

The Rise in Self-Employment Amongst UK Males

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ABSTRACT. This paper uses time-series data to attempt to identify the factors responsible for the rise in self-employment amongst UK males, focusing in particular on the period of rapid growth which was experienced during the 1980s. The empirical results suggest that the most significant long-run influence on the growth of self-employment has been the rise in the real value of personal sector liquid wealth, though rising levels of GDP and, to a lesser extent, increases in the real value of housing wealth have also made a significant contribution. There is tentative support for the notion that Mrs Thatcher may have succeeded in ushering in an 'entrepreneurial renaissance' within the UK economy, though the evidence for this is rather crude. There is no evidence for the view that 'recession-push' effects have been significant in accounting for the rise in self-employment.

I. Introduction

In 1968, fewer than one in ten of the male workforce was self-employed. By the end of 1993, despite having fallen back slightly from the peak which it attained in 1990, this figure stood at well over one in seven. The aim of this paper is to try to identify the factors which have been responsible for this remarkable transformation in the structure of the UK labour force.

Much of the growth in self-employment has occurred in the period since 1979, and this has prompted the development of two broad schools of thought concerning its origins. The first attributes much of the 1980s increase in self-employment to the effects of the recessionary conditions which prevailed during the early part of the decade. An absence of opportunities for paid-employment, it is argued, led many individuals to move into self-employment as a means of escaping

from, or avoiding, unemployment. The availability of a temporary subsidy in the form of the Enterprise Allowance Scheme (EAS) provided additional incentives for them to do so.¹ In contrast to this 'recession-push' view of events, the second school sees the rise in self-employment as symptomatic of an 'entrepreneurial renaissance' within the economy, stimulated in part by various government-initiated supply-side measures such as reductions in the rate of income tax.

More recently, it has been argued that the source of the rise in the level of self-employment may be traced to the effects of rising levels of personal wealth – particularly in the form of housing assets – which have enabled many individuals who might previously have been denied access to self-employment by a shortage of capital, to raise the finance necessary to start up in business. This argument would appear to have a number of factors to recommend it. Firstly, there are a number of studies based on individual-level data which point to the existence of a positive relationship between the availability of funds for start-up capital and the propensity to enter self-employment.² Secondly, the timing of the most dramatic increases in the rate of UK self-employment coincided with the late 1980s boom in the housing market. Finally, studies by Black, de Meza and Jeffreys (1996) and Robson (1996a) find evidence of a positive relationship between real net housing wealth and the level of new business creation in the economy, with the latter also finding evidence of a positive effect from the growth in the real value of personal sector liquid assets.³

Previous studies

There is a growing literature concerned with identifying the determinants of variations in the

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level of self-employment over time, much of it concerned specifically with developments in the UK. Blanchflower and Oswald (1990) analyse the growth in UK self-employment over the period 1983–1989, and find that much of it can be explained by improvements in the macroeconomic environment. They reject the view that this period saw a revival of an entrepreneurial spirit within the UK economy, noting that amongst respondents to the British Social Attitudes Survey there was no change between 1983 and 1989 in the proportion of employees who had seriously thought about the possibility of becoming self-employed, nor any evidence of an upward trend in the propensity for individuals to be self-employed which could not be explained by controls for personal characteristics and changes in the economic environment. A similarly sceptical view of the ‘entrepreneurial renaissance’ hypothesis appears in the work of Blanchflower and Freeman (1994). Using Labour Force Survey data on flows of individuals between different labour market states to construct Markov transition matrices, they find firstly that a rise in self-employment during the 1980s could have been predicted on the basis of the steady state solution to the 1979 transition matrix. Secondly, they find that for men at least, flows of workers from employment to self-employment were no greater in 1990 than in 1979 – evidence which they find difficult to reconcile with claims that the 1980s saw the establishment of an ‘entrepreneurial culture’ within the UK economy.

Two recent studies which consider the determinants of UK self-employment in a longer term perspective are Crouchley, Abell and Smeaton (1994) and Parker (1996). The former estimate a series of structural time-series models using quarterly data on self-employment for the period 1950–1990. Their main finding is that for both men and women the probability of self-employment is negatively related to the level of unemployment but is insensitive to cyclical fluctuations in GNP. Their evidence would therefore seem to cast some doubt on the ability of the ‘recession-push’ hypothesis to account for longer-term movements in self-employment in the UK.

Parker (1996), the study which is closest in spirit to the analysis of the present paper, uses cointegration methods to analyse the determinants of variations in the rate of UK self-employment

over the years 1960–1991. One of the main findings of this analysis is that the rate of self-employment is positively related in both the long-run and the short-run to variations in relative incomes in the self-employment and paid-employment sectors. However, given that Parker uses total rather than average incomes to measure these effects, there must be some doubt concerning the precise direction of causality in this relationship, i.e., it is unclear whether it is increases in total self-employment income relative to income from paid-employment which lead to increases in the rate of self-employment or *vice versa*. Elsewhere, the paper finds evidence for a positive long-run relationship between self-employment and the rate of unemployment – a finding which is at variance with that reported by Crouchley et al., above; positive effects in both the long-run and short-run from the marginal rate of income tax; a significantly negative long-run effect from the level of strike activity in the economy, which is included as a measure of uncertainty in the economic environment; and a significant negative effect from the real interest rate. Finally, there is a significant positive effect from a dummy variable which is designed to capture the effect of the introduction of the Enterprise Allowance Scheme. For a subsample of data beginning in 1966, Parker tests for an effect on the rate of self-employment from variations in the real value of personal sector net wealth, but this fails to attain significance. No attempt is made to discriminate between the liquid and illiquid components of wealth, which may conceivably have quite different effects on the availability of capital for start-up finance.

