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JOB CREATION AND THE SELF-EMPLOYED:
A STORY OF LIFE, WEALTH AND VOCATIONAL
QUALIFICATIONS

Marc Cowling, Peter Mitchell and Mark Taylor

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Job Creation and the Self-Employed:
A Story of Life, Wealth and Vocational Qualifications

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Abstract

This paper develops the theory of utility based switching models of self-employment to allow for a significant component of the self-employed, namely the self-employed with employees, who have thus far been ignored in both the theoretical and empirical literature\(^1\). The model predicts that the higher the endowment of human capital the greater the likelihood of the entrepreneur employing additional labour and of making the transition from individual self-employment to self-employment with employees, subject to overcoming any capital constraints. Aspects of the model are then tested against empirical data from the British Household Panel Survey. The key findings are that the decision to hire employees is related to work and lifetime experiences rather than academic achievements. There is also an important and complementary role for financial capital.

I. Introduction

Economic theory has spawned a volume of literature relating to new firm formation and more specifically to market entry over a considerable period of time (see Acs and Audretsch, 1989, Kessides, 1990 and Robson, 1996 for some recent examples). More recently, the focus of attention has shifted to consider questions relating to the dramatic growth in self-employment and entrepreneurship that has occurred in most developed economies over the last decade (see OECD, 1992). In line with this there is now a significant body of theoretical and empirical work relating to this phenomenon. However, at the firm level the discussion has tended to focus on the larger firm reflecting the more traditional interests of industrial economists, whilst the discussion at the self-employed or entrepreneurial level has, by comparison, focused very specifically on the individual (see for example Cowling and Mitchell, 1996, Holtz-

\(^1\) The exception being Caroll et al (1996) using US data.
Eakin, Joulfaiain, Rosen, 1994 or Blau, 1987). Yet these literatures are not as disparate as they might seem, given that it is individuals who start firms.

Yet it is apparent that there is a significant component of the self-employed that are to all intents and purposes micro-businesses. That is to say that the entrepreneurs labour is augmented by the employment of further labour units. In the UK, for instance, over 800,000 (or 25%) of the total self-employed employ other workers, a figure similar to that recorded in Japan and Canada, but much less than the 60.8% reported in Germany (see OECD ‘Labour Force Statistics’ and ‘Economic Outlooks’ for statistical information relating to cross-country variations in self-employment rates).

With this in mind, our line of argument is that there are effectively two categories of self-employment, namely; (a) individual self-employment, and (b) self-employment with employees, and furthermore that these two categories are significantly different in terms of the way they are managed, the constraints they face at start-up and in terms of the way public policy should accommodate them. As such they should be investigated accordingly (i.e. as two related, but distinct groups). That is to say that the decision rules for individuals choosing to enter either of these two categories of self-employment will be different. To date this aspect of self-employment has not been considered in the literature and we believe that this is an important omission which should be addressed in order that empirical work can incorporate this important component of the self-employed.

In the light of this we discuss, in the next section, in the context of two simple theoretical models, the decision rules which our two subsets of the self-employed, hitherto referred to as ISEs and SEWEs, use to determine the choice between four labour market states; those of self-employment, paid (or waged) employment and unemployment.

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2 A micro business can be defined as one which has less than ten employees.
II. A Theoretical Framework for ISEs and SEWEs.

Our starting point is with the individual who we assume to be risk-neutral. Following the standard theoretical models (see Blau, 1987 or Rees and Shah, 1986), the individual simply compares expected utility from each activity. For simplicity, and in line with Robson (1996) and Taylor (1996), we assume utility to be a positive function of net income earned from each of the competing activities. In doing so we neglect other non-pecuniary factors e.g. that utility that may be gained from being in control of one's work (see Blanchflower and Oswald, 1996, for a theoretical exposition and empirical test of non-pecuniary utility attributable to the self-employed). However, empirical evidence from Cowling and Mitchell (1996) and Fujii and Hawley (1991) who state that by far the most powerful predictor of choice of mode of work is the predicted income differential, suggests that this approach has a degree of validity.

Given our assumptions and utilising a Cobb-Douglas functional form we can derive a revenue equation based on six fundamental parameters. Our choice of functional form is based on empirical evidence from Reid (1992) and Cowling (1997), both of whom found that this type of specification performed well for samples of small businesses in Scotland and the UK respectively over different time periods. Here $Y$ is net income, $K$ the amount of capital invested in the business and $r$ the interest rate on borrowed capital. $\delta$ is a shift parameter in the revenue function that reflects the individuals endowment of human capital (sometimes referred to as entrepreneurial ability). The latter is assumed not to be known either by the individual or by other agents in line with Jovanovic (1982). On the nature of entrepreneurial ability, we take on board the work of Casson (1996), who identifies two fundamental roles for the entrepreneur. The first is an explicitly entrepreneurial role in which the entrepreneur monitors the external environment for new opportunities, new markets and new products, and the second is a more formalised role or function which can be carried out by others at least as efficiently as the entrepreneur. Finally, $\sigma$ is a random variable that captures
fluctuations in aggregate demand around trend levels and \( w \) is the wage rate paid to labour.

