hand side of (8). The result is, after some minor rearrangement of terms,

$$\frac{\lambda\theta + \theta q(\theta)}{\lambda + \theta q(\theta)} = \frac{\int_S^A \alpha dF(\alpha)}{F(S)}. \tag{9}$$

Equation (9) closes the system. By the properties of the matching technology, which make $\theta q(\theta)$ an increasing function of θ, the left-hand side of (9) increases in θ. The right-hand side is decreasing in S, so (9) gives a negatively-sloping relation between θ and S. Intuitively, when there are more entrepreneurs, there is more job creation and fewer workers applying for the jobs, so tightness is higher. Plotted against the positively-sloping relation in Figure 2, this curve gives a unique equilibrium θ and S. Since as θ tends to 0, $\theta q(\theta)$ also tends to 0, for very small θ, S tends to A. Therefore we can be assured of a unique equilibrium θ and S by choosing a sufficiently large A.[5] We refer to the graphical representation of (9) as the job creation condition.

5 Employment and start-up costs

Employment in the model has two components, managers and workers. Managers are never unemployed, they always manage either vacant or filled jobs. Therefore total

[5] Bill Gates has to be able to manage a lot of jobs for the model to yield a solution. He does.

employment in the model is given by $1 - F(S) + n$. Unemployment is given by $F(S) - n$. In the steady-state implied by (7) this is given by

$$u = \frac{\lambda F(S)}{\lambda + \theta q(\theta)}. \tag{10}$$

With knowledge of θ and S, the number of entrepreneurs, workers and total employment and unemployment are all uniquely determined. It is convenient to work with two of these, the split between entrepreneurs and workers, $F(S)$, and the overall unemployment rate, given in (10).

The influence of start-up costs is easy to derive with the help of figure 2. From (4), higher start-up costs increase S at all θ, i.e., shift the entrepreneurship curve up. They do not influence the job creation curve. Therefore when start-up costs are higher, S is higher and θ lower. There are fewer entrepreneurs and fewer job vacancies for each unemployed worker. The unemployment rate is higher for two reasons. Because entrepreneurs have higher employment rates than workers, the shift from entrepreneurship to worker status increases unemployment. We refer to this as the **composition** effect of start-up costs. It is shown in (10) by a higher $F(S)$ associated with higher start-up costs. In addition, with fewer entrepreneurs, job creation is lower, so fewer workers find jobs. We refer to this as the **job creation** effect of start-up costs. It is shown in (10) by a lower $\theta q(\theta)$.

The implication of this analysis is that other things equal, countries with higher start-up costs should have fewer entrepreneurs and more workers competing for a smaller number of jobs. Company start-ups should be lower and job creation also lower, with lower overall employment and higher unemployment. We look at some cross country evidence for or against these propositions.

6 Some evidence

The argument advanced in this paper is that jobs are created by entrepreneurs who are constrained by start-up costs and by the number of workers that they can manage. This argument is naturally more relevant for small businesses that employ a small number of employees, and (with slight modifications not developed here) could also apply to self-employed people. It is less relevant for large corporations that have existed for many years.

Table 2 shows the number of jobs in small enterprises in a selection of countries. The first column shows self employment and the second shows companies that have fewer than ten employees. The fraction of employment in these two categories of firms varies from 56.4% in Greece to numbers around 23% for Germany, Austria, Luxembourg and Ireland, which have very low self-employment rates. Table 3 gives the start-up cost of a new enterprise. The column headed "number of procedures" gives the number of administrative procedures that an individual has to go through to set up a new company and the second column, headed "number of weeks," is the average number of weeks required for the registration to be complete. In the final column we construct an index that brings the two components together. The index has units of weeks. It averages the number of weeks that a new company on average needs to start up with an approximate value for the number of weeks needed to complete the necessary number of procedures. Thus, if say two countries require on average the same number of weeks delay before start-up but one requires a larger number of registration procedures than the other, the one with the larger number of procedures gets a larger index.

There are large variations in the cost of setting up a company in OECD countries. The most striking difference is between the US and UK on the one hand (joined by Denmark), which have low registration requirements, and Greece, Spain and Italy on the other, which have high costs. The countries with the high costs also happen to be the ones with the biggest concentration of smaller employers, so they are the ones most likely to suffer from the high start-up costs.

Our model suggests that high start-up costs reduce the rate at which new enterprises are set up and reduce also overall job creation. We show the following bits of evidence to support these claims. First, the movement between employment and self-employment seems to be negatively correlated with start-up costs; see figure 3. Second, higher start-up rates are associated with higher employment growth; see figure 4. Finally, the most striking correlation of all, higher start-up costs are associated with lower employment rates across all the countries in the sample (figure 5).