Parker’s finding of a significant effect of the rate of income tax rate on self-employment echoes results obtained by Blau (1987) and Evans and Leighton (1989) using US data. This effect, which is contrary to that usually predicted by supply-side economists and which runs counter to the ‘entrepreneurial renaissance’ thesis for the UK, may be explained by reference to the incentives which high rates of income tax create for individuals to take advantage of the opportunities afforded by self-employment to avoid or evade the payment of tax.

Finally, we may refer to two papers by Acs, Audretsch and Evans (1994) and Staber and Bogenhold (1993), which help to place the rise in

UK self-employment within an international context. Acs et al. show that between 1966 and 1987, the UK was one of three OECD economies which experienced more or less continuing increases in the rate of non-agricultural self-employment, the others being Australia and Ireland. A number of the remaining OECD countries experienced a 'U'-shaped pattern of growth, with an initial period of decline being followed by rising levels of self-employment from around the mid to late 1970s. The two papers explore largely different possible explanations for the international pattern of self-employment growth but one area of agreement is in their common finding of a positive relationship between self-employment and the rate of unemployment; a result which suggests that 'recession-push' effects may have international relevance, rather than simply being a matter for the UK alone.

The aim of this paper, as stated above, is to try to identify the factors responsible for the rise of self-employment in the UK. Our focus is on the development of self-employment amongst males, partly because males account for the major part of total self-employment, and partly because there are good grounds for believing that the forces which have shaped the development of self-employment amongst females are somewhat different to those of males and are to some extent bound up with the general trend towards higher rates of female labour force participation.⁴ Our choice of potential explanatory variables will to some extent be guided by the results of the previous studies surveyed above, but a major focus of the analysis will be on the role of personal wealth, particularly in the form of housing assets, in enabling individuals to set up in business for themselves.

The pattern of the paper is as follows. In Section II we set out the basic theoretical framework for the analysis and discuss the selection of potential explanatory variables. In Section III, we present the results of the empirical analysis, with the discussion focusing on alternative methods of estimating the parameters of the long-run relationship for the rate of self-employment amongst UK males. Section IV provides some concluding remarks.

II. Theoretical framework

The selection of potential explanatory variables for the analysis of the rise in self-employment amongst UK males follows the framework set out by Evans and Jovanovic (1989) in assuming that individuals are drawn into self-employment on the basis of a consideration of the expected returns to entrepreneurship relative to those which may be earned either in paid-employment or in unemployment. In addition, however, it is assumed that entry into self-employment requires some form of capital outlay on the part of the individual concerned. This implies that, in the absence of perfect capital markets, entry into self-employment may be restricted to those with access to the necessary funds for start-up capital, or who have sufficient collateral to be able to secure a loan to cover the required investment.

In keeping with this framework, detailed consideration of the factors which may have influenced the rise in self-employment is organised under three broad headings: (i) factors which may have influenced the relative returns to self-employment; (ii) factors which may have influenced the ease with which start-up finance may be obtained; and (iii) policy variables. The latter are grouped together for convenience, but in general comprise variables which could alternatively be classified under one or other of the previous two headings

(i) *Relative returns to self-employment*

The returns to self-employment may be conjectured to be an increasing function of the level of aggregate demand in the economy (possibly relative to some underlying trend) and the level of real interest rates, where the latter represents the opportunity cost of any capital which is invested in the business. For self-employed workers with employees, the returns to self-employment will, in addition, be negatively related to the level of real labour costs.

The alternative to self-employment may be represented by a weighted average of earnings in paid-employment and unemployment, where the weights will depend on the probability that an individual will find his or herself in either state.

(ii) *Ease with which start-up finance may be obtained*

There are two relevant aspects to this issue: (a) the amount of start-up finance which individuals need to raise; and (b) the ease with which the necessary funds may be obtained. The former is likely to depend principally on the minimum efficient scale of the industry which the entrepreneur is seeking to enter. In particular, one would expect the required level of start-up finance to be lower in industries characterised by relatively low minimum efficient scales of operation. One possible explanation for the rise in self-employment, therefore, is that there may have been a shift in the composition of demand in favour of industries with relatively low minimum efficient scales of operation. Evans and Leighton (1989) find such shifts to have contributed significantly to the growth of self-employment in the USA over the period 1967–1987, whilst Acs et al. (1994) cite the increase in the service sector's share of GDP as a major factor in the recent rise of self-employment in a number of OECD countries. We attempt to test for the relevance of such effects in the UK by including in the empirical analysis a measure of the share of GDP which is accounted for by Construction and Distribution, Hotels, Catering and Repairs, etc. – two industry sectors with traditionally high levels of self-employment.⁵

Individuals may attempt to raise funds for start-up capital either by drawing on their accumulated savings or by borrowing. Potential creditors, however, are likely to lend only to those individuals with sufficient collateral to provide security for a loan. Established businesses too may find it easier to raise additional loan capital if they are able to pledge some external collateral (i.e. outside the business) as security. For many individuals in the UK, the major source of loan collateral is provided by owner-occupied housing. It seems reasonable to conjecture, therefore, that the rise in owner-occupancy and in the value of the housing assets concerned may have been a significant factor in the growth of self-employment.

(iii) *Policy variables*

There are two kinds of policy variable which may be considered under this heading: (a) those which

are directly concerned with the promotion of self-employment or the small business sector in general; and (b) those which are not directly concerned with self-employment but which may nevertheless impact upon it. In the former category, the main policy initiatives which are of interest to this study are the Enterprise Allowance Scheme (EAS) and its successor the Business Start-up Scheme (BSUS), and the Loan Guarantee Scheme (LGS).

