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CENTRE FOR ECONOMIC RESEARCH

**THE IMPACT OF CAPITAL GRANTS ON
ENTREPRENEURSHIP:**

**A MODEL OF THE SUPPLY OF
GENERAL ENTREPRENEURS**

BY

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WORKING PAPER 92/16



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The Impact of Capital Grants on Entrepreneurship: A Model of the Supply of General Entrepreneurs.

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This paper, examining the impact of capital grants on entrepreneurship, augments Evans and Jovanovics' (1989) model of the supply of self-employed entrepreneurs by including corporate entrepreneurs. It shows that consideration of corporate entrepreneurship greatly reduces the scope of using capital grants as a policy instrument to stimulate enterprise. The main impact of capital grants is seen to cause a redistribution of entrepreneurs from the corporate to the self-employed sector. This movement, while reducing capital constraint among existing self-employed entrepreneurs, increases the level of capital constraint among former corporate entrepreneurs who, stimulated by the availability of capital grants, choose to become capital constrained self-employed entrepreneurs. The model shows that a sufficient condition to ensure that capital grants do increase entrepreneurship would be to make them available exclusively to existing capital constrained self-employed entrepreneurs and high wage routine labour. Also, by altering the distribution of a given endowment of entrepreneurs between sectors of the economy, and with reference to U.K. industrial data, capital grants are seen to have long term implications for the structure of the industrial base and could be useful in a 'portfolio' approach to GDP growth. Thus, the paper concludes that the impacts of a capital grant strategy are very different to the goals that policy makers hope to attain in the employment of this policy instrument so that the orientation of its current use should be altered.

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The Impact of Capital Grants on Entrepreneurship: A Model of the Supply of General Entrepreneurs.

Introduction

Recently, there has been a proliferation of literature on the supply of self-employed entrepreneurship with papers such as Evans and Jovanovic (1989), Evans and Leighton (1989), Holmes and Schmitz (1990), and Blanchflower and Oswald (1990, 1991). These papers argue that many of the self-employed are constrained by capital and the supply of this cohort of entrepreneurs could be increased through capital grants. These research findings have, however, been preceded by policies in many countries aimed at encouraging entrepreneurship through capital grants. Such policies have been precariously implemented to the extent that cost-benefit considerations have focused exclusively on self-employed entrepreneurs. If one hopes to stimulate entrepreneurship one must consider all entrepreneurs in assessing the impact of a policy instrument. Thus, as far as capital grants are concerned it is necessary to examine how these affect entrepreneurial activity in both the corporate and self-employed sectors.

Therefore, the aim of this paper is to extend the current trajectory of research on entrepreneurship supply by augmenting self-employment models to include corporate entrepreneurs i.e. employees who innovate and/or imitate. Thus, we will advance the model of Evans and Jovanovic (1989) to include corporate entrepreneurs and examine the comparative statics of the introduction of capital grants in the resulting model in order to assess the impact of such a policy on the total supply of entrepreneurs. We will also examine U.K. industry data relating to the nature of firms favoured by the self-employed and corporate sectors to shed further light on the implications of the comparative static analysis.

The structure of the paper is as follows. Section 1 examines the empirical evidence relating to the importance of capital as a constraint on the activities of self-employed and corporate entrepreneurs. It will also examine the degree of mobility of individuals between these sectors in order to provide a picture of the extent to which there is a market for entrepreneurs. Section 2 will build the model of the total, or general, supply of entrepreneurs i.e corporate and self-employed entrepreneurs. Section 3 will conduct a comparative static analysis of the introduction of capital grants. It will apply the results of this analysis to industry data in order to assess the full policy implications.

Before proceeding, however, we feel it important to define what exactly we mean by entrepreneurship. This has often been neglected in other studies and has most usually resulted in fruitless debate on issues where both parties, who seemingly are unaware, have clearly different types of actions and actors in mind yet still believe they are debating the same issue. We feel that the study of entrepreneurship is only of importance if it contributes to the understanding of what it is that determines economic performance. Thus, in so far as it relates to activities within the firm, we adopt the definition outlined by Schultz (1975, 1980) where entrepreneurship is the re-allocation of resources that moves the economy from an existing, to a more optimal, equilibrium in the face of technological and/or market constraint changes. This model concerns these activities as they relate to firms so that entrepreneurship includes innovative and imitative activities (since these are the movements towards a new equilibrium) and excludes routine repetitive duties (since these maintain an existing equilibrium). Entrepreneurs are, therefore, individuals who wholly or partly in their labours innovate and/or

imitate other innovation.

Section 1: The Evidence

Recent studies of self-employed entrepreneurs such as Evans and Jovanovic (1989), Evans and Leighton (1989) and Blanchflower and Oswald (1990, 1991) all lay claim to the existence of a statistically significant constraint placed on many self-employed entrepreneurs by capital availability. These analyses were preceded, however, by both government recognition and policy action to help small firms constrained by capital in most western countries. A study by 'Segal Quince Wicksteed' (1988) finds that small firms are either quoted higher interest rates or do not have sufficient security to acquire adequate finance. In the U.K. the Government has responded to both of these constraints by acting as a guarantor for small business loans via the 'Small Business Loan Guarantee Scheme'. The Commission of the European Communities (1989) points out that these type of policies are prevalent throughout the E.C. and have been in operation for many decades in some countries, e.g. Ireland. A survey of self-employed female entrepreneurs by Carter and Cannon (Dept of Employment, U.K.) came to similar conclusions for firms of over a year old.

A study of small firms by The U.K. Advisory Council On Science and Technology (A.C.O.S.T.), (1990) argues that small firms are at a disadvantage relative to larger firms in the capital market because they cannot realistically hope to raise capital by going public given that the fixed costs of a floatation are high. They point out that the vast majority of these firms secure capital via acquisitions and takeovers. In the venture capital market start-up projects received 14.9% of total available venture capital in 1983, 12.9% in 1985 and only 5% in 1988; while buy-out/buy-in/acquisition received 24.2% in 1983, 38.1% in 1985 and 56% in 1988.

This latter point is important. If small firms are constrained by capital as a result of merely not favouring acquisition, then such a constraint must be classed as 'voluntary' and, to this extent, should not be supported by small business grants. The work by Scase and Goffee (1980) find that prestige and independence are two commonly cited reasons for becoming self-employed and would seem to imply that small business owners may trade-off capital availability (and hence lower profits) in return for the prestige of a managing directors title and/or independence in job activities. In fact this aspect has an empirical tradition in the U.K., especially in the Cotton Industry which was voluntarily capital constrained by family ownership refusing to merge; see Lazonick (1986). More recently, a study by Barclays Bank provided further evidence of this view. Cited by Batchelor (1992) this study of self-employed small business owners supported the argument of Scase and Goffee that independence is one of the major reasons for setting up a firm. The report showed that on average the hourly wage of the self-employed (£6.67) was lower than the U.K. average wage (£7.30) implying that the extra utility derived from 'independence' was worth at least sixty three pence per hour to the self-employed entrepreneur. Therefore, given that survey evidence of the self-employed often shows capital to be an important constraint on activities, such evidence must certainly exaggerate the true extent of this problem as it does not distinguish between voluntary and involuntary capital constraint.

Currently, we have solely focused on how the self-employed entrepreneur is capital

constrained. We now need to examine the case of the corporate entrepreneur. Addressing this point from another angle, suppose we ask the question of what happens if a self-employed entrepreneur is capital constrained? The answer is that he could choose to become employed with a firm that is not constrained by capital or merge with another firm. In each event he becomes a corporate entrepreneur. Such a case occurred when the capital constrained Randolph Fields, owner of British Atlantic, decided to merge with Virgin Records to form Virgin Atlantic and hence became an employee of Richard Branson¹. Broadly speaking, as long as the firm employing the entrepreneur is not itself capital constrained the corporate entrepreneur would (as long as the firm is pre-disposed towards his ideas²) not find his activities curtailed by capital shortage.