Of course, these correlations do not prove anything and they are sufficiently week that they may not be robust to the inclusion or exclusion of other observations. But they are sufficiently striking to encourage further work on the subject. We intend to collect more data and test our model's propositions more rigorously.

References

[1] Commission of the European Communities (1999). Report from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of Regions, "On Concerned Action with the Member States in the Field of Enterprise Policy", Brussels, 09.11.1999 COM(1999) 569 final.

[2] Lucas, R. E. (1978). "On the Size Distribution of Business Firms." Bell Journal of Economics 9, 508-523.

[3] OECD (1998). Fostering Entrepreneurship: The OECD Jobs Strategy. OECD: Paris

[4] Pissarides, C. A. (2000). Equilibrium Unemployment Theory. 2nd ed., Cambridge, MA: MIT Press.

7 Appendix

The present-discounted value of income of a vacant job for a constant discount rate r and infinite horizon satisfies the Bellman equation

$$rV = -c + q(\theta)(J - V), \tag{11}$$

where J are the expected returns from an occupied job. these satisfy

$$rJ = y - w - \lambda(J - V), \tag{12}$$

under the assumption that when a negative shock arrives the job is destroyed and the worker laid off but the firm re-advertises a position. w is the wage rate.

The expected income of unemployed workers for unemployment compensation b and transition rate $\theta q(\theta)$ satisfies

$$rU = b + \theta q(\theta)(W - U), \tag{13}$$

where W are the expected returns from holding a job that pays wage w,

$$rW = w - \lambda(W - U). \tag{14}$$

Wages share the surplus from the job match according to the fixed parameter $\beta \in (0, 1)$. In flow terms

$$(1 - \beta)(w - rU) = \beta(y - w - rV), \tag{15}$$

where rU is the reservation wage of workers and rV the reservation profit of firms. In stock terms the sharing rule is

$$(1 - \beta)(W - U) = \beta(J - V). \tag{16}$$

From (13), (16) and (11) we obtain

$$rU = b + \frac{\beta}{1 - \beta}\theta(c + rV) \tag{17}$$

and so the wage equation becomes

$$w = (1 - \beta)b + \beta(y + \theta c + (\theta - 1)rV). \tag{18}$$

Equation (12) gives

$$J - V = \frac{y - w - rV}{r + \lambda}. \tag{19}$$

Substitution now of w from (18) into (19) and of the resulting $J - V$ into (11) gives V as a function of θ :

$$rV = \frac{(1 - \beta)q(\theta)(y - b) - (r + \lambda + \beta\theta q(\theta))c}{(1 - \beta)q(\theta) + r + \lambda + \beta\theta q(\theta)}. \tag{20}$$

If we split the fraction in (20) into two terms, one in $y - b$ and the other in c, we immediately see that the first term decreases in θ by virtue of the fact that $q'(\theta) < 0$, and the second term, which has a negative sign in front of it, increases. This establishes the first result that we used in the derivation of entrepreneurship, that V can be written as a single-valued decreasing function of θ; i.e., $V = V(\theta)$, with $V'(\theta) < 0$.

To establish that U is increasing in θ, we substitute rV from (20) into (17) to get

$$rU(\theta) = b + \frac{\beta\theta}{1-\beta}c + \frac{(1-\beta)\theta q(\theta)(y-b+c)}{(1-\beta)q(\theta)+r+\lambda+\beta\theta q(\theta)}. \tag{21}$$

The result then follows immediately, because both the second and third terms are increasing in θ. Thus, $U = U(\theta)$ with $U'(\theta) > 0$.

8 Data sources

Employment rate. The percentage of the population of working age (16-65) with job. Source, OECD Labour Force Survey. The growth for 2000-01 is an estimate by Eurostat. The source for the sectoral distribution in Table 1 is the website of the Directorate of Social and Economic Affairs, http://europa.eu.int/comm/dg05/index_en.htm.

Distribution by firm size. Source, European Commission DG XXIII, *Enterprises in Europe: Data 1994-95* Fifth Report(Eurostat).

Flows between employment an self-employment. The average annual flows from 1990 to 1997. Source: OECD *Employment Outlook*, 2000, Table 5.5 (page 166)

Start-up costs. The source is a forthcoming study by Logotech on business start-up costs in the OECD, 1997. The study is not yet available but the sources of their costs are. We constructed the costs from their sources, in particular the study *Fostering Entrepreneurship* by the OECD (1998).