The EAS, which was introduced in August 1983, provided a temporary operating subsidy to eligible unemployed individuals who set up in business for themselves by enabling them to continue to claim unemployment benefit of £40 per week for up to one year after start-up. The scheme therefore aimed to encourage entrepreneurial behaviour on the part of the unemployed by raising, at least on a temporary basis, the returns from self-employment relative to those from their current state. One of the criteria for eligibility for the scheme, however, was that applicants should have at least £1000 to invest in their business. It is possible, therefore, that some individuals may have been denied access to self-employment under the scheme because of an inability to raise the necessary start-up capital. In April 1991, responsibility for the administration of the scheme – which was renamed the Business Start-up Scheme – was transferred from the Employment Department to local Training and Enterprise Councils (TECs) who were given discretion to vary both the eligibility criteria and the terms of support given.⁶

The LGS, introduced in 1981, is intended to promote access for small businesses to sources of debt finance. Under the scheme, the government guarantees to repay lenders a proportion of the loan made to a business in the event that the borrower defaults (and in return receives an interest premium from the borrower over and above the amount paid to the lending institution). As a result, banks may be induced to make loans to small business customers which though potentially profitable, would not satisfy their normal lending criteria. The scheme may therefore be seen as an attempt to overcome the 'capital barriers' which individuals may face in attempting either to enter or to remain in entrepreneurship.⁷

Amongst the numerous 'indirect' policy vari-

ables which may influence the level of self-employment, the role of various taxes deserves particular attention. Indeed, it is clear that the UK government has seen its stance on taxation – particularly income taxes – as an important stimulus to enterprise during its period of office.⁸ As noted in the Introduction, research in the USA by Blau (1987) and Evans and Leighton (1989) as well as that by Parker (1996) for the UK has produced evidence of a positive relationship between income tax rates and self-employment, a finding which would appear to challenge the traditional ‘supply-side’ view which sees high rates of income tax as inimical to enterprise.⁹ However, in theory at least, it may be possible to resolve this apparent contradiction by drawing a distinction between the effects of changes in the average rate of income tax and changes in the marginal rate. Robson and Wren (1996) show that through its joint effect on individuals’ desired levels of effort and tax evasion, the net effect of a pure increase in the marginal rate of tax (i.e. an increase in the marginal rate with the average rate held constant) is to reduce the incentive for individuals to be self-employed rather than work in paid-employment. The explanation for this is that although a pure increase in the marginal tax rate makes self-employment more attractive by raising the desired rate of evasion (assuming that evasion is more likely to be successful in self-employment), this is outweighed by the effect which the higher marginal tax rate has in reducing the desired level of work effort – the latter being assumed to have a larger effect on earnings in self-employment than in paid-employment.

In contrast, a pure increase in the average rate of tax is shown to have an ambiguous effect on the incentive for self-employment, *a priori*. Here again, the effects of the tax change on the evasion and effort supply decisions have opposing influences on the incentive for self-employment, but this time the net effect proves impossible to sign.

In the light of these theoretical results, we include measures of both the marginal and average rate of tax on incomes in our basic empirical model of self-employment, reported below.¹⁰

Taxes may also have a bearing on the rate of self-employment by influencing the choice of organisational form for a business. Some self-

employed individuals may seek corporate status for their business and subsequently become employees of the enterprise thereby created. The factors which may influence the decision to incorporate are discussed at some length by King (1977). One of the key considerations is the relationship between the personal income tax rate and the rate of Corporation Tax. Increases in the latter reduce the incentives for incorporation, *ceteris paribus*, and thereby raise the level of self-employment above what it might otherwise be. Selective Employment Tax (SET) which operated from 1966 to 1973 may have had a similar effect on the incentives for individuals to choose self-employment. A tax on service sector employment, it was levied only on incorporated businesses and may therefore have provided a boost to self-employment by discouraging some businesses from seeking corporate status.¹¹

Summary

The framework outlined above suggests the following basic model of the determinants of the rate of self-employment amongst UK males, which is used to guide the empirical analysis of the next section (predicted signs are given beneath the variables).

$$\begin{aligned}
 SE = f(Y, W, RR, BEN, U, COMP, \\
 & \quad + \quad - \quad - \quad - \quad + \quad + \\
 & A_L, A_I, LGS, EAS, BSUS, \\
 & \quad + \quad + \quad + \quad + \quad + \\
 & MTR, ATR, T) \\
 & \quad - \quad ? \quad +
 \end{aligned} \tag{1}$$

Here, Y is the real value of GDP which is our chosen proxy for the level of aggregate demand, W denotes the real average wage for paid-employees, RR is a measure of the real interest rate and BEN denotes the real value of unemployment benefit. U , the male unemployment rate, is included as our proxy for the likelihood that an individual not in self-employment will find himself in paid-employment. $COMP$ denotes the proportion of GDP accounted for by Construction and Distribution, Hotels, Catering and Repairs, etc., as discussed above. A_L and A_I are measures of the real value of personal sector ‘liquid’ and ‘illiquid’ wealth, where the latter acts as a source

of collateral which individuals may use to secure loan finance for their business. As discussed earlier, we use the real value of housing wealth net of outstanding mortgages as our measure of the latter. LGS, EAS and BSUS represent the effects of the three 'direct' policy measures discussed earlier. In the absence of better measures, these are represented in the empirical analysis by simple zero-one dummy variables. Finally, MTR and ATR denote, respectively, the marginal and the average rate of income tax, whilst T represents a vector of the remaining tax variables discussed above.

III. Empirical analysis

Whilst the theoretical analysis of Section II is cast entirely in static terms, it is not difficult to see how factors such as the need to formulate a business plan, raise the necessary start-up finance, and locate suitable premises are likely to create significant delays between the moment that the decision is made to set up in business and the actual date of entry into self-employment. The process of winding down a business and leaving self-employment is likely to be subject to similar adjustment lags. With this in mind, it is probably best to view equation (1) as describing the determination of the long-run 'equilibrium' rate of male self-employment with the actual rate of self-employment following some form of dynamic adjustment path around this long-run rate. Our task in this paper is to estimate a model which is capable of identifying the long-run forces which have shaped the rise in self-employment amongst UK males whilst taking satisfactory account of these short-run dynamics.