Net income for an ISE is then defined as;

\[
y_{i}^{ISE} = \sigma \delta\, K_i^\alpha - r K_i \quad \alpha > 0 \quad (1a)
\]

The corresponding definition for SEWEs is;

\[
y_{i}^{SEWE} = \sigma \delta\, K_i^\alpha (1 + L_i) - w L_i - r K_i \quad \alpha + \beta < 1 \quad (1b)
\]

The optimal choices for capital and labour for ISEs and SEWEs are then given by maximising (1a) and (1b) subject to the Kuhn-Tucker non-linear programming conditions set out below. Dropping subscript ‘i’ for convenience;

\[
K > 0, \quad \frac{\partial y}{\partial K} = 0 \quad (2a)
\]

\[
L \geq 0, \quad \frac{\partial y}{\partial L} \leq 0 \quad \text{and} \quad L\left(\frac{\partial y}{\partial L}\right) = 0 \quad (2b)
\]

Applying (2a) to (1a) gives the optimal capital stock for ISEs;

\[
K^{ISE*} = \left(\frac{r}{\sigma \delta \alpha}\right)^{\frac{1}{\alpha - 1}} \quad (3a)
\]

Thus, the optimal capital stock is declining in interest rates and increasing in demand and human capital. In similar fashion, applying (2a), (2b) to (1b), then gives the optimal capital stock and labour input for SEWEs;

\[
K^{SEWE*} = \left(\sigma \delta \alpha^{1-\beta} \beta \frac{w}{\beta} r^{\beta - 1}\right)^{\frac{1}{1-\alpha - \beta}} \quad (3bi)
\]
\[ L = \left( \alpha \delta \alpha^a \beta^{1-a} w^{a-1} r^{-a} \right)^{\frac{1}{1-\alpha}} \] where \( \bar{L} = 1 + L \) (3bii)

Here we assume perfect substitutability between 'own-labour' and other labour for the non-entrepreneurial component of the entrepreneur's labour. The entrepreneur is simply augmenting his or her 'own-labour' by the labour of others. As such we allow for the entrepreneur to assign a shadow value of 'own-labour' to equal the market wage which is determined exogenously. Thus \( L \) can be denoted as total employment.

To tie up the model neatly, we assume decreasing returns to labour.

As for ISEs, the capital stock is declining in interest rates reflecting the higher cost of capital and increasing in demand and human capital for the SEWE. Regarding SEWEs it is also shown that the optimal labour input is declining in the real wage and increasing in demand and human capital. The role of human capital is of great import here in the sense that, holding all other factors constant, individuals with high endowments of human capital will tend to employ larger workforces than individuals at the lower end of the human capital distribution. This is consistent with Brock and Evans (1986) who allow for differences in entrepreneurial ability amongst potential entrants to determine firm size. It is also consistent with the central result of the famous Lucas (1978) paper from which the later work of Brock and Evans was derived.

Regarding capital inputs we note that there are two potential sources of finance for business start-up, namely the individuals stock of wealth and borrowing from financial institutions. In doing so we neglect any role for venture capital, which is notoriously difficult to obtain in amounts of less than £200,000, as an irrelevance for the vast majority of start-ups. With this in mind, and taking into account that each persons entrepreneurial ability is not directly observable (by banks), the possibility of credit rationing occurs with some individuals facing a constraint on the amount they can borrow. Here we assume that individual wealth has two components, liquid assets and non-liquid assets (which includes physical assets such as housing wealth). The latter is of the utmost importance since its value may be used as collateral against
which borrowing may be secured. If we assume that the supply of lending is proportional to the value of non-liquid assets, then the self-employed person has a total available finance of \( A = A^l + \pi A^{nl} \) and \( 0 < \pi < 1 \). Here, superscript ‘\( l \)’ denotes liquid assets and superscript ‘\( nl \)’ denotes non-liquid assets. This represents the total capital available to fund start-up. We also note here that if \( K^* > A \), then self-employment is not optimal which we define as credit constrained. In addition, we assume that the capital required to fund an SEWE is greater than the capital required to fund an ISE. Thus \( K^{sewe*} > K^{ise*} \), and we would thus expect that there is a greater potential for capital constraints to occur at the \( \text{with employees} \) level where there is a higher optimal level of start-up capital.

We now focus upon identifying threshold values for human capital. In doing so we identify the marginal individual who makes the transition between self-employment and waged employment in the first instance and self-employment and unemployment in the second instance. In addition, we also derive the threshold value of \( \delta \) above which the ISE makes the transition to an SEWE. Once again we distinguish between ISEs and SEWEs.

**Threshold Levels for Human Capital.**

In this section, we derive five transition threshold levels at which the marginal individual is indifferent between each potential pair of labour market states. To give an intuitive feel for this, Figure 1 depicts the real world status of the UK labour market and identifies the relevant transitions. The particular point of focus here is on the identification of the \( \delta \) parameter, which is explicitly our human capital or entrepreneurial ability parameter. We begin by deriving the threshold level for the transition between waged or salaried employment to individual self-employment (ISE), and then work our way through the five possible transitions between different states of the labour market.
Fig 1.