Therefore, looking at the total set of entrepreneurs, we would expect a higher importance attached to securing capital among self-employed entrepreneurs rather than corporate entrepreneurs. Given this perspective, and our previous point that many small firms may be voluntarily capital constrained, we postulate that the problem of capital availability is most likely overstated in empirical studies of entrepreneurship given their sole focus on the self-employed. Evidence that such a perspective is indeed accurate is inherent in A.C.O.S.T.'s study of small firms (which includes subsidiaries of larger firms) where only 13% of small firms (compared to estimates of around 50% from purely self-employed studies) claimed that capital availability constrained their growth.

Given the divergence in importance attached to capital availability among self-employed and corporate entrepreneurs, it is necessary to assess the net effect of the implementation of such a policy on the total supply of entrepreneurs. This is what the comparative statics of our model of general entrepreneurship examines.

First, however, we must determine the degree to which self-employed and corporate entrepreneurship are substitutes as far as the individual's choice of career is concerned. A common misconception is that corporate and self-employed markets for entrepreneurship are dichotomous with little movement between them. This view assumes that self-employed entrepreneurs were either always self-employed or temporarily took a menial job to acquire capital. However, empirical evidence is quite to the contrary as Storey et al's (Dept of Employment, U.K.) study of self-employed entrepreneurs finds that 69.4% of their sample were employed in management in their previous job; suggesting similar job roles in corporate and self-employed sectors.

Given the scant data on corporate entrepreneurs we decided to gather an introductory data set of managerial entrepreneurs in top management positions, most of which are employed. The data was extracted from biographies of well-known businessmen. In Table 1 we show the mobility of these entrepreneurs between jobs. The data shows that movement between the corporate and self-employed entrepreneurship sectors is quite high (46.3%), suggesting that

¹ Robinson (1990).

² Donaldson (1985) argues, in effect, that middle management corporate entrepreneurs are not perfect substitutes for top tier corporate entrepreneurs and self-employed entrepreneurs, as they do not have the same degree of freedom due to corporate hierarchal rules etc. However, his evidence is only drawn from the experience of two subsidiaries of one multinational company and hence is hardly statistically significant.

a mobile market does indeed exist.

Table I

Movement of entrepreneurs between self-employment and corporate employment. Sample = 41 observations.

Previous/Current employment	%	No.
Corporate/Corporate	34.2	(14)
Corporate/Self-Employed	39.0	(16)
Self-Employed/Corporate	7.3	(3)
Self-Employed/Self-employed	19.5	(8)

Sources: Applause Magazine, Numbers 1 to 24, and Robinson (1990).

Section 2: The Model.

We start by assuming that an individual's utility function is solely dependent on income ignoring the desire for independence cited in the empirical literature³. The individual has a choice of income from three sources:

(a) *Self-employed entrepreneurship*: income (Y) includes a return on innovation/imitation and capital.

(b) *Corporate entrepreneurship*: income (Ye) includes a fixed wage and innovation/imitation related pay. For example, sales representatives being paid a fixed wage plus bonuses in relation to sales targets, or managers receiving payment in the form of a fixed wage and profit related pay. The incentive component of the wage being related to the workers' innovative input to the firm, while the fixed wage relates to routine non-innovative labour duties. Note the Schultzian characteristic of this pay scheme. Schultz defines entrepreneurship as reallocations that move the market from an existing, to a new equilibrium. Thus, in the case of the sales representative the fixed wage is non-entrepreneurial, as maintaining existing accounts maintains the existing equilibrium. However, finding new accounts moves the market

³ Augmenting the resulting model to cater for 'utility from independence' is simple and has obvious implications - essentially an 'independence wage wedge' is driven between corporate and self-employed entrepreneurship and these match the empirical results described by Batchelor (1992).

towards a new equilibrium and for this service the firm offers the sales representative entrepreneurial related pay. Note that in cases where all sales are made up of 'once-off contracts' all pay may be entrepreneurial related e.g. door to door sales persons.

U.K. government policy has attempted to encourage corporate entrepreneurship through its 'Profit Related Pay' (P.R.P.) scheme which exempts employees from income tax (although not national insurance) for the proportion of their pay related to the firm's profits.

(c) *Routine labour*: Workers receive a fixed wage (W_l), they are required to fulfil a defined task and not expected to innovate, (in an economic sense), in any significant manner. Thus, by nature, their work maintains an existing equilibrium. It is important to note that routine labour can often be highly skilled and well paid e.g. medical doctors, aircraft pilots etc.

The incomes (Y , Y_e) from entrepreneurial careers are positively related to the individuals entrepreneurial ability (Q). Therefore, the individual's estimate of his entrepreneurial ability will have a significant bearing on career choice. In this regard, we assume the individual has to make two rational estimations: one relating to his unknown level of innovative and imitative abilities, and the other concerning the value the market might place on these attributes. The assessment of these two aspects gives the individual an estimation of the value of his entrepreneurial ability which we call $E(Q)$.

To avoid tedious cross reference between papers we provide the reader with a brief review of the fundamental equations of Evans and Jovanovics' self-employment model. They assume that the individual has a choice between routine labour and self-employment. We reproduce their wage equation in general form as

$$W_l = g(x_1, x_2): \quad (1)$$

$$\partial g / \partial x_1, \partial g / \partial x_2 > 0.$$

$$\partial^2 g / \partial x_1^2, \partial^2 g / \partial x_2^2 < 0.$$

where 'x1' is work experience and 'x2' education.

Evans and Jovanovic assume the individual is certain of his entrepreneurial ability. We drop this assumption in order to include uncertainty of entrepreneurial ability as a factor determining career choice. Therefore, moving from certainty to uncertainty we replace Q by $E(Q)$. Thus self-employed income is defined as

$$Y_g = E(Q)k^d \quad (2)$$

$$k = \text{capital invested}$$

An entrepreneur in self-employment will have to find his own capital and Evans and Jovanovic assume that he can borrow up to a proportion 'b-1' ($b \geq 1$) of his initial wealth 'Z'.

They do not offer the intuition behind this assumption⁴ leading to an ambiguity of what its root cause actually is. There are many possible explanations in other studies. Blanchflower and Oswald (1991), on a similar line of reasoning, argue that an asymmetry of information relating to the proposed entrepreneurial project between lenders (mainly banks) and entrepreneurs may cause capital market imperfection. The outcome resulting in a less than optimal supply of capital being provided to self-employed entrepreneurs. If banks attempt to reduce the downside risk of such loans through collateral (security) then justification for Evans and Jovanovics' borrowing constraint is provided - at least on a theoretical level.

But asymmetry of information has important implications for the *nature* of projects banks would be willing to support. Typically, they would be more supportive of 'imitative' rather than 'innovative' proposals. Entrepreneurial projects involving imitation provide more information to lenders as there is concrete historical evidence to examine. Therefore, the asymmetry of information is greatly reduced and this coupled with a reduction in uncertainty is likely to bias banks' lending in favour of imitative projects at the expense of their innovative counterparts i.e. $b(\text{imitation}) > b(\text{innovation})$.