There are, in essence, two ways of achieving this objective. The first is to follow the general-to-specific methodology of Hendry (1989), starting with a general autoregressive distributed lag (ADL) model of self-employment which is then tested down and reparameterised to achieve a best parsimonious error-correction model (ECM). The second – assuming that the individual data series are non-stationary (or 'integrated') – is to search for a cointegrating relationship among the variables of interest.¹² There are, in turn, a variety of ways of estimating the parameters of such a cointegrating relationship.¹³ For example, Stock (1987) has shown that the application of

Ordinary Least Squares (OLS) to a static regression on the variables of interest will, provided that the variables are cointegrated, produce super-consistent estimates of the parameters of the cointegrating relationship. The standard errors of these estimates will, however, be asymptotically biased whilst the estimates themselves may be subject to substantial small sample bias (Banerjee et al., 1986). Engle and Yoo (1991) provide a three-step procedure which gives 'corrected' estimates of the parameters of the cointegrating relationship together with their 'true' standard errors. Finally, Johansen (1988) describes a maximum likelihood procedure which allows for the possibility that there may be more than one cointegrating relationship amongst a set of integrated variables.¹⁴

Each of the methods outlined above has its advantages and disadvantages.¹⁵ The approach adopted in this paper is therefore to compare estimates of the parameters of the long-run relationship for self-employment amongst UK males generated by each method, whilst placing greatest emphasis on those obtained from the general-to-specific ECM approach, as these are the ones which are likely to be subject to the least small sample bias.

Prior to the application of any of these methods, it is important to be able to establish the integration properties of the individual variables of interest. To this end, we report in Table I the results of a series of Augmented Dickey Fuller (ADF) tests on the variables concerned.¹⁶ These results suggest that most of the series concerned are I(1), that is that they require differencing once in order to make them stationary. An exception is our measure of the real rate of interest, RR, which appears to be I(0). There is also some ambiguity concerning the order of integration of ATR, the average rate of income tax, but on the whole it seems safest to conclude that this too will be I(1).

Results using the general-to-specific approach

Equation (1) provides the starting point for our analysis, with the initial ADL model including four lags of the dependent variable and up to four, but more typically two, lags on each of the continuous explanatory variables. The sample period

TABLE I
ADF tests for order of integration^a

$H_0: z \sim I(1)$		
Variable (z) ^b	With constant	With constant plus trend
ln SE	-0.58	-2.34
ln LA	-0.49	-1.84
ln NHW	-1.90 ^c	-3.41 ^c
ln U	-1.65	-2.37
ln BEN	-2.36	-3.59
ln W	-1.15	-2.27
ln Y	-0.92	-2.35
RR	-3.15*	-3.74*
COMP	-1.88	-1.47
ATR	-2.99*	-2.85
MTR	-1.26	-3.00

$H_0: z \sim I(2)$		
Variable (z) ^b	With constant	Without constant ^d
ln SE	-3.01*	-2.60*
ln LA	-2.98*	-2.67*
ln NHW	-3.40*	-3.19*
ln U	-3.94*	-3.64*
ln BEN	-5.70*	-5.60*
ln W	-4.09*	-2.82*
ln Y	-4.20*	-3.02*
RR	-5.22*	-5.25*
COMP	-3.53*	-3.43*
ATR	-2.64	-2.66*
MTR	-3.21*	-3.11*

^a Test statistics based on regressions with four lags of the dependent variable. Sample period 1967Q3–1993Q4, except for ln NHW: 1969Q1–1993Q4. * denotes test significant at 5 percent level (MacKinnon, 1991, critical values).

^b Variable definitions: SE = male self-employment rate; LA = real value of personal sector liquid assets; NHW = real value of net housing wealth; U = male unemployment rate; BEN = real value of unemployment benefit; W = real average earnings of employees; Y = real GDP; RR = real interest rate; COMP = share of Construction plus Distribution, Hotels and Catering, and Repairs etc, in national GDP; ATR = average rate of income tax; MTR = marginal rate of income tax. See text and data appendix for further details.

^c Seasonal dummies included to remove serial correlation in residuals of test regression.

^d Test statistics for $H_0: z \sim I(2)$ which allowed for the presence of a deterministic trend were also computed but the trend term was never significant. These results are therefore not reported.

for the analysis is 1968Q3–1993Q4, the starting date being dictated by the availability of data on the net housing wealth variable. Sequential deletion of insignificant terms and reparameterisation

leads eventually to the ‘preferred’ parsimonious ECM specification shown in Table II.

The equation paints an interesting picture of the forces which have shaped the rise in self-employment amongst UK males. It appears to be generally satisfactory in having coefficients which are signed in accordance with theoretical priors and in its ability to pass the various diagnostic tests with which it is confronted. The most important of these is probably the Chow test for parameter constancy over the period 1990Q1–1993Q4. This provides a stringent test of the model’s ability to account for the development of self-employment amongst UK males as this period witnessed a sharp decline in self-employment following a decade of uninterrupted growth. There is no doubt that the model does have a little difficulty tracking the movement of self-employment over this period, having a slight tendency to over-predict during the period from 1990 through to 1992, but the fact that it picks up both the turning point in 1990 and the subsequent upturn in self-employment in 1993 must be viewed as evidence in its favour.

The model excludes terms in the marginal rate of income tax and the dummy variables for LGS and BSUS, as these were found to be insignificant. Note, however, that a significant role is found for a shift dummy which takes on a value of one from 1979Q4 until the end of the sample. The timing of the implied upward shift in the self-employment rate is consistent with it reflecting a response to the election of the new Conservative government of Margaret Thatcher earlier in the same year. In other words, it provides tentative evidence in support of the view that Mrs Thatcher may indeed have ushered in something of an ‘entrepreneurial renaissance’ within the UK economy.¹⁷

The term in squared brackets suggests that the long-run equilibrium rate of male self-employment is positively related to the real value of personal sector liquid assets, the real value of net housing wealth, real GDP and the average rate of income tax. Increases in the real value of unemployment benefits, on the other hand, lead to a lowering of the rate of self-employment in the long-run. The t_{ECM} statistic of Kremers et al. (1992) compares with a MacKinnon 5% critical value of -4.88 and suggests that this long-run solution represents a valid cointegrating vector.