DIRECT AND INDIRECT EMPLOYMENT EFFECTS

```
DIRECT                INDIRECT

ISE
2,482,000

UN
2,300,000

SEWE
873,000

WAGED
25,753,000

1,750,000
= 7% of wage employed

We note here that the flows are in actuality both ways between each labour market state. Yet for our purposes we are particularly concerned with flows into and within self-employment, hence the observed direction of the arrows depicting flows. Whilst the incorporated figures are clearly rough and ready approximations of the real position of the UK labour market they are included to give a broad brush feel for the respective labour market states under consideration in this paper. We now concern ourselves with deriving the respective transition thresholds between the different states of the labour market.

Employment => ISE

\[ \sigma \delta \left( K^{ISE}\gamma \right) - rK^{ISE} \geq w \] yields \[ \gamma \left( \sigma \delta r^{-\alpha} \right)^{\frac{1}{1-\alpha}} \geq w \] where \[ \gamma = \alpha^{\frac{1}{1-\alpha}} \left( \alpha^{\alpha} - 1 \right) \]

at the margin \[ \delta_0 = \frac{\gamma^{\alpha-1}w^{1-\alpha}r^{\alpha}}{\sigma} \]  (4a)
Here, the marginal individual is the one, who given the wage, interest rates and demand conditions is indifferent to either waged employment or individual self-employment. For persons in paid employment entry into self-employment is desirable if the expected income in self-employment, as an ISE is greater than the expected income in waged employment which can be expressed as, \( E[Y_{1}^{ise} - Y_{1}^{w}] > 0 \).

We now turn our attention to the transition threshold between unemployment and individual self-employment. Once again the marginal individual is the person who is just indifferent between unemployment and self-employment.

Unemployment => ISE

\[
\sigma \delta (K^{ise}) - rK^{ise} \geq qw + (1-q)b \quad \text{yields} \quad \gamma \left( \sigma \delta r^{-\alpha} \right)^{1-\alpha} \geq qw + (1-q)b
\]

at the margin \( \delta_1 = \frac{\gamma^{\alpha-1}(qw + (1-q)b)^{1-\alpha} r^{-\alpha}}{\sigma} \) (4b)

Here ‘q’ reflects the individuals probability of receiving an acceptable job offer in which case he or she receives ‘w’, the wage rate or if no acceptable offer presents itself the individual receives ‘b’, the rate of unemployment benefit. As for those in paid employment, entry into self-employment is desirable if the expected income in self-employment exceeds the expected income in unemployment defined as, \( qw + (1-q)b \). Once more, the marginal individual is the person who is just indifferent between self-employment and unemployment.

Having identified the transitions into individual self-employment, which is by far the most common form of self-employment in the UK and the majority of other economies, we now focus on the self-employed with employees (SEWEs). This cohort of the self-employed, at least in policy terms, is the focus of a great deal of
public sector attention at the moment as policy makers increasingly focus on what are often termed potential growth firms. Consistent with this, policy ultimately aimed at new job generation is now targeted at raising individuals human capital which is perceived to be an even greater constraint on growth than financial constraints. On this note we now derive the three relevant transition thresholds for SEWEs from employment, unemployment and finally from individual self-employment.

Employment $\Rightarrow$ SEWE

$$\sigma \delta \left( K^{\text{SEWE}^*} \right)^{a} \left( L^{\text{SEWE}^*} \right)^{b} - r K^{\text{SEWE}^*} - w L^{\text{SEWE}^*} \geq w \; \text{yields} \; \phi \left( \sigma \delta w^{-\beta} r^{-\alpha} \right)^{1-\alpha-\beta} \geq w \; \text{where}$$

$$\phi = \alpha \beta^{1-\alpha-\beta} \left( \alpha \beta^{\beta} - \alpha \beta^{1-\alpha} - \alpha^{1-\beta} \beta^{\beta} \right).$$

At the margin

$$\hat{\delta}_2 = \frac{w^{1-\alpha} \sigma^{\alpha+\beta-1}}{\phi} \; \text{(5a)}$$

Entry into SEWE from employment is triggered by expected net income from SEWE being larger than the wage received in employment. The marginal individual is just indifferent between being in either state, given the wage, cost of capital and the level of demand.

Entry into SEWE from unemployment is determined by the comparison of expected net income, where for simplicity the alternative wage for hiring extra labour units is assumed to be the same as that for the entrepreneur. Again the marginal type moves into SEWE if his ability index exceeds $\delta_3$ which is a function of income in unemployment, capital, hiring costs and the state of aggregate demand.

Unemployment $\Rightarrow$ SEWE

$$\sigma \delta \left( K^{\text{SEWE}^*} \right)^{a} \left( L^{\text{SEWE}^*} \right)^{b} - r K^{\text{SEWE}^*} - w L^{\text{SEWE}^*} \geq q w + (1-q) b \; \text{gives.}$$

at the margin

$$\hat{\delta}_3 = \frac{(q w + (1-q) b)^{1-\alpha-\beta} w^{\beta} \sigma \phi^{\alpha+\beta-1}}{\phi} \; \text{(5b)}$$

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We note here that issues surrounding the flow of unemployed people into self-employment have been the subject of much debate at both the theoretical and empirical level. The 'recession-push' hypothesis implies that when the probability of unemployment increases then the number of self-employed will increase. However, if the revenue function of the self-employed also shifts down in recession, then the overall effect is ambiguous. Empirically, a number of papers have found support for the recession-push hypothesis (see for instance Acs, Audretsch and Evans,1991, or Meager,1992a). Yet for the most part studies of this nature have failed to disaggregate the unemployed into short-term and long-term unemployed, thus the positive effect reported may be dominated by the largest of these two quite distinct groups. This aspect was however tested in a UK time-series study by Cowling and Mitchell (1996), who found that, in the long-run, short and long-term unemployment had roughly equal but opposite effects acting negatively and positively upon self-employment respectively. On this basis they concluded that it is the duration structure of unemployment which matters not simply the stock of unemployed people. An alternative interpretation might argue that the long-term unemployed are likely to possess significantly lower values of $\delta$ than the short-term unemployed and although they have relatively low $q$ values this is unlikely to offset the entrepreneurial ability effect. Importantly, Storey (1991,p.177) reports that, 'the broad consensus is that time series analysis point to unemployment being, ceteris paribus, positively associated with indices of new firm formation, whereas cross-sectional studies appear to indicate the reverse.'