However, in the empirical survey we saw that while capital constraint is cited as a valid factor restraining entrepreneurship among the self-employed and small firms, no direct reference was made to asymmetrical information as a possible cause of this occurrence. Albeit this does not rule it out as a factor because most investigations did not inquire into reasons for loan refusal. A.C.O.S.T. (1990) identified the large fixed costs of equity floatations which would be excessive for small firms thereby blocking off capital from this source. This would give another justification for Evans and Jovanovics' wealth constraint as these firms would be forced to borrow off more risk averse lenders who would require some collateral in the form of initial wealth.

Bank lending practice may also give rise to some initial wealth constraint and Best and Humphries (1986) argue that the confinement of financial capital to short term loans in the British economy from the Nineteenth Century up to World War Two constrained entrepreneurs' freedom to innovate.

What we have attempted to show with this brief digression is that Evans and Jovanovics' modelling of capital constrained by initial wealth can be justified via a number of different routes; some with concrete empirical support. Which route one chooses does not bear on the conclusions as far as modelling the impact of initial wealth constraint is concerned.

Thus, returning to the model, Evans and Jovanovic assert that the individual can raise capital up to a maximum of bZ , where Z = initial wealth. Hence capital $k \leq \text{initial wealth} + \text{any borrowings}$

$$\text{i.e. } k \leq Z + (b-1)Z = bZ$$

$$\text{so } 0 \leq k \leq bZ \quad (3)$$

⁴ They do, however, show that initial wealth increases the probability of an individual becoming a self-employed entrepreneur. Blanchflower and Oswald (1990, 1991) derive similar conclusions regarding financial gifts.

Thus, self-employed entrepreneurs net income is

$$Y = E(Q)k^d + r(Z-k) \quad (4)$$

where $r = [1 + \text{the interest rate}]$. Maximising (4) to find optimal 'k' gives

$$k = \left(\frac{dE(Q)}{r} \right)^{\frac{1}{1-d}} \quad (5)$$

If the self employed individual is not constrained then

$$k \leq bZ \quad (6)$$

Substituting (5) into (6) and solving for $E(Q)$ yields

$$E(Q) \leq \left(\frac{r}{d} \right) (bZ)^{1-d} \quad (7)$$

This gives us a locus in $E(Q)$ and Z space which below the self-employed is not constrained but who is constrained above. However, if the entrepreneur is indeed constrained then this optimal level of k is not attained and

$$k = bZ \quad (8)$$

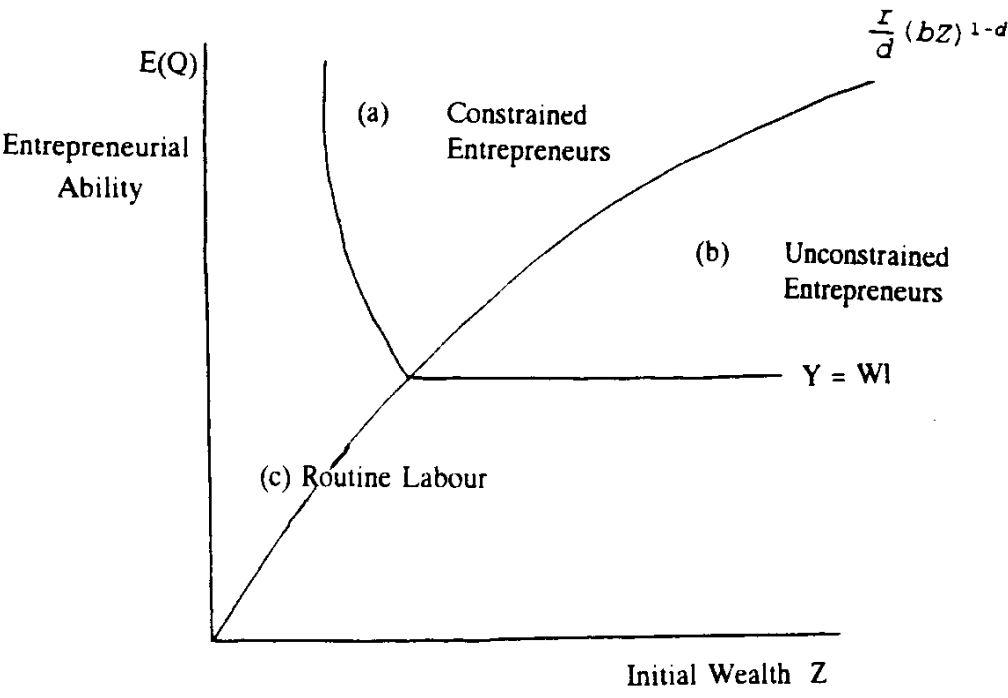
Thus, substituting the constrained (8) and the unconstrained (5) values for k into the self-employed gross income (2), gives constrained and unconstrained self employment gross incomes.

$$\text{Constrained } Y_g = E(Q)(bZ)^d \quad (9)$$

$$\text{Unconstrained } Y_g = E(Q)^{1/1-d} \left(\frac{d}{r} \right)^{d/1-d} \quad (10)$$

Hence in the constrained region an indifference locus between Q and Z can be derived which has a slope of $-(dE(Q))/Z$ from (9). In the unconstrained region this becomes a horizontal line as an increase in initial wealth no longer increases gross income as is apparent from (10). This gives Evans and Jovanovic a distinction between routine labour and self-employed

Figure 1



- (a) Constrained Entrepreneurs
- (b) Unconstrained Entrepreneurs
- (c) Routine Labour

entrepreneurs which splits into 3 divisions: (a) constrained self-employed, (b) unconstrained self-employed and (c) routine labour. This is represented in figure 1.

Now we want to further augment Evans and Jovanovics' model to allow some entrepreneurial endeavours to be imputed by the employed. Therefore, we define the income of corporate entrepreneurs (Y_e) as being made up of two components; that related to entrepreneurial ability (QA^β) and that related to certain routine tasks that are part of the job but which do not involve entrepreneurship (D).

$$Y_e = D + E(Q)A^\beta; \quad A, \beta \geq 0 \quad (11)$$

We expect $D = f(x_1, x_2)$; $f'(\cdot) > 0$, $f''(\cdot) < 0$.

To model the individual's expanded choice decision we will first clarify the individual's relative income between corporate and unconstrained self-employed entrepreneurship. With this relationship specified we can then use the indifference curves in figure 1. to compare all four possible income sources for the individual. We graph the relative incomes of employed and unconstrained self-employment in figure 2 from equations (11) and (10) respectively:

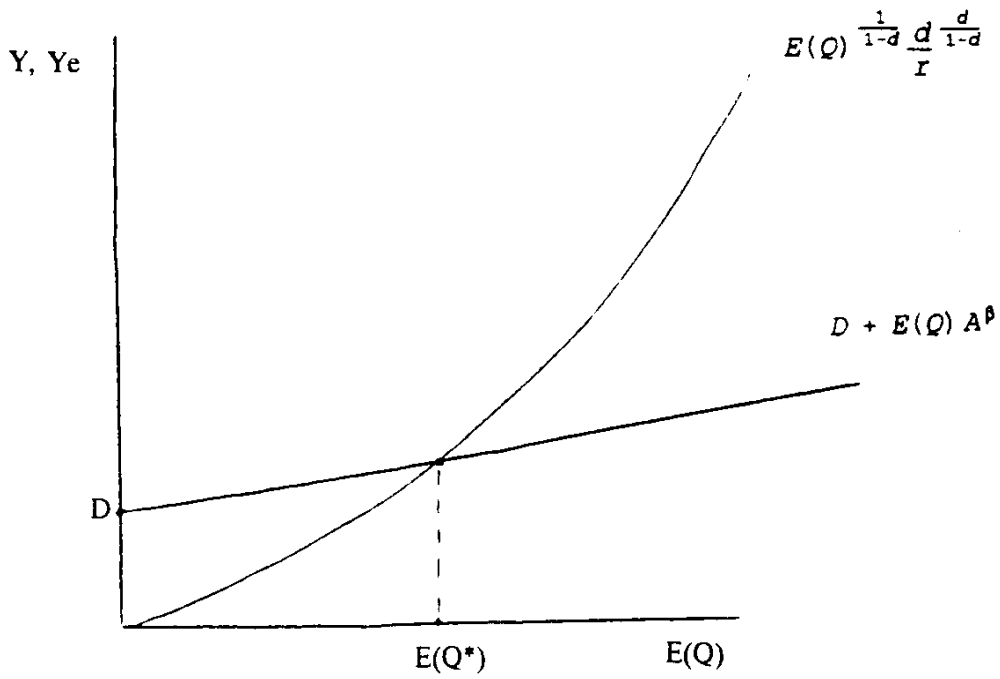
$$\frac{\partial Y_e}{\partial E(Q)} = A^\beta > 0 \quad (12)$$