TABLE II
ECM model of self-employment amongst UK males^{a, b}

$\Delta \ln SE_t = -2.945 + 0.213 \Delta \ln SE_{t-1} - 0.365 \Delta \ln SE_{t-2} + 0.041 \Delta \ln NHW_{t-3} - 0.0003 RR_t - 0.063 \Delta^2 \ln U_t + 0.008 \Delta COMP_{t-1}$						
(8.13)	(2.66)	(4.83)	(2.56)	(2.24)	(3.82)	(3.61)
$- 0.150 \Delta \ln W_t + 0.068 CTAX_t + 0.015 EAS_t + 0.012 D794_t + 0.010 SET_{t-1} - 0.250 [\ln SE_{t-4} - 0.486 \ln LA_{t-2}$						
(3.69)	(1.49)	(6.14)	(4.78)	(5.09)	(7.93)	(11.00)
$- 0.089 \ln NHW_{t-1} - 0.341 \ln Y_t - 0.605 ATR_{t-2} + 0.465 LNBMA_t] + \text{seasonals}$						
(3.10)	(4.25)	(3.04)	(4.45)			
$\bar{R}^2 = 0.806$						
AR(4) = 1.60 (0.18)						
ARCH(4) = 1.68 (0.16)						
RAM(2) = 0.67 (0.52)						
JB = 1.67 (0.44)						
CHOW901 = 1.53 (0.12)						
$t_{ECM} = -7.69$						
Sample: 1968Q3–1993Q4						

^a Non-linear Least Squares estimates; *t*-ratios are given in parentheses below the coefficients.

Variables not already defined in Table I: CTAX = small firms' rate of Corporation Tax; EAS = dummy variable for effects of Enterprise Allowance Scheme; D794 = 'Thatcher' shift dummy; SET = rate of Selective Employment Tax; LNBMA = 4th order moving average of log of real value of unemployment benefit. See text and data appendix for further details.

^b The regression diagnostic statistics are as follows. AR(4) is an F-statistic for testing the null hypothesis of zero serial correlation (up to fourth order) in the equation disturbances. ARCH(4) provides an F-test for autoregressive conditional heteroskedasticity, again up to fourth order. RAM(2) is Ramsey's RESET test for misspecification, which is formed by adding the squares and cubes of the equation's fitted values to the list of regressors and then performing an F-test of their joint significance. JB denotes the Jarque-Bera statistic for testing the null hypothesis of normality of the equation disturbances. It has an asymptotic $\chi^2(2)$ distribution. CHOW901 denotes a Chow test for parameter constancy over the final sixteen quarters of the data sample. Finally, t_{ECM} denotes the *t*-statistic suggested by Kremers et al. (1992) for testing for cointegration in the long-run solution to the model. Numbers in parentheses alongside the test statistics denote exact significance levels.

The estimates of the long-run parameters are worthy of further comment. First of all, they confirm the significant role of rising levels of personal wealth in leading to higher levels of self-employment amongst UK males. Secondly, a comparison of the coefficients for LA and NHW suggests that self-employment is much more responsive to changes in the value of liquid wealth than in the value of housing assets. This suggests that although the rise in the value of housing assets may have had some effect in enabling individuals to overcome the capital barriers to entrepreneurship through its role as a source of loan collateral, a more significant role has been played by increases in the value of funds available to individuals to invest directly in their own businesses.

Finally, the positive coefficient attached to the average rate of income tax echoes the results of Blau (1987), Evans and Leighton (1989) and Parker (1996) concerning the effects of income tax rates on self-employment. The interpretation of this result which is put forward in these studies is that a higher rate of tax makes self-employment relatively attractive because of the greater oppor-

tunities which it presents for evasion. However, a rather different interpretation is suggested by the theoretical work of Robson and Wren (1996). In their analysis, in which the level of effort and rate of evasion are jointly determined, the result would chiefly be explained by the effect which an increase in the average rate of tax has in raising individuals' desired level of effort. Self-employment becomes relatively attractive because the higher level of effort yields a higher pecuniary return in self-employment than in paid-employment.¹⁸ Whichever explanation is correct, the result itself – together with the insignificance of terms in the marginal tax rate – suggests that the UK government's recent policy of cutting rates of income tax, far from promoting self-employment as has been claimed, may actually have restrained it.

Cointegration analysis

Equation (2) below shows the results of estimating a static OLS regression on the variables which enter the error-correction term in the equation in Table II:¹⁹

$$\begin{aligned} \ln SE_t = & -11.660 + 0.581 \ln LA_{t-1} \\ & (36.1) \quad (19.1) \\ & - 0.028 \ln NHW_t + 0.450 \ln Y_t \\ & (1.13) \quad (6.07) \\ & + 0.618 ATR_t - 0.719 LNBMA_t \quad (2) \\ & (3.50) \quad (6.72) \end{aligned}$$

Sample: 1968Q3 – 1993Q4 $R^2 = 0.978$

The OLS estimates are generally of a similar order of magnitude to the long-run coefficients obtained from the ECM approach, though tending to be slightly greater in absolute value. The main exception concerns the estimate of the long-run elasticity of self-employment with respect to real housing wealth, which now turns out to be negative and is apparently insignificant. Recall, however, that these estimates may be subject to substantial short-run biases, whilst the ‘*t*-ratios’ shown in parentheses below the coefficients have a non-standard distribution. Applying the Engle and Yoo (1991) three-step estimator, using the same dynamic terms as in the ECM model, produces the following results:

$$\begin{aligned} \ln SE_t = & -11.671 + 0.554 \ln LA_{t-1} \\ & (182.9) \quad (17.1) \\ & + 0.009 \ln NHW_t + 0.414 \ln Y_t \\ & (0.36) \quad (5.25) \\ & + 0.516 ATR_t - 0.653 LNBMA_t \quad (3) \\ & (2.74) \quad (5.71) \end{aligned}$$

The estimates are now much closer to those obtained from the long-run solution to the ECM. In particular, the coefficient for $\ln NHW$ is now positive, though still insignificant and some way below the value obtained from the ECM approach.