Start-up rates. The percentage of the adult population who at the time of the survey (May-July 2000) were in the process of starting a new business. Sources Global Entrepreneurship Monitor (http://www.entreworld.org/GEM2000)

Table 2
Percentage distribution of employment by firm size

COUNTRY	0.0	1--9	10--49	50--249	250+
Italy	10.9	36.9	21.4	10.7	20.1
Greece	27.5	29.1	17.2	12.7	13.5
Spain	20.0	27.5	19.0	12.9	20.6
Portugal	11.1	27.2	22.8	18.4	20.5
Belgium	19.7	26.1	15.4	11.4	27.4
Denmark	6.5	22.5	22.6	17.9	30.5
Iceland	9.2	22.0	22.4	10.1	36.2
Sweden	5.2	21.4	18.2	16.1	39.0
France	11.0	21.3	18.7	14.9	34.1
Germany	2.7	20.8	20.3	13.9	42.3
Austria	3.3	20.7	19.2	21.3	35.5
Netherlands	6.1	19.9	17.0	17.7	39.4
Finland	5.3	19.2	16.4	16.4	42.6
Ireland	4.3	18.8	23.0	22.5	31.5
Luxembourg	5.1	17.7	24.6	24.0	28.6
UK	12.3	16.6	15.3	12.6	43.1

Table 3

Start-Up Costs

Two measures of start-up costs, the number of procedures required to set up a new company and the number of weeks that it takes on average to set up the company. The index is defined as

(no. of weeks + no. of procedures/average procedures per week)/2.

Country	No. procedures	No. weeks	Index
Australia	6.5	1	1.78
Austria	10	8	5.97
Belgium	7	6	4.38
Denmark	2	1	0.89
Finland	7	6	4.38
France	16	6	6.15
Germany	10	16	9.97
Greece	28	6.5	8.76
Ireland	15	3	4.45
Italy	25	10	9.92
Japan	14	3	4.26
Luxembourg	5	2	1.98
Netherlands	9	12	7.77
Portugal	10	8	5.97
Spain	17	23.5	15.10
Sweden	7	3	2.88
United Kingdom	4	1	1.29
United States	3.5	1.5	1.44