Finally we turn to what is perhaps the most interesting transition threshold and arguably the most worthy of empirical investigation, that between individual self-employment and self-employment with employees. Recent evidence from the US by Caroll, Holtz-Eakin, Rider and Rosen (1996) shows that only 7% of ISEs made the transition to SEWEs over a three year period. The important research question is why don’t larger numbers of ISEs make the transition to SEWEs. On this Caroll et al (1996) found that taxes had an important role to play. However, the nature of their data set meant that a wider range of potentially important demographic and personal
characteristics were not available. To this end the nature of human capital constraints need to be identified before it is feasible that public policy can correct for any identifiable deficiencies. With this in mind the theoretical derivation of the transition threshold, defined as it is in terms of human capital or entrepreneurial ability, is an important step in preparing the ground for empirical analysis. The threshold or margin is identified below.

\[ ISE \Rightarrow SEWE \]

The parametric condition which must hold for \( L = 0 \) to be a valid solution is

\[ \beta \sigma \delta K^{ISE^*} - w \leq 0. \] Substituting for \( K^{ISE^*} \) gives \( w \geq \left( \frac{r^a}{\beta \sigma \delta} \right)^{1/(a-1)} \) from which the threshold value for \( \delta \) at the margin is

\[ \hat{\delta} = \frac{w^{a-1}r^{-a} \beta^{-1}}{\sigma}. \] (6)

The final threshold, that relating to the transition between ISE and SEWE is worthy of further discussion, much of which can be related to the work of Jovanovic (1982) which can still be regarded as the most influential work concerning the growth and survival of firms. In essence, Jovanovic starts with the assumption that firms, or more explicitly entrepreneurs, have incomplete information at start-up and they learn more about their efficiency as they operate in an industry. The efficient grow and survive and the inefficient decline and fail. Thus firms differ in size not because of any fixed capital accumulation per se but because some discover that they are more efficient than others. The recent empirical findings of Phillips and Kirchoff (1989a) that zero growth firms had between 2 and 3 times the failure rates of even low growth firms, over the eight year period measured, tends to offer support for the Jovanovic theory.

In this sense our human capital distribution takes into account some sort of learning-by-doing experience for those individuals already operating in the self-employed sector which then, over time, gives those who remain in self-employment, on average, a much increased level of entrepreneurial human capital and thus a greater chance of making the transition from ISE to SEWE. This occurs as in our model \( \delta \) is a fixed
parameter which doesn’t change over time, thus as one’s experience of ISE increases the probability of achieving the threshold parameter level of human capital also increases, thus easing the potential transition to an SEWE.

Having identified the relevant transition thresholds for human capital in all possible states, we can now begin to develop our discussion of these margins subject to a number of assumptions about the respective distributions of human capital. Our first assumption is that the distribution of human capital for those in waged employment is different from that of those who are unemployed and will tend to reflect factors such as education and on-the-job training for the employed and skills obsolescence amongst the longer-term unemployed. Furthermore, we also assume that the level of human capital required to organise and employ others is greater than that required to organise one’s own work. This reflects the need to fulfil a much wider range of managerial competencies than is the case for the individual.

In terms of our identifiable thresholds, we note that irrespective of one’s current state in the labour market the threshold level of human capital for SEWEs is higher than the threshold level for ISEs. Thus $\delta_0 < \delta_2$ and likewise $\delta_1 < \delta_3$. For this reason, we would expect that the majority of the self-employed operate as ISEs rather than SEWEs, as is borne out by the self-employment statistics for most countries.

This aspect does however raise some important policy related issues, particularly for the UK where the government for the last sixteen years has been promoting self-employment as a means of reducing unemployment. If indeed the self-employed could create additional employment by making the transition from ISEs to SEWEs by raising the average level of human capital, implying a shift in the distribution of human capital to the right, then policies aimed at doing this might prove to be fruitful.

In more general terms, the thresholds derived also reflect the point that it is more difficult for the currently unemployed to enter any form of self-employment than it is for the currently employed, given our assumptions regarding the relative distributions of human capital amongst the two groups. This implies that policies aimed at raising
the mean level of human capital amongst the unemployed may be successful in terms of encouraging this cohort of the labour force to move into self-employment.

Fig.2

Optimal Combinations of Human and Financial Capital Inputs to the Self-Employed Firm

Quadrant

(a) \( K > K^*, \delta < \hat{\delta} \)
(b) \( K > K^*, \delta > \hat{\delta} \)
(c) \( K < K^*, \delta < \hat{\delta} \)
(d) \( K < K^*, \delta > \hat{\delta} \)

From Fig 2, we can identify four quadrants (denoted (a), (b), (c), (d)). For a given optimal combination of \([K, \delta]\) defined on the curve OC we can observe that in both (a) and (b) there is no finance capital constraint on the entrepreneur. However, in quadrants (c) and (d) the entrepreneurs wealth and collateralisable assets are below that required to reach the optimal capital threshold. Thus for this group self-employment is not optimal due to an effective finance constraint. This is not to say that the individual will not enter self-employment but simply that he or she faces a real constraint in terms of access to finance. In a similar vein quadrants (a) and (c) define areas in which the entrepreneur does not possess the optimal level of human