Interestingly, when ADF tests are applied to the residuals from equations (2) and (3) they reject the hypothesis that either equation represents a cointegrating vector (ADF(4) = -3.04 and -2.99 , respectively, against a 5% critical value of -4.88). The contrast between these results and the value of the t_{ECM} statistic suggests that the ADF test regressions may be imposing invalid common factor restrictions on the dynamics of the relationship between male self-employment and its determinants (Kremers et al., 1992).

Johansen estimates

Table III shows the results of Johansen’s Maximal Eigenvalue and Trace tests for a fourth order Vector Autoregression (VAR) on the six variables featured in the static regressions above. An unrestricted constant, $CTAX_t$, SET_{t-1} , the EAS and ‘Thatcher’ shift dummies were also included as conditioning variables in the VAR equations.²⁰ The tests indicate that there may be up to three cointegrating vectors amongst this set of variables.²¹ The elements of the three significant eigenvectors – normalised on $\ln SE$ – are shown in Table IV. Those in the first, corresponding to the highest eigenvalue, seem to be the most economically sensible in terms of the analysis of male self-employment. The coefficient for $\ln NHW$ lies in between the values obtained from the ECM and Engle-Yoo approaches, whilst those for the other variables are generally somewhat larger in absolute value than the estimates previously obtained, though of broadly similar magnitude.

Given the possible small-sample biases in the

TABLE III
Johansen test statistics^a

Number of cointegrating Vectors, r	Maximal eigenvalue	Critical value (5%)	Trace	Critical value (5%)
$r = 0$	71.67	39.37	174.53	94.16
$r \leq 1$	54.26	33.46	102.87	68.52
$r \leq 2$	23.51	27.07	48.61	47.21
$r \leq 3$	17.79	20.97	25.09	29.68
$r \leq 4$	7.25	14.07	7.30	15.41
$r \leq 5$	0.04	3.76	0.04	3.76

^a In addition to the six I(1) variables, an unrestricted constant, $CTAX_t$, SET_{t-1} , EAS_t and $D794$ are included in the VAR. VAR length = 4. Sample: 1968Q3–1993Q4.

TABLE IV
Johansen estimates^a

	(1)	(2)	(3)
ln SE	-1.000	-1.000	-1.000
ln LA _{t-1}	0.608	-0.844	-13.45
ln NHW	0.038	-1.226	0.782
ln Y	0.314	4.900	17.30
ATR	0.910	-2.035	-72.76
LNBMA	-0.844	-1.993	21.93

^a Elements of the three significant eigenvectors, normalised on ln SE.

OLS, Engle-Yoo and Johansen estimates, we take the ECM equation as our preferred specification, though the broad similarity of the estimates of the long-run parameters produced by each of the various approaches (with the exception of the estimate of the long-run elasticity for net housing wealth produced by the static OLS regression) is encouraging.

Explaining the rise in self-employment amongst UK males

Our next task is to use the estimates derived from the ECM model to try to say something about the factors which have driven the rise in self-employment amongst UK males. Our focus is on the period from 1979 to 1990, as this is the period in which the self-employment rate exhibited its steepest increase.

Using the long-run parameter estimates contained in the ECM term in the equation depicted in Table II, and comparing the average values of the relevant explanatory variables for the years 1979 and 1990, we find that the long-run equilibrium rate of male self-employment is estimated to have increased by some 4.75 percentage points between these two years (compared with an actual increase of around 6.4 percentage points). Of this change, 3.3 percentage points is accounted for by an increase in the real value of personal sector liquid asset holdings and a further 1.2 percentage points is attributable to a rise in the real value of GDP. Changes in the real value of net housing wealth appear only to have contributed to a very small extent to the long-run rise in the rate of male self-employment over this period. On the policy front, changes in the average rate of income tax

(together with changes in the real value of unemployment benefit) appear to have had a small negative effect on the rate of male self-employment. Finally, if the long-run analysis is extended to incorporate the effects of the EAS and 'Thatcher' shift dummies, the former is estimated to have raised the long-run self-employment rate by roughly 0.9 percentage points and the latter by 0.8 points.

Of course, all of these are point estimates which are subject to standard errors. They are also based on a fairly limited time-series of observations and must therefore be treated with caution. The effect attributed to EAS, based as it is on the use of a simple zero-one dummy, must in particular be viewed as a broad-brush estimate rather than a precise assessment of the scheme's effects. Nevertheless, we would suggest that these estimates do offer a valuable insight into the forces which have shaped the rise in UK self-employment during the 1980s.

What of more recent events? In terms of our model, the sharp decline in the male self-employment rate which was experienced during 1990–1992 seems to have been largely a disequilibrium phenomenon, associated in part with a high level of real interest rates, sharply rising unemployment, and declines in the Construction and Distribution, Hotels and Catering, etc. sectors. Movements in a number of the factors which have been found to influence the long-run rate of male self-employment, however, also pointed to a period of decline: falls in the real value of GDP and of net housing wealth; a steady decline in the average rate of income tax; and a levelling off in the rate of growth of real personal sector liquid assets. The devolution of responsibility for the administration of the EAS and its transformation into the Business Start-up Scheme also seems likely to have contributed somewhat to the period of decline in male self-employment.