$$\frac{\partial^2 Y_e}{\partial (E(Q))^2} = 0 \quad (13)$$

$$\begin{aligned} \frac{\partial Y_g}{\partial E(Q)} &= \left(\frac{1}{1-d}\right)(E(Q))^{(1/(1-d)-1)}\left(\frac{d}{r}\right)^{d/(1-d)} \\ &= \left(\frac{1}{1-d}\right)(E(Q)\frac{d}{r})^{d/(1-d)} > 0; \quad \text{if } d < 1 \end{aligned} \quad (14)$$

$$\begin{aligned} \frac{\partial^2 Y_g}{\partial (E(Q))^2} &= \left(\frac{1}{1-d} - 1\right)\left(\frac{1}{1-d}\right)(E(Q))^{\frac{1}{1-d}-2}\left(\frac{d}{r}\right)^{\frac{d}{1-d}} \\ &= \left(\frac{d}{1-d}\right)\left(\frac{1}{1-d}\right)(E(Q))^{\frac{2d-1}{1-d}}\left(\frac{d}{r}\right)^{\frac{d}{1-d}} \\ &= d(1-d)^{-2}E(Q)^{\frac{2d-1}{1-d}}\left(\frac{d}{r}\right)^{\frac{d}{1-d}} > 0 \end{aligned} \quad (15)$$

Figure 2



Y = Unconstrained Self-Employed Income

$$Y = E(Q) \frac{1}{1-d} \frac{d}{1-d}$$

Y_e = Corporate Entrepreneurship Income

$$Y_e = D + E(Q) A^\beta$$



Assuming there are diminishing returns to capital ($0 < d < 1$) entrepreneurial ability causes unconstrained self-employed income to increase at an increasing rate. In figure 2 for all entrepreneurial ability up to demarcation $E(Q^*)$ the individual would secure a higher income in employment than self-employment. Above $E(Q^*)$, assuming no capital constraint, the individual is better off in self-employment.

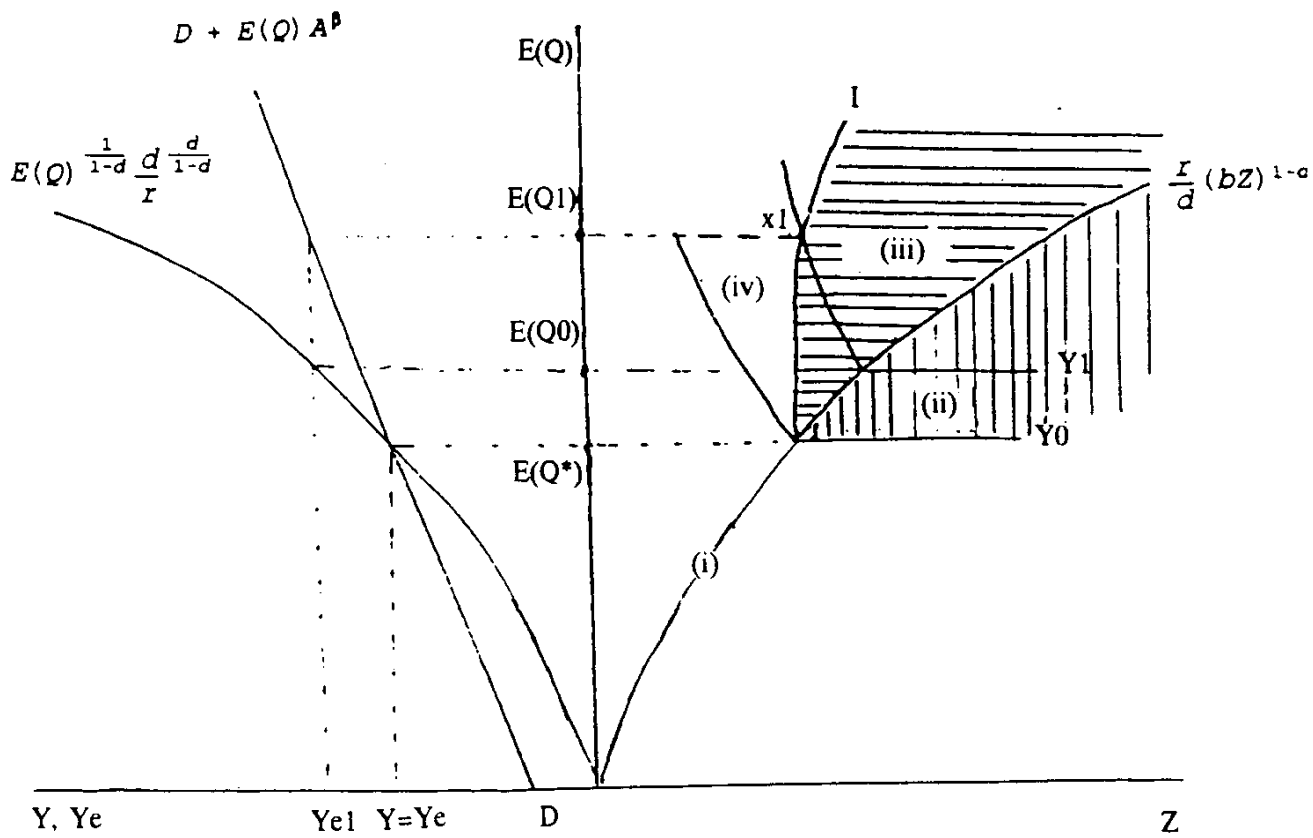
Linking figures 1 and 2 we derive figure 3. Using the equation for unconstrained self-employment as numeraire, we are able to compare incomes in indifference curve space. By tracing an income level from the horizontal axis of the left hand panel through $Y_{\text{unconstrained}} = [E(Q)^{1/(1-d)}][(d/r)^{d/(1-d)}]$ we are able to ascertain the $E(Q)$ level that would have secured such an income if the individual was self-employed and unconstrained by capital. This derived $E(Q)$ value links our original income value up with an indifference curve in the right hand panel which represents the same income level. To find this indifference curve we just trace the derived $E(Q)$ value horizontally across until it intersects $(r/d)(bZ)^{(1-d)}$, thereby linking it to the indifference curve which represents the same unconstrained self-employed entrepreneur's income.