capital. Thus he or she is faced with a real human capital constraint. In terms of the optimal combination curve, OC, which exhibits declining marginal productivity of human capital, the implication is that the lower levels of education and training, perhaps of a vocational nature or in basic management skills, are more important than higher less job orientated educational achievements. In terms of moving towards an explanation of why failure rates amongst the self-employed and smaller firms in general are so high, the theory might suggest that the majority of failures are located in quadrant (c) with the next highest failure rates occurring in quadrants (a) and (d) depending upon whether the finance capital or human capital constraint is more binding. Thus we are left predicting that the majority of high flyers and successful self-employed individuals are located in quadrant (b) and face no constraints.

III. Summary of the Theory.

We have developed and extended the standard type theoretical models governing the decision to move into self-employment to allow for the individual employing other workers. In doing so we have identified the threshold levels of human capital which influence the individuals ability to switch between the four (previous work identifies only three) states of the labour market, namely waged employment, unemployment, individual self-employment and self-employment with employees.

In extending the theoretical base we hope to establish a framework for our empirical analysis of this important phenomenon. At the heart of the models presented is the role that human capital plays in the entry, or switching decision, with higher endowments leading to an increased likelihood of employing other labour. The theory also defines groups of the potential and actual self-employed that are constrained by either human capital or finance capital or both. In addition the optimal human capital input exhibits decreasing marginal returns. There are some obvious policy conclusions to be drawn if the theory, when tested empirically, can be supported. For example, an extended programme of business training for the currently unemployed aimed at raising the levels of human capital might be a first step towards encouraging entry.
into ISE. Once operating as an ISE, a further programme aimed at overcoming barriers to growth and expanding employment might permit a higher proportion of the self-employed to make the transition from ISE to SEWE thus generating additional employment opportunities in the process.

However, human capital augmenting training may be of limited use if the self-employed find themselves capital constrained. It would thus seem that a two-pronged approach is the most desirable one with schemes like the Loan Guarantee Scheme, or indeed the Business Start-Up Scheme, linking the availability of finance to an extended programme of training. This indeed is the way forward that at least two of the big-four UK banks have chosen in the start-up area given the excessively high closure rates of start-up businesses reported in the 1980’s.

IV Empirical Estimation

This takes the form of estimating five probit equations. We examine the effects of individual characteristics on the chosen employment status of the individual. In particular, we estimate one equation for each of the employment decisions outlined in the theoretical section, i.e. the individual self-employment - wage employment decision, the self-employment with employees - wage employment decision, the individual self-employment - unemployment decision, the self-employment with employees - unemployment decision, and the self-employment with employees - individual self-employment decision.

The Data

This paper uses the fifth wave of the BHPS, a nationally representative data set of around 5,500 households and 9,000 individuals residing in Britain south of the Caledonian Canal. Wave 5 of the survey was carried in the Autumn/Winter of 1995, and is the most recent available wave (it should be noted that all numbers have been

Confining our interest to those individuals active in the labour market at the time of interview, and discarding observations with missing data for any of the relevant variables, results in a sample of some 5,712 observations of which 668 (or 11.7%) are self-employed, 381 (or 6.7%) unemployed and the remaining 4663 (or 81.6%) in wage employment. Of the self-employed, 465 (or 69.6%) are ISEs and 203 (30.4%) are defined SEWEs. Selection of individuals into wage employment and self-employment (both ISE and SEWE) depends on the subjective classification of the respondents. The unemployed are those out of work on the date of interview and who have actively searched for employment in the four weeks prior to interview.

Sample Statistics

From Table 1, a number of potentially important differences are apparent between our four identifiable labour market states. In short, ISEs were more likely to have university degrees than all other types of workers, although SEWEs were more likely to have vocational related qualifications.

Both subsets of the self-employed were more likely to be male and were older on average. In terms of geographical location, ISEs tended to be more concentrated in London, whilst SEWEs were the least likely. On wealth, SEWEs were found to possess substantially more assets than all other workers, and the wealth ranking by order of magnitude was SEWE, ISE, Waged, Unemployed. This was also true for our alternative wealth measure which takes into account interest and dividend income. Here SEWEs, on average, were twice as likely than the waged employed to derive income from this source. On occupational status, SEWEs were more likely to be in professional/managerial and non-manual occupations than the waged employed or ISEs.
Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>ISE</th>
<th></th>
<th>SEWE</th>
<th></th>
<th>W</th>
<th></th>
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<td></td>
<td>Mean</td>
<td>Std Dev</td>
<td>Mean</td>
<td>Std Dev</td>
<td>Mean</td>
<td>Std Dev</td>
<td>Mean</td>
<td>Std Dev</td>
</tr>
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<td><strong>Highest qual.</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher degree</td>
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<td>0.47</td>
<td>0.00</td>
<td>0.07</td>
<td>0.02</td>
<td>0.15</td>
<td>0.02</td>
<td>0.14</td>
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<td>First degree</td>
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<td>0.31</td>
<td>0.08</td>
<td>0.28</td>
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<tr>
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<td>0.37</td>
</tr>
<tr>
<td>A Levels or equiv.</td>
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<td>0.33</td>
<td>0.12</td>
<td>0.32</td>
<td>0.13</td>
<td>0.34</td>