In 1993, as the UK economy slowly emerged from recession, the rate of male self-employment seems to have turned back towards its long-run equilibrium path. If the recovery in economic activity can be sustained, one would expect its effects to lead to a resumption of growth in the real value of personal sector liquid assets and in the real value of net housing wealth. In these circumstances, the prospects for further growth in

the rate of self-employment amongst UK males would appear to be quite good.

IV. Conclusions

This paper has set out to identify the factors responsible for the rise in self-employment amongst UK males over the last twenty five years, focusing in particular on the period of rapid growth which was experienced during the 1980s. Although one must of course caution against placing too much weight on results generated on the basis of a fairly limited time-series of observations, our investigations suggest that the most important factor influencing the growth of self-employment in the long-run has been the rise in the real value of personal sector liquid wealth, though significant contributions have also been made by the growth in the real value of GDP and, to a lesser extent, by increases in the real value of net housing wealth.²² Increases in the average rate of income tax have been found to have a positive long-run effect on the male self-employment rate, though the effect of tax changes in the 1980s was to reduce the self-employment rate slightly below what it might otherwise have been. Changes in the real value of unemployment benefit are found to have a negative effect on the rate of male self-employment in the long-run.

Amongst the various explanations for the rise in UK self-employment which were discussed in the Introduction, there would appear to be no evidence to support the 'recession push' view of events. Indeed, our investigations suggest that changes in the rate of unemployment have a modest detrimental effect on the rate of self-employment in the short-run. There is some evidence in favour of a 'collateral effect' in the development of UK self-employment, but as noted above, this is of relatively little significance compared with the role played by increases in the real value of personal sector liquid wealth. Our suggested interpretation of this 'wealth effect' has been that increases in the value of liquid assets provide individuals with a source of funds which may be invested directly in their own business, thus avoiding the need to raise debt finance from banks. An alternative interpretation, however, is that higher levels of wealth may make individuals more willing to take on the risks associated with

self-employment as opposed to a career as a paid-employee.²³

We have found tentative support for the notion that there may have been something of an 'entrepreneurial renaissance' within the UK economy during the 1980s, associated with the election of the Conservative government of Margaret Thatcher. The – admittedly rather crude – evidence for this comes in the form of an otherwise unexplained small upward shift in the rate of male self-employment dated from the fourth quarter of 1979. Contrary to the claim which is sometimes made in policy-making circles, there is no evidence to suggest that reductions in the marginal rate of income tax, at least for basic rate tax payers, have contributed to the growth in entrepreneurial behaviour. There would, however, appear to be evidence – again rather crude in nature – to suggest that the Enterprise Allowance Scheme has had some success in raising the rate of self-employment amongst UK males.

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Data appendix

Variable definitions and data sources

SE – Self-employment Rate of UK Males

Number of self-employed males as a proportion of the male workforce. Figures for self-employment and employees in employment were taken from various issues of the *Employment Gazette (EG)*, especially Historical Supplements Nos. 3 (June, 1992) and 4 (October, 1994). The series for unemployed males was constructed as follows. For 1971–1993, we use seasonally adjusted figures based on the current definition of unemployment, obtained from the Employment Department and various issues of *EG*. For years prior to 1971, it is assumed that the figures based on the current definition would have grown at the same rate as the contemporary seasonally adjusted series for unemployment excluding school leavers.

LA – Real Value of Personal Sector Liquid Assets

Total identified liquid assets of the personal sector (end of period holdings; source, *Financial Statistics (FS)*, various

issues), deflated by the GDP deflator (source: *Economic Trends Annual Supplement (ETAS)*, 1994).

NHW – Real Net Housing Wealth

Figures for gross housing wealth were obtained by multiplying figures for the stock of owner-occupied housing (interpolated from annual data published in the *Annual Abstract of Statistics (AAS)* and *Housing and Construction Statistics*, various issues) by the average price of dwellings for Building Societies' completed advances (*Housing and Construction Statistics*, various issues). Figures for net housing wealth were then obtained by subtracting the value of outstanding mortgages (*Housing and Construction Statistics*, various issues). Real values were obtained by dividing by the GDP deflator.

U – Male Unemployment Rate

Sources: as above.

RR – Real Interest Rate

The real interest rate is calculated as $r_t - (p_{t+2}^e - p_{t-2})$, where r is a measure of the nominal interest rate and p denotes the log of the GDP deflator. Expectations of p in period $t + 2$ were generated recursively using fitted values from the following autoregression:

$$\begin{aligned}\hat{p}_t &= 1.5287 p_{t-1} - 0.3207 p_{t-2} - 0.0772 p_{t-3} \\ &\quad - 0.0521 p_{t-4} - 0.0787 p_{t-5} \\ \text{s.e.} &= 0.01 \quad \text{AR}(4) = 0.41 (0.80)\end{aligned}$$

The equation was estimated by OLS using data from 1966Q2–1993Q4 and the coefficients were constrained to sum to unity.

Prior to 1970Q3, r is measured by the 3 month local authority bill rate (source: *Bank of England Quarterly Bulletin*, various), and thereafter by the 3 month inter-bank rate (from various issues of *FS*).

Y – Real Gross Domestic Product

Index of output measure of GDP at constant factor cost (1990 = 100); seasonally adjusted. Source: *ETAS 1994*.

W – Real Average Earnings of Employees

Wages and salaries (excluding Forces pay) divided by the number of employees in employment and deflated using the GDP deflator. For 1965–1982Q2, the wages and salaries series is obtained from various issues of *FS*. Subsequent figures are obtained from *ETAS 1994* with figures for Forces pay being obtained by interpolation using data from *National Income and Expenditure*.

COMP – Share of GDP Accounted for by Construction and Distribution, Hotels and Catering, and Repairs etc.

Calculated using the index numbers of output at constant factor cost given in *ETAS 1994* and the figures for GDP at

constant factor cost (1990 prices) published in the same source.