Thus, for example, tracing $Y = Y_e$ at $E(Q^*)$ across to the right hand panel in figure 3, we have this income level represented by indifference curve Y_0 . Initially ignoring the option of employment in routine labour we can split the right hand panel into forms of entrepreneurship. On all utility curves below Y_0 corporate entrepreneurship is a superior income source to both constrained and unconstrained self-employment as is apparent from the left hand panel. Therefore, this area is made up exclusively of corporate entrepreneurs and is represented by area (i) in figure 3. Also from the left hand panel we know that unconstrained self-employed entrepreneurs earn more than their corporate counterparts for all levels of $E(Q)$ above $E(Q^*)$. This gives us area (ii) in figure 3 which is solely made up of unconstrained self-employed entrepreneurs.

The remaining area, formerly entirely devoted to constrained self-employed entrepreneurs in Evans and Jovanovics' framework, is now split between corporate and constrained self-employed entrepreneurs. We can see this by choosing $E(Q_1) > E(Q^*)$ which gives the individual corporate income of Y_{e1} . We can find the indifference curve corresponding to Y_{e1} by tracing it through $Y_{\text{unconstrained}} = [E(Q)^{1/(1-d)}][(d/r)^{d/(1-d)}]$ in the left hand panel. This gives us $E(Q_0)$ which corresponds to utility curve Y_1 . Thus the corporate entrepreneur with entrepreneurial ability $E(Q_1)$'s income is represented by the point 'x' on indifference curve Y_1 . This allows us to compare the income derived from corporate entrepreneurship and constrained self-employment.

Supposing the individual is initially at point 'x' where he is indifferent between corporate and constrained self-employment. If we were to increase his initial wealth 'Z' above that at 'x' then his income from self-employment would increase but that of employment would remain unchanged (since Y_e is independent of 'Z'). Hence the individual would choose to become self-employed. If on the other hand we were to reduce his initial wealth below that at point 'x' we would reduce the income to be derived from self-employment but again leave income derived from corporate entrepreneurship unchanged. Therefore, in this case the individual would choose to become a corporate entrepreneur. Thus by locating corresponding points to 'x' for each $E(Q)$ above $E(Q^*)$ we are able to derive an indifference locus 'I' where the individual is indifferent between corporate and constrained self-employed entrepreneurship.

Figure 3



- (i) Corporate Entrepreneurs
- (ii) Unconstrained Self-employed Entrepreneurs
- (iii) Constrained Self-employed Entrepreneurs
- (iv) Corporate Entrepreneurs

To the right of 'I' [denoted (iii)] the individual chooses to become a self-employed entrepreneur and to the left of 'I' [denoted (iv)] he opts for corporate entrepreneurship.

In the forgoing analysis we adopt the assumption that $(bZ)^d < A^\beta$ so that the 'I' locus is presented with a positive concave slope. The slope of 'I' is easily ascertained. Along 'I' the income from constrained self-employment is equal to the income from corporate entrepreneurship i.e. $E(Q)(bZ)^d = D + E(Q)A^\beta$. The first derivatives of these incomes with respect to $E(Q)$ are $(bZ)^d$ and A^β respectively. The second derivatives are both equal to zero. If $(bZ)^d < A^\beta$ then as $E(Q)$ rises income from corporate entrepreneurship grows faster than that of constrained self-employed entrepreneurship. Consequently, in order to reduce this differential so that incomes are equal we must give (take) larger (smaller) and larger (smaller) amounts of initial wealth Z to (from) the constrained self-employed as $E(Q)$ increases to maintain equality of corporate and self-employed incomes. This implies that if $(bZ)^d < A^\beta$ then the 'I' locus will have a concave slope⁵.

Therefore, we see an area that was formerly constrained self-employment under Evans and Jovanovics' schema now being split between corporate and constrained self-employed entrepreneurship. The intuition makes perfect sense because it tells us that for a given level of entrepreneurial ability among those that are constrained by initial wealth; those with relatively less wealth are more likely to become employed since their income capacity in self-employment is constrained by capital to an extent that they could earn more by becoming corporate entrepreneurs.

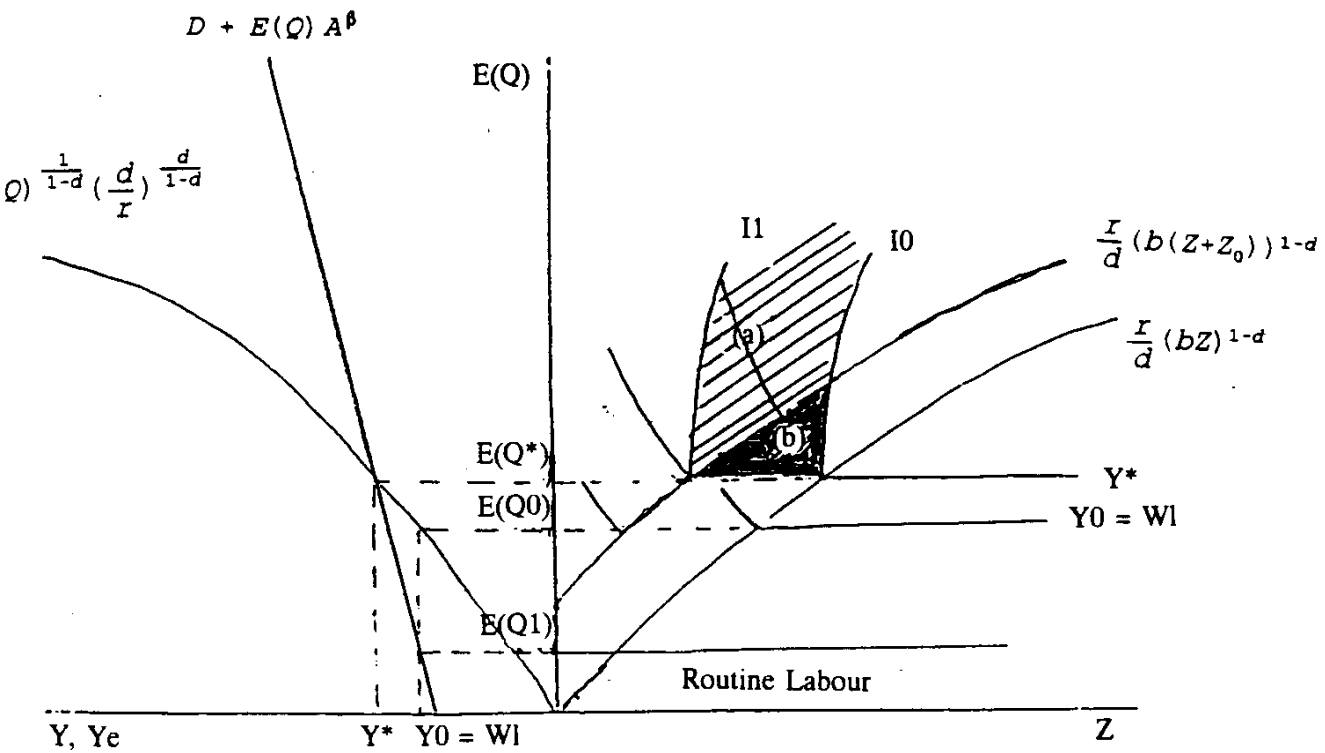
Section 3: Comparative Statics of Capital Grants

In order to represent the full career choice we must introduce routine labour into figure 3. This leads to three possible configurations of W_l relative to $Y = Y_e$ at $E(Q^*)$. These are $W_l < Y$ at $E(Q^*)$, $W_l = Y$ at $E(Q^*)$ and $W_l > Y$ at $E(Q^*)$. A rise in W_l within the range $W_l \leq Y$ at $E(Q^*)$ reduces the supply of corporate entrepreneurs with movement into routine labour. Increases in W_l in the $W_l > Y$ at $E(Q^*)$ zone reduces both corporate and self-employed entrepreneurship supply as individuals move into routine labour employment. These three relative income configurations also have implications for the comparative statics of capital grants.