<td>0.13</td>
<td>0.34</td>
</tr>
<tr>
<td>O Levels or equiv.</td>
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<td>0.40</td>
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<td>0.29</td>
<td>0.09</td>
<td>0.29</td>
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<td>10.90</td>
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<tr>
<td>Age²/100</td>
<td>20.80</td>
<td>12.37</td>
<td>23.60</td>
<td>10.37</td>
<td>16.07</td>
<td>10.26</td>
<td>12.52</td>
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<td>0.21</td>
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<td>Health limits work</td>
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<td>0.48</td>
<td>0.41</td>
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<td>Lives in London</td>
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<td>0.09</td>
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<td>0.12</td>
<td>0.33</td>
<td>0.13</td>
<td>0.34</td>
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<td>Lives in South East</td>
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<td>0.56</td>
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<td>0.63</td>
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<td>Has child under 5 yrs</td>
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<td>0.12</td>
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<td>0.14</td>
<td>0.35</td>
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</tr>
<tr>
<td>Assets (£10,000)</td>
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<td>7.92</td>
<td>11.34</td>
<td>9.43</td>
<td>5.95</td>
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<td>3.98</td>
<td>5.41</td>
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<td>Interest/divs&gt;£100pa</td>
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<td>0.46</td>
<td>0.47</td>
<td>0.50</td>
<td>0.24</td>
<td>0.42</td>
<td>0.10</td>
<td>0.30</td>
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<tr>
<td><strong>Occupation measures</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional/manager</td>
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<td>0.59</td>
<td>0.49</td>
<td>0.35</td>
<td>0.48</td>
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</tr>
<tr>
<td>Other non-manual</td>
<td>0.08</td>
<td>0.28</td>
<td>0.13</td>
<td>0.33</td>
<td>0.26</td>
<td>0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled manual</td>
<td>0.35</td>
<td>0.48</td>
<td>0.19</td>
<td>0.39</td>
<td>0.18</td>
<td>0.38</td>
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<tr>
<td><strong>N</strong></td>
<td>465</td>
<td>203</td>
<td>4663</td>
<td>381</td>
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</table>

**Results**

Table 2 shows the probit estimates for the employment decision equations. The first column presents the effects of the explanatory variables on the probability of being in ISE relative to wage employment. Interestingly, the only difference in terms of formal qualifications between the two groups was that ISEs were more likely to have
‘A’ Levels, which is not strong evidence in support of the human capital theory. Further investigation of the results show that ISEs are more likely to be skilled manual workers, whereas waged employees are more likely to be in professional or other non-manual occupations.

There was, however, evidence that financial capital, measured by assets, was an important area of distinction, with ISEs having substantially more assets. This aspect is consistent with the results reported in many of the most prominent works in this area (see Evans and Jovanovic, 1989, Holtz-Eakin et al., 1994a; b, Robson, 1996, Cowling and Mitchell, 1996, Black et al., 1996). This implies that substantial assets can act as an important means of overcoming credit constraints for the self-employed, either by reducing the need for external financing, or by leveraging debt finance from banks via a collateral effect. Importantly, the results thus far reinforce the Blanchflower and Oswald (1995) finding that around 15% of the waged employed in Britain had actively considered self-employment but that many felt constrained from doing so by a lack of finance.

In addition, a number of other demographic variables were found to be important in distinguishing between ISEs and the waged employed. Typically, the profile of an ISE is a single male, with no mortgage, living in London or the South East. Other distinguishing characteristics were an increased probability of being born outside of Great Britain, and if married having a working partner and a young child. Further, ISEs were more likely to have a health problem which limits the amount of work hours they can supply.
<table>
<thead>
<tr>
<th>Variable</th>
<th>ISE-W</th>
<th>SEWE-W</th>
<th>ISE-U</th>
<th>SEWE-U</th>
<th>SEWE-ISE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-2.286 (8.85)</td>
<td>-4.145 (9.00)</td>
<td>-2.656 (6.13)</td>
<td>-5.308 (6.92)</td>
<td>-3.400 (4.57)</td>
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<tr>
<td>Highest qual.</td>
<td></td>
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</tr>
<tr>
<td>Higher degree</td>
<td>0.164 (0.97)</td>
<td>-1.432 (3.40)</td>
<td>0.084 (0.25)</td>
<td>-1.472 (1.72)</td>
<td>-1.856 (3.18)</td>
</tr>
<tr>
<td>First degree</td>
<td>0.165 (1.47)</td>
<td>-0.444 (2.76)</td>
<td>0.296 (1.49)</td>
<td>-0.504 (1.64)</td>
<td>-0.477 (1.90)</td>
</tr>
<tr>
<td>Other higher qual.</td>
<td>0.133 (1.56)</td>
<td>-0.163 (1.40)</td>
<td>0.488 (3.03)</td>
<td>0.446 (2.09)</td>
<td>-0.185 (1.07)</td>
</tr>
<tr>
<td>A Levels or equiv.</td>
<td>0.182 (1.81)</td>
<td>-0.066 (0.46)</td>
<td>0.214 (1.17)</td>
<td>-0.076 (0.29)</td>
<td>-0.161 (0.77)</td>
</tr>
<tr>
<td>O Levels or equiv.</td>
<td>0.090 (1.05)</td>
<td>0.032 (0.27)</td>
<td>0.188 (1.17)</td>
<td>0.162 (0.75)</td>
<td>0.104 (0.59)</td>
</tr>
<tr>
<td>Other qualification</td>
<td>0.003 (0.03)</td>
<td>0.113 (0.80)</td>
<td>0.195 (0.96)</td>
<td>0.456 (1.72)</td>
<td>0.060 (0.27)</td>
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<tr>
<td>Demographics</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0.417 (7.26)</td>
<td>0.450 (5.51)</td>
<td>0.535 (5.12)</td>
<td>0.663 (4.37)</td>
<td>0.077 (0.57)</td>
</tr>
<tr>
<td>Age</td>
<td>0.008 (0.63)</td>
<td>0.058 (2.74)</td>
<td>0.066 (3.04)</td>
<td>0.153 (4.19)</td>
<td>0.099 (3.00)</td>
</tr>
<tr>
<td>Age²/100</td>
<td>0.013 (0.88)</td>
<td>-0.046 (1.93)</td>
<td>-0.046 (1.80)</td>
<td>-0.144 (3.37)</td>
<td>-0.107 (3.02)</td>
</tr>
<tr>
<td>Non-white</td>
<td>-0.179 (1.21)</td>
<td>0.126 (0.51)</td>
<td>-0.253 (1.12)</td>
<td>-0.055 (0.14)</td>
<td>0.182 (0.50)</td>