ATR – Average Rate of Income Taxation

Calculated as:

$$\text{ATR} = \frac{\text{UK Taxes on Personal Income} + \text{NICS}}{\text{Wages and Salaries} + \text{Other Personal Income}}$$

where NICS = employees' national insurance contributions. Source: *FS*, various issues.

MTR – Marginal Rate of Income Taxation

Sum of Basic/ Standard rate of Income Tax and marginal NICS rate paid by Class 2 contributors (principally, self-employed earners). Class 2 contributions are paid at a weekly flat rate, so a marginal percentage rate is calculated by dividing this figure by the average weekly earnings of self-employed individuals. Information on the latter is obtained by interpolation of annual data from *National Income and Expenditure*, using figures for 'Other Income' in *ETAS 1994*. Data on tax and contributions rates are taken from various issues of *AAS*.

BEN – Real Value of Unemployment Benefit

Weekly rate of unemployment benefit for a single person, deflated by the GDP deflator. The benefit series is taken from various issues of *AAS* and *Social Security Statistics*.

SET – Rate of Selective Employment Tax

Source: Reddaway (1973).

LGS – Loan Guarantee Scheme Dummy

Equals one from 1981Q2 onwards; zero prior to this.

EAS – Enterprise Allowance Scheme Dummy

Equals one from 1983Q3–1991Q1; zero elsewhere.

BSUS – Business Start-up Scheme Dummy

Equals one from 1991Q2 onwards; zero prior to this.

CTAX – Small Firms' Rate of Corporation Tax

Source: *Inland Revenue Statistics*.

Notes

¹ Details of the operation of the EAS and its successor, the Business Start-up Scheme, are discussed in Section II, below.

² Examples include Evans and Jovanovic (1989), Meyer (1990), Blanchflower and Oswald (1991) and Holtz-Eakin, Joulfaian and Rosen (1994).

³ For contrary evidence on the relationship between housing assets and the rate of new business creation, see Robson (1996b).

⁴ See Crouchley et al. (1994). Note also the finding from Labour Force Survey data that a large proportion of female entrants into self-employment were previously outside the labour force (45 percent on average over the years 1983–1991) and that a similarly large proportion of females exit the labour force on leaving self-employment (39 percent). These figures are much larger than the corresponding values for males (10 percent and 19 percent, respectively). See Campbell and Daly (1992) for further details.

⁵ Campbell and Daly (1992), quoting Labour Force Survey data, report that in 1991, these two industry sectors accounted for 50 percent of self-employment amongst UK males, a proportion similar to that (54 percent) recorded in 1981.

⁶ For a detailed discussion of the design and effects of the EAS, see Storey (1994).

⁷ For an analysis of the factors influencing take-up of the Loan Guarantee Scheme, see Cowling and Clay (1995).

⁸ For example, a 1989 Employment Department paper, *Small Firms in Britain* claims that, “A more beneficial tax regime has been a major factor in stimulating enterprise”. (p. 16)

⁹ Along similar lines, studies by Long (1982) and Moore (1983) using cross-section data for the USA have found that individuals who would face relatively high tax liabilities on their expected earnings if in paid-employment are more likely to be self-employed, *ceteris paribus*.

¹⁰ Previous studies of the effect of income taxes on the incentive for self-employment have included either the marginal rate (e.g. the studies by Blau and Parker referred to above) or the average rate (e.g. Evans and Leighton, 1989). Blau in fact includes measures of marginal tax rates for both high and low income earners.

¹¹ For a discussion of the wider effects of SET, see Reddaway (1973).

¹² In fact, these two methods can be shown to be equivalent in that the existence of a valid ECM implies and is implied by the presence of a cointegrating relationship between the variables concerned (Engle and Granger, 1987). In an infinite sample moreover, the two methods would yield identical estimates of the parameters of this relationship. In small samples, however, the results are likely to differ (Hall, 1991).

¹³ For a detailed introduction to the analysis of cointegrating relationships, see for example Cuthbertson, Hall and Taylor (1992), chapter 5.

¹⁴ In general, there may be up to $n - 1$ distinct cointegrating relationships amongst a set of n integrated variables.

¹⁵ See, for example, the discussion in Cuthbertson and Gasparro (1995).

¹⁶ There now exists a variety of textbook and survey treatments of the problem of testing for orders of integration in economic time series. See, for example, Banerjee et al. (1993).

¹⁷ Of course, other interpretations of this shift are possible. One possible interpretation is that it reflects the effects of corporate restructuring and ‘down-sizing’ activities in response to the onset of recession. The timing of the effect, however, would appear to be inconsistent with this explanation as the recession did not begin in earnest until mid 1980.

¹⁸ The theoretical ambiguity in Robson and Wren’s analysis concerning the effect of a pure increase in the average rate of tax arises because of the effect which the higher rate of tax is found to have in reducing the desired rate of evasion.

¹⁹ The liquid assets term is lagged one period as our measure refers to end-of-period holdings.

²⁰ The hypothesis that the constant may be restricted to enter the long-run solution to the VAR only is rejected by the data. The relevant chi-squared statistic – with one degree of freedom – has a value of 5.56, against a 5% critical value of 3.84.

²¹ Under the assumption of a restricted constant, the Trace statistic indicates that there may be up to five (!) cointegrating vectors.

²² Further evidence in support of the hypothesis of a positive effect of real net housing wealth on self-employment is reported in Robson (1996c), which examines UK regional data.

²³ A still further interpretation is that the real liquid assets variable could be picking up the effects of demand-side influences on the incentives for self-employment: indeed, a similar point could be made in relation to the level of real net housing wealth. The fact that we have already included more explicit measures of demand-side effects – real GDP and COMP – elsewhere in the analysis, however, would lead one to discount this interpretation. I am grateful to a referee for raising this point.

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