Capital grants to the self-employed undoubtedly stimulate the numbers of self-employed

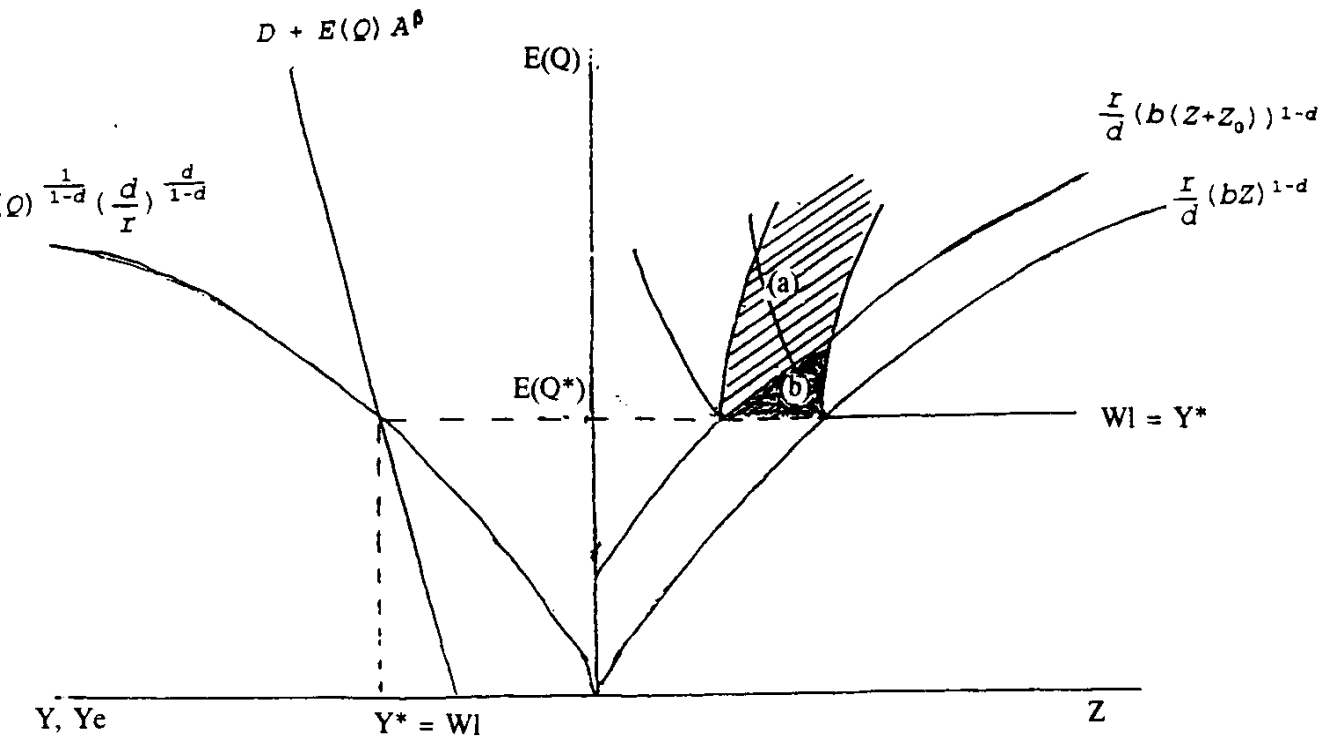
⁵ We make this assumption on the grounds that it appears to be empirically more likely. The adoption of either assumption does not change the conclusions of the analysis except in one area. This is where we increase $E(Q)$ in the limit: the adoption of the assumption $(bZ)^d < A^\beta$ implies that the probability of the individual choosing corporate entrepreneurship as a career approaches 1. If we assume $(bZ)^d > A^\beta$ then as $E(Q)$ increases in the limit the probability of the individual choosing self-employment approaches 1. The first outcome seems more realistic, top entrepreneurs such as James Hanson of Hanson PLC, and Tony O'Reilly of Heinz find that their projects are so large that they cannot be catered for within the constraints of their own initial wealth. They either become corporate entrepreneurs or, if already self-employed, become semi-employed by selling shares and/or merging with other companies.

Figure 4



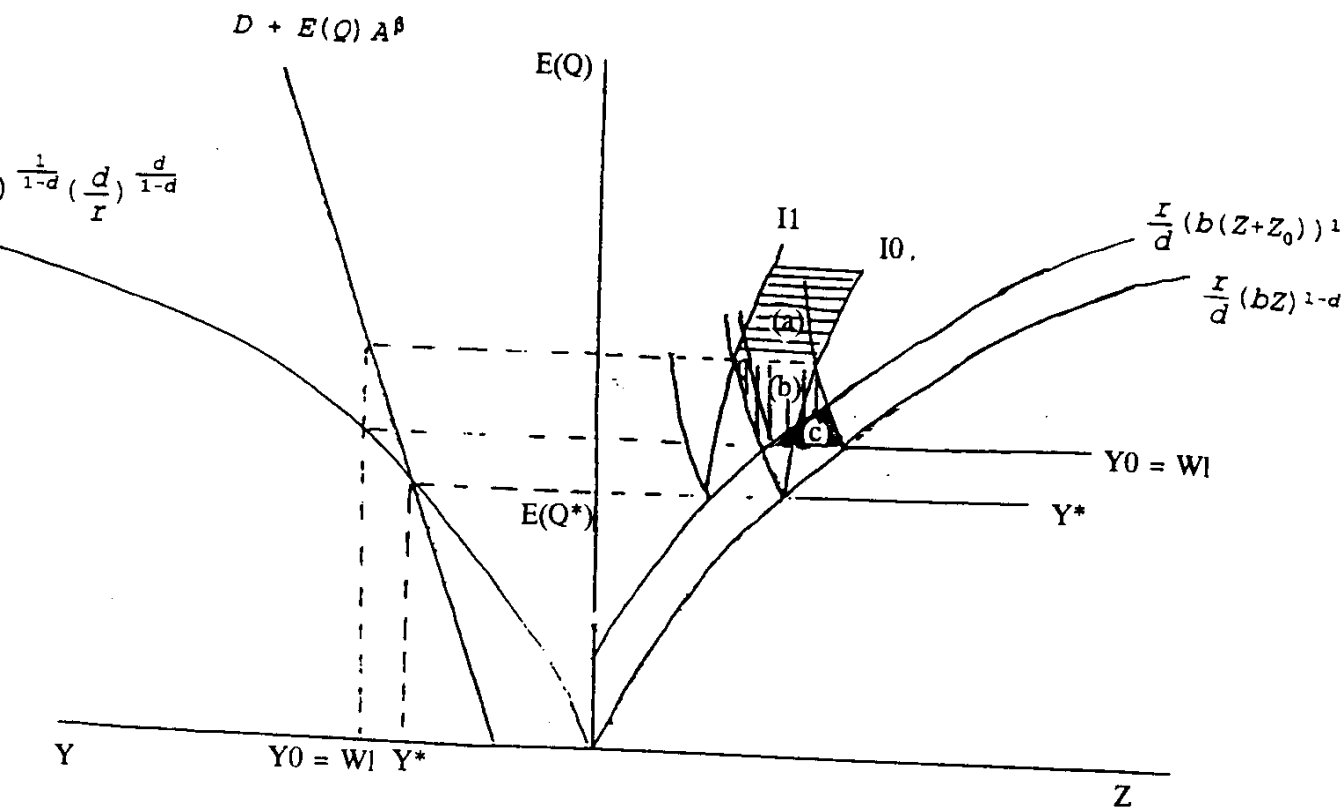
- (a) Movement from Corporate Entrepreneurship to Constrained Self-Employed Entrepreneurship.
- (b) Movement from Corporate Entrepreneurship to Unconstrained Self-Employed Entrepreneurship.