</tr>
<tr>
<td>Born outside GB</td>
<td>0.319 (2.88)</td>
<td>-0.031 (0.16)</td>
<td>0.031 (0.16)</td>
<td>-0.131 (0.39)</td>
<td>-0.431 (1.55)</td>
</tr>
<tr>
<td>Health limits work</td>
<td>0.170 (1.84)</td>
<td>-0.022 (0.16)</td>
<td>-0.584 (3.91)</td>
<td>-1.031 (4.47)</td>
<td>-0.215 (1.02)</td>
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<td>Has a mortgage</td>
<td>-0.177 (2.95)</td>
<td>-0.291 (3.40)</td>
<td>0.239 (2.03)</td>
<td>0.106 (0.63)</td>
<td>0.021 (0.16)</td>
</tr>
<tr>
<td>Lives in London</td>
<td>0.256 (3.34)</td>
<td>-0.260 (2.02)</td>
<td>0.341 (2.18)</td>
<td>-0.048 (0.17)</td>
<td>-0.360 (1.87)</td>
</tr>
<tr>
<td>Lives in South East</td>
<td>0.104 (1.67)</td>
<td>0.109 (1.31)</td>
<td>0.093 (0.76)</td>
<td>-0.007 (0.04)</td>
<td>0.099 (0.76)</td>
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<tr>
<td>Family</td>
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</tr>
<tr>
<td>Married</td>
<td>-0.146 (1.92)</td>
<td>0.196 (1.72)</td>
<td>0.145 (1.01)</td>
<td>0.386 (1.89)</td>
<td>0.430 (2.47)</td>
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<tr>
<td>Spouse employed</td>
<td>0.152 (2.35)</td>
<td>-0.051 (0.57)</td>
<td>0.448 (3.68)</td>
<td>0.264 (1.56)</td>
<td>-0.292 (2.16)</td>
</tr>
<tr>
<td>Number of children</td>
<td>0.055 (1.65)</td>
<td>0.063 (1.40)</td>
<td>-0.170 (2.79)</td>
<td>-0.197 (2.33)</td>
<td>0.001 (0.01)</td>
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<tr>
<td>Has child under 5 yrs</td>
<td>0.257 (3.06)</td>
<td>0.012 (0.10)</td>
<td>0.482 (2.89)</td>
<td>0.462 (1.86)</td>
<td>-0.189 (0.92)</td>
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<td>Wealth measures</td>
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</tr>
<tr>
<td>Assets (£10,000)</td>
<td>0.023 (5.26)</td>
<td>0.042 (8.22)</td>
<td>0.028 (2.79)</td>
<td>0.062 (4.81)</td>
<td>0.018 (2.44)</td>
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<tr>
<td>Interest/divs&gt;£100pa</td>
<td>-0.058 (0.93)</td>
<td>0.204 (2.62)</td>
<td>0.234 (1.61)</td>
<td>0.834 (4.63)</td>
<td>0.331 (2.65)</td>
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<td>Occupation measures</td>
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<tr>
<td>Professional/manager</td>
<td>-0.193 (2.36)</td>
<td>0.524 (4.17)</td>
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<td>0.794 (4.28)</td>
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<tr>
<td>Other non-manual</td>
<td>-0.515 (5.51)</td>
<td>0.144 (1.02)</td>
<td></td>
<td></td>
<td>0.794 (3.47)</td>
</tr>
<tr>
<td>Skilled manual</td>
<td>0.238 (3.13)</td>
<td>0.243 (1.84)</td>
<td></td>
<td></td>
<td>-0.027 (0.14)</td>
</tr>
</tbody>
</table>

Log-L                          | -1479.614     | -719.6272     | -429.1497     | -212.1472     | -341.9788     |
Restricted log-L                | -1559.451     | -843.6002     | -582.2254     | -377.2348     | -410.2363     |
% correctly predicted           | 91.0          | 95.8          | 74.1          | 82.5          | 71.7          |
Mean of dependent var           | 0.099         | 0.044         | 0.550         | 0.373         | 0.304         |
N                               | 5128          | 4866          | 846           | 584           | 668           

Notes:  

a T-statistics in brackets  
b Highest education qualification at Wave 5. Base category is no qualifications.  
c Refers to having a health problem that limits the type or amount of work possible.  
d Assets defined as the respondent’s estimated value of their property (assumed to be zero for those not owning or buying their property) plus the value of any car owned by the respondent.  
e Received interest and/or dividend payments exceeding £100 per annum.  
f Semi- or unskilled manual occupations is the base category.
Turning to the SEWE-waged employment equation, (reported in column 2) there is strong evidence to refute the human capital theory in that SEWEs were less likely to hold high level academic qualifications than waged employees. Yet they were also found to be more likely to possess professional/managerial or skilled manual occupational status, which might imply high informal job related human capital.

On both measures of wealth, SEWEs were found to be significantly better off than the waged employed. They were likely to have more assets on the one hand and had a greater probability of an additional income stream derived from financial assets or savings. In both cases, the ability to self-finance or attract external finance for a business venture is presumably enhanced.

Regarding demographics, the SEWE is more likely to be male and older, although the negative sign on the age squared coefficient suggests that this is a declining and non-linear relationship between age and the probability of being an SEWE. Interestingly, the SEWE is less likely to hold a mortgage, which for this group might imply their property is fully owned.

The SEWE is also less likely to reside in London, offering some support for the findings of Keeble et al (1992) and Westhead and Moyes (1990), both of whom found that in-migration into rural areas was often a catalyst for new firm formation. There was also an increased probability of the SEWE being married.

Column 3 reports the probit estimates for the ISE-unemployment decision. On formal qualifications ISEs had a higher probability of possessing high level vocational qualifications, yet perhaps surprisingly no other differences were apparent. On financial capital, ISEs were also more likely to have higher levels of assets to draw upon, which gives them an advantage in terms of overcoming financial barriers to self-employment both at start-up and in later stages of development.

On demographics there were considerable differences between ISEs and the unemployed. For example, ISEs were more likely to be male, older, healthier, hold
mortgages and live in London. They were also more likely to have a working spouse and a young child, although smaller families in general.

Focusing our attention on the SEWE-unemployed estimates reported in column 4, our prior expectations were that it would be here that we would find the greatest distinction between labour market states. The theoretical model implies that SEWEs should be better qualified, wealthier and generally more entrepreneurially orientated.