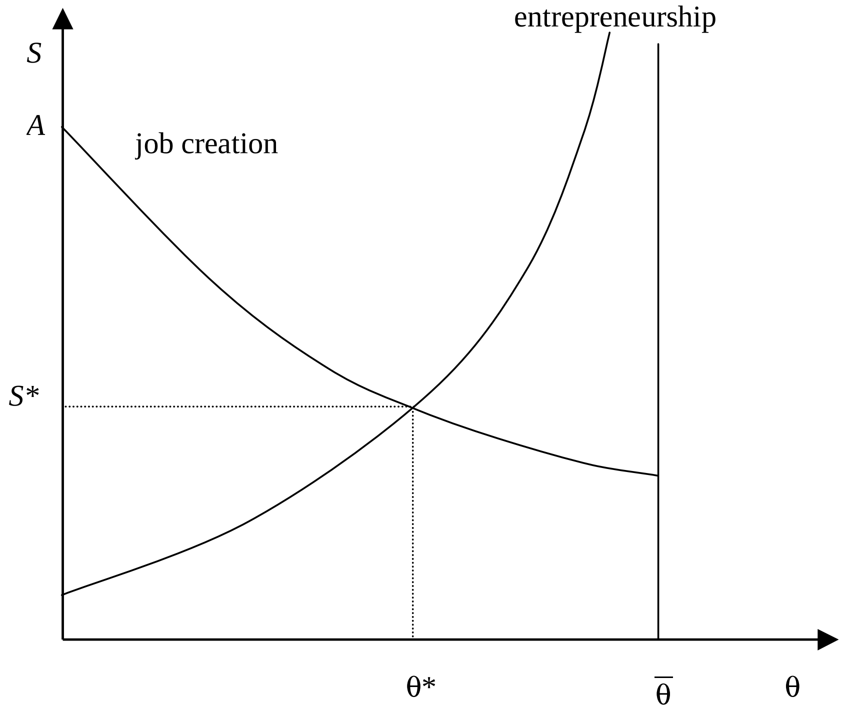

Figure 1
Equilibrium entrepreneurship and labour-market tightness

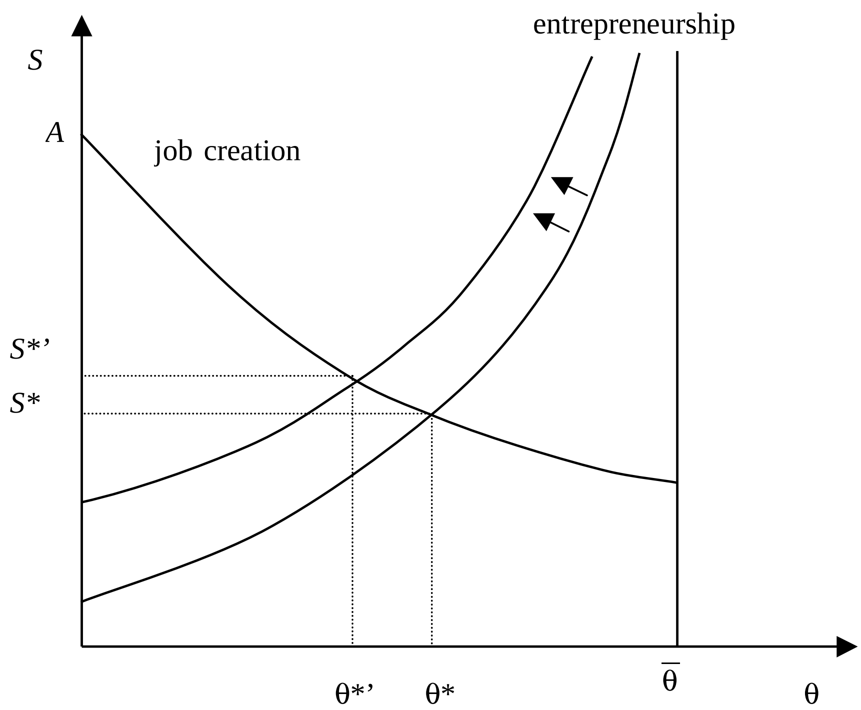

Figure 2
Implications of higher start-up costs

Figure 3: Movement into Self-Employment and Start-Up Costs

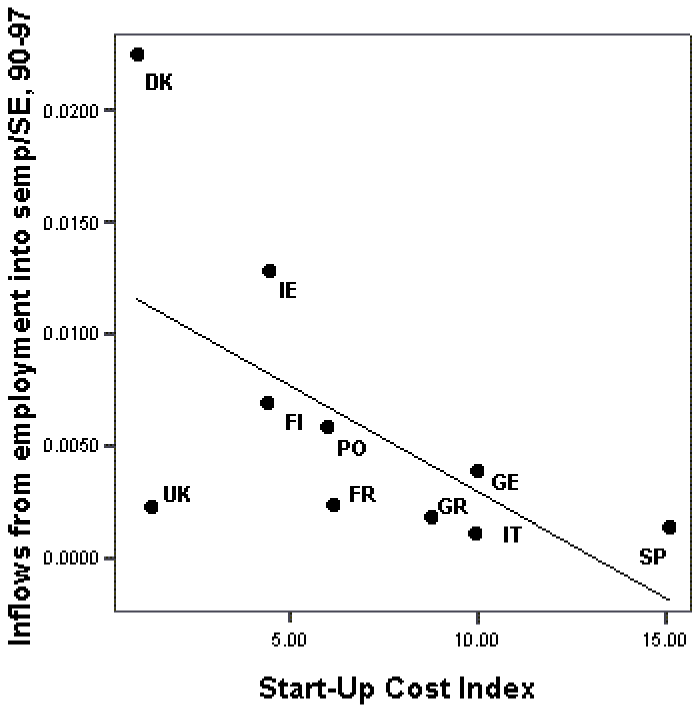

Figure 4: Start-Up Rates and Employment Growth

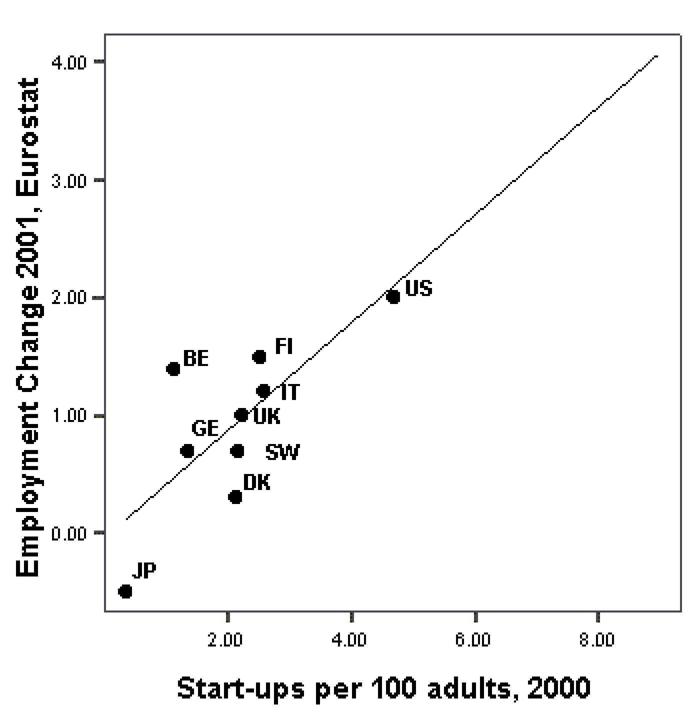

Figure 5: Employment and Start-Up costs