Figure 5



- (a) Movement from Corporate Entrepreneurship to Constrained Self-Employed Entrepreneurship.
- (b) Movement from Corporate Entrepreneurship to Unconstrained Self-Employed Entrepreneurship.

Figure 6



- (a) Movement from Corporate Entrepreneurship to Constrained Self-Employed Entrepreneurship.
- (b) Movement from Routine Labour to Constrained Self-Employed Entrepreneurship.
- (c) Movement from Routine Labour to Unconstrained Self-Employed Entrepreneurship.

entrepreneurs, but do they achieve their desired objective of increasing the level of entrepreneurship ? In figures 4, 5 and 6, we show the effect of the introduction of a capital grant (of amount Z_0) to the self-employed in the respective cases of $W_1 < Y$ at $E(Q^*)$, $W_1 = Y$ at $E(Q^*)$ and $W_1 > Y$ at $E(Q^*)$. This has the same effect as increasing the individual's initial wealth and hence, increases the area in $'E(Q), Z'$ space classified as unconstrained by capital i.e. it shifts the $(r/d)((bZ)^{(1-d)})$ locus up by the amount $(r/d)((bZ_0)^{(1-d)})$. In all regimes the supply of self-employed entrepreneurs increases as self-employment income is enhanced by the reduced capital cost, rZ_0 . Only in the case of constrained self-employment is there a *real* increase in entrepreneurial income⁶:

$$\begin{aligned}
 Y &= Q(bZ)^d + r(Z-k) \\
 \partial Y / \partial Z &= dQ(b^d)(Z^{d-1}) + r \\
 \text{So } \frac{\partial Y}{\partial Z} Z_0 &= dQb^d Z_0^{d-1} + rZ_0 \quad (16) \\
 \text{i.e.} &= (\text{income increase}) + (\text{wealth redistribution})
 \end{aligned}$$

This real increase in income is due to the fact that the capital grant allows constrained entrepreneurs to move towards, and sometimes attain, the optimal level of capital needed.

However, for all cases when W_1 is less than or equal to Y at $E(Q^*)$ the increase in the supply of self-employed entrepreneurs occurs at the expense of an equal reduction in the number of corporate entrepreneurs so that the supply of entrepreneurs remains unchanged. But note carefully that this movement has *changed* the supply of entrepreneurship. Although the number of individuals classified as entrepreneurs has remained unchanged, the number of entrepreneurs who are constrained by capital may be either greater or less than that prior to the introduction of capital grants. The increase is derived from formerly constrained self-employed entrepreneurs now being less constrained by capital in their activities. The reduction is due to former corporate entrepreneurs (who were unconstrained by capital in the corporate sector) moving into capital constrained self-employment. Therefore, the level of entrepreneurship activity may be either greater or less after the introduction of capital grants than before.

Only when $W_1 > Y$ at $E(Q^*)$ does a capital grant cause an increase in the total supply of entrepreneurs; but even in this case there is still a redistribution of entrepreneurs from the corporate to the constrained self-employed sector.

Thus, we see that consideration of corporate entrepreneurship changes the nature of the effect of capital grants significantly. Firstly, we note that its capacity to increase the level of entrepreneurship supply is greatly diminished: in only one regime ($W_1 > Y$ at $E(Q^*)$) did the

⁶ ' rZ_0 ' is not a real increase in entrepreneurial income since it is merely a redistribution of wealth from taxpayers to self-employed entrepreneurs.

supply of entrepreneurs increase. In all other regimes it led to an indefinite impact on the level of entrepreneurship. Thus its overall effect on entrepreneurship supply is ambiguous.

Table 2.

U.K. Total number of business units (factory or site) and % of all units in brackets ().

	<u>Self-Employed</u>	<u>Partnership</u>	<u>Corporate</u>
Agric, Fish and Forestry:	41,379 (36%)	63,462 (56%)	9,121 (8%)
Mining:	125 (10%)	149 (11%)	1,036 (79%)
Manufacture:	34,114 (23%)	25,717 (17%)	90,965 (60%)
Construction:	122,393 (52%)	44,408 (19%)	69,652 (30%)
Road Transport Services:	32,584 (49%)	12,056 (18%)	21,472 (33%)
Other Transport:	251 (10%)	177 (7%)	2,059 (83%)
Post and Communications:	409 (30%)	196 (14%)	766 (56%)
Wholesaling and Dealing:	31,553 (25%)	19,165 (15%)	75,326 (60%)
Retailing:	111,898 (45%)	95,225 (39%)	39,721 (16%)
Finance, Property and Prof Services:	61,385 (41%)	28,965 (19%)	57,872 (39%)
Catering:	47,271 (42%)	49,497 (44%)	16,073 (14%)
Motor Trades:	36,131 (47%)	20,495 (26%)	21,250 (27%)
Business Services and Central Offices:	30,294 (27%)	13,398 (12%)	68,840 (61%)
All Other Services:	52,509 (46%)	23,791 (21%)	37,132 (33%)
Average:	40,153 (40%)	26,447 (26%)	34,086 (34%)

Source: Business Monitor

Secondly, we note a new impact in the form that it changes the distribution of the existing supply of entrepreneurship, encouraging a movement from the corporate sector to the self-employed sector. Given this latter characteristic, we might ask if a redistribution of entrepreneurs may be desirable under any circumstances? If it is true that the self-employed tend to locate in specific sectors of the economy, this reallocation of entrepreneurs from the corporate to the self-employed sector is likely to effect the structure of the industrial base. We examine this more closely by looking at the industrial base broken down according to firm type (self-employed, partnerships, and corporate). This is presented in Table 2 for the U.K. in 1991.

It is clear from Table 2 that specific forms of business activity tend to favour specific forms of ownership. In Table 3 we list the top five most popular form of business activity (measured by the percentage of the sector's market accounted for by the particular form of ownership) for the self-employed and corporate sectors. The Table also lists the percentage of firms within these sectors that had a turnover greater than or equal to £1 million in 1991. The Table shows that among the five most popular forms of business activity there is no common business sector between self-employed and corporate firms. Furthermore, the turnover of the self-employed firms is also much smaller than the corporate firms. On average only 6.8% of the five most popular business activities of self-employed firms have a turnover in excess of £1 million. The comparative level for corporate firms was much higher at 23.2%.