An interesting paradox is apparent when we examine the nature of formal qualifications across the two groups. On more academic measures the unemployed were found to have a higher probability of possessing degrees at all levels, thus tending to refute human capital based theories. Yet on more vocational measures of human capital SEWEs were found to be the dominant group. This feature hints at the need for care when attaching appropriate weights to the various components of what we term entrepreneurial ability, but which is often simply referred to as ones endowment of human capital. This is further reinforced by the positive and significant sign on the age coefficient. Here we take age to be a more general proxy for lifetime experience which may enhance ones probability of survival and/or success in business. This is in accordance with the key finding of Cressy (1996,p.1261) who found age to be ‘the most important individual variable’ in his survival model.

On our wealth measures, proxying as the ability to self-finance or the ability to secure external debt finance, SEWEs unsurprisingly had more assets available, and were also more likely to receive interest/dividend income. The magnitude of the coefficient on both wealth measures is also larger than those reported in all other equations.

On demographics, SEWEs were also more likely to be male, married and healthy, with fewer and younger children. This feature is interesting as with the exception of an increased probability of being married any category of the self-employed are more likely to be male, older, healthier and with a smaller, younger family than the unemployed.
The final employment decision, reported in column 5, shows the ISE-SEWE equation. This we suggested earlier might be the most important area for policymakers concerned with the job generating capabilities of the self-employed. This is particularly vital in the light of the very recent US findings of Caroll et al (1996) who found that in the three greatest years of economic expansion in the 1980s, only 7% of ISEs made the transition to SEWEs.

So what are the distinguishing features that separate out the self-employed individuals (ISEs) from the job creators, the SEWEs? On formal education measures of human capital we find that SEWEs are actually less likely to possess academic degrees of any sort. No differences were apparent on other academic and vocational measures of human capital. Thus our human capital theory is in a precarious position. We know that possession of ‘A’ Levels distinguishes between ISEs and the waged employed and that the self-employed as a whole are more likely to hold vocational qualifications. Our one saving grace is the monotonous regularity with which the age variable is found to be positive (normally in a diminishing, non-linear way) and significant for SEWEs over all other labour market states. This is given further weight by the positive association between having a professional/managerial or non-manual occupational status, thus implying that it is the key to the employment decision, rather than more formal academic or vocational achievements. When on-the-job experience is combined with experience of life itself, this appears to be a strong and productive combination.

Yet the counterpart to this embodied human capital is a requirement for financial capital inputs. As Figure 2 depicts, there are optimum combinations of human and financial capital. On this SEWEs were found to have a higher probability of being well endowed with assets and also more likely to generate additional income from interest and/or dividends. Interestingly though, whilst the sign on assets was always positive and significant for SEWEs over ISEs, the waged employed and the unemployed, the magnitude of the coefficient was more than three times that for the SEWE-unemployed than the SEWE-ISE decision.
On demographics differences between SEWEs and ISEs, in line with both other SEWE decisions, SEWEs were more likely to be located outside of London. Further, they also had a higher probability of being married, with a non-employed spouse.

**VII. Summary and Conclusions**

The aim of this paper has been to test an explicit theory of labour and capital inputs to self-employment. When developing the theoretical model our prior assumption was that entrepreneurial ability could be defined in terms of formal educational achievements and other more business and life related experiences. In fact, the evidence presented here shows that formal education has little effect on the probability of being self-employed, and where it does have an effect it acts in a counterintuitive way. The key determinant of entrepreneurial ability was found to be experience of life itself, along with other business related experiences defined by occupational status. This is shown through the incidence of having professional or other non-manual experience acting in a positive and significant way on the hiring decision of the self-employed.

To sum up this key employment decision, the evidence suggests that it is not academic achievements that influence the decision to take on employees, but job related measures of human capital. It would thus appear that the true measure of entrepreneurial ability is more heavily weighted to job specific rather than academic skills. This is further reinforced by the positive, and non-linear relationship on the age and age² variables. We interpret this as evidence that more mature individuals, with greater experience of life in general can be seen to have accumulated a valuable store of human capital which stands them in good stead in the business world. This, once again, is consistent with the findings of Cressy (1996) who found a similar relationship between age and probability of business survival.

On the nature of financial capital constraints, it does appear that access to capital is an important determinant of labour market status. The evidence broadly supports our
initial hypothesis that there are progressively higher capital barriers that must be overcome as one progresses from individual self-employment to self-employment with employees.

In summary, the empirical results do suggest that the barriers that must be overcome to become self-employed in the first instance and to reach a stage where hiring additional employees is a feasible option are progressively higher. In the first instance it appears that access to capital is the crucial determinant in becoming self-employed. However, a combination of high levels of human capital and financial capital is required to make the progression to having employees. On entrepreneurial ability, it is clear that vocational skills are more important than paper qualifications in terms of creating employment.
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Westhead, P, Moyes, A (1990), 'New Firms and their Founders in Rural and Urban Wales.' University of Wales, Aberystwyth, Rural Studies Research Unit, Monograph No.4