These two facts are interesting on their own merit but combining them contradicts a common belief that encouraging self-employment will initially stimulate smaller enterprises which will eventually grow into large corporate bodies. The data seems to suggest that capital grants would cause self-employed entrepreneurs to locate in sectors *which by their nature require small-scale business activities* and hence, are unlikely to evolve into large corporate enterprises. Far more likely, the capital grant stimulates growth in particular sectors of the economy with particular long term size characteristics. This point is borne out even more strongly when we add into consideration the five least popular business activities for the corporate and self-employed sectors. This is presented in Table 4 in the same format as Table 3. Again we find that there is no common business activity between the self-employed and corporate sectors. But note that the five least popular business activities of the self-employed in Table 4 are exactly the same activities which are the five most popular business activities of the corporate sector in Table 3. Also three out of the five activities listed as the least popular forms of business activity of the corporate sector are among the top five most popular activities of the self-employed sector. Focusing on turnover, we find that the activities the self-employed sector avoids business activities that have high levels of turnover. On average, 23.2% of the units have a turnover in excess of £1 million. On the other hand, the turnover of the activities least liked by the corporate sector tends to be significantly low with on average only 5.4% of units having a turnover exceeding £1 million. Thus, on aggregate, the conclusions we can draw from this evidence is that the dichotomy of business activity between the self-employed and corporate sector implies that one cannot assume that the redistributive effects of capital grants on entrepreneurship supply are short term. Rather the movement is likely to be long term since 'barriers to knowledge' and 'learning from doing' inhibit movement of entrepreneurs between business sectors (see Caves 1971, Sheshinski 1967 and Stiglitz 1987). However, this does not rule its use out as a policy tool. But it does imply that a re-orientation of the goals of capital grants towards changing the *distribution*, rather than the *level*, of entrepreneurship. If, as is often the case, we want to encourage enterprise in particular

sectors of business (say, for example, to have a more diversified industrial base - portfolio GDP approach) capital grants may be used as a stimulus if these sectors are favoured by the self-employed.

Table 3.

1991 U.K. top 5 most common sectors of business activity by percentage of total business units. Also, in brackets (.), percentage of units with a turnover at least as great as £1 million.

<u>Self-employed:</u>	<i>% of units</i>	<i>% >= £1m turnover</i>
(1) Construction:	52	7
(2) Road Trans Servcs:	49	7
(3) Motor Trades:	47	15
(4) All Other Services:	46	2
(5) Retailing:	45	3
Average:	47.8	6.8

Corporate:

(1) Other Transport:	83	33
(2) Mining:	79	36
(3) Business Serv and C.O:	61	8
(4) Manufacture:	60	16
(5) Wholesaling and D:	60	23
Average:	68.6	23.2

Source: Business Monitor.

However, the traditional purpose for which capital grants were intended, namely increasing the number of entrepreneurs, must be seriously reconsidered. We make this assertion on three grounds: (1) The effect of increasing the number of entrepreneurs may only be marginal since

Table 4.

1991 U.K. top 5 least common sectors of business activity by percentage of total business units. Also, in brackets (.), percentage of units with a turnover at least as great as £1 million.

<u>Self-Employed</u>	% of units	% turnover >= £1m
(1) Mining:	10	36
(2) Other Transport:	10	33
(3) Manufacture:	23	16
(4) Wholesaling and D:	25	23
(5) Business Serv and C.O:	27	8
Average:	19	23.2
 <u>Corporate</u>		
(1) Agric, For and Fish:	8	1
(2) Catering:	14	1
(3) Retailing:	16	3
(4) Motor Trades:	27	15
(5) Construction:	30	7
Average:	19	5.4

Source: *Business Monitor*.

this outcome is only ensured under one regime $W1 > Y$ at $E(Q^*)$. (2) The capital grant artificially increases the demand for entrepreneurs in the self-employed sectors of the economy by reducing the cost of capital to this group⁷. (3) There is a redistribution of entrepreneurs in all regimes which may even retard the performance of the stock of entrepreneurs if the proportion of entrepreneurs who are constrained by capital is increased.

Summary and Conclusions

In the paper we advanced the present trajectory of research on entrepreneurship supply by augmenting the self-employment model of Evans and Jovanovic to include corporate entrepreneurs. This resulted in a model of general entrepreneurship supply that can not only be used for comparative static analysis of the impact of various shocks on the supply of entrepreneurship, but can also be inserted into mainstream micro models (where entrepreneurship is a factor) for more general analysis.

The main focus of the study was, however, to assess the impact of capital grants on entrepreneurship. By surveying existing evidence the paper argued that the importance of capital grants was probably overstated in most studies of self-employment given that they did not distinguish between voluntary and involuntary capital constraint. By comparing empirical studies of corporate and owner-manager firms, capital availability is cited as one of the lesser constraints on enterprise activity by the former group.

Using this as an implicit assumption we examined the impact of capital grants via a comparative static analysis of the model. We found that the introduction of capital grants caused a redistribution of entrepreneurs out of the corporate sector into the self-employed sector. This redistribution involved the movement of corporate entrepreneurs into both constrained and unconstrained self-employment. The net effect on the level of entrepreneurship was ambiguous. On the one hand, the re-allocation of entrepreneurs from the corporate sector (which is unconstrained by capital) to the constrained self-employment sector was likely to reduce the effectiveness of this sub-set of entrepreneurs. On the other hand, the introduction of capital grants to self-employed entrepreneurs, who were originally constrained by capital, allowed these to move towards, and sometimes attain, the optimal level of capital they required to enact their enterprise plans. The net impact of these two offsetting effects is unclear and it is important to stress that a welfare analysis must also include the fact that the opportunity costs of financing such a policy is negative.

However, a clear policy recommendation does arise in that the results show clearly that a capital grants policy aimed purely at existing constrained self-employed entrepreneurs, and routine labour with wages $W1 > Y$ at $E(Q^*)$ would unambiguously increase the level of entrepreneurship since it would ensure the above gain while removing the stimulus for corporate entrepreneurs to become constrained self-employed entrepreneurs.

⁷ Sometimes this may correct an imbalance in the capital market that causes smaller companies to be more constrained by capital. See Segal Quince Wicksteed (1988) and Storey et al.



Applying the model to U.K. industry data we discovered that the redistribution of entrepreneurs from the corporate to the self-employed sector is likely to have long-run implications for the underlying structure of the economy. We found that specific activities were favoured by the self-employed and corporate sectors and these tended to be diametrically opposed. Therefore, the evolution of a self-employed firm into a larger scale corporate body has empirically been the exception rather than the rule when one considers such development within a given sector. Other studies, previously cited, have produced strong evidence showing that there are strong economic impediments, centred around information costs, preventing movement of entrepreneurs between industries. Consideration of both of these results implies that the redistribution of entrepreneurs from the corporate to the self-employed sectors of the economy will cause a similar long term restructuring of the industrial base. Tables 1 to 3 provide a clear indication of which industries are likely to contract in the adjustment process. A characteristic of this restructuring will be a higher proportion of small to medium sized firms among total firms.

It is possible that policy makers might want the type of industrial re-emphasis described above. For example, an open economy dominated by large-scale corporate firms might want to reduce its risk exposure to decline in these industries by spreading its GDP more evenly across a range of industries and in this case capital grants would be an effective policy tool. This new redistributive effect of capital grants opens up a whole new dimension for its use in microeconomic policy initiatives but it clearly underlines that macro orientated objectives, utilising capital grants to fulfil those ends, needs to fully incorporate the redistributive effects of capital grants in order to assess whether such a policy is likely to be beneficial or not.

Finally, in light of the fact that capital grants are usually utilised in an unemployment scenario as a means of creating employment, it is worth pointing out that the existence of unemployment above its natural rate does not necessarily enhance the potential of capital grants increasing the total supply of entrepreneurs. As is evident from the model, Schumpeter's (1939) claim that corporate entrepreneurs are free of risk is false as long as firms (who provide the capital) embody some of the risk of capital in entrepreneurs' pay; which we have assumed to be the case in equation (11) via the presence of $E(Q)$. Therefore, if capital grants draw entrepreneurs from the corporate to the self-employed sector, a stock of unemployed labour does not necessarily imply that the corporate sector can replace lost entrepreneurs by employing currently unemployed labour since these new corporate entrepreneurs must be willing to embody entrepreneurial risk in their income. If such potential entrepreneurs are more risk averse than their predecessors, the corporate sector will be forced to offer higher wages thereby reducing optimal output and employment in this sector.

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