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New Firm Formation in British Counties:

Comparing the 1990s with the 1980s

Brian Ashcroft[*], Maria Plotnikova[*] and David Ritchie[+1]

[*] Fraser of Allander Institute and Centre for Public Policy for the Regions,
University of Strathclyde

[+] Scottish Executive

Introduction

New firm formation has continued to play a key role in regional development policies across the globe for more than twenty years. Successful policy requires a clear understanding of the underlying determinants of the business birth rate and there is good reason to believe that the fundamentals may be subject to change. Armington and Acs (2002) argue for a fresh examination of the subject in the United States, in part because of developments in spatial theory including the new economic geography (Krugman 1991a, 1991b, 1994) and endogenous growth theory (Romer, 1990; Nijkamp and Poot, 1989) and because of the evolution of the regional economy. They contend that the motivation for much of the literature on new firm formation in the 1980s was high levels of unemployment in traditional US industrial regions. But the focus of the literature today is different, emphasising high technology start-ups as a critical driver of the new economy.

In this paper, we pose a similar question for the UK regions. Specifically, we seek to apply and develop the model tested by one of the present authors and colleagues on 1980s data, to data for the 1990s (Ashcroft, Love and Malloy, 1991). The paper is in five parts. First, we discuss the measurement of new firm formation in the UK regional context. Secondly, we identify some stylised facts on the variation of new firm formation in British counties in the 1980s and 1990s. The third part of the paper specifies the model used in our work on the 1980s and discusses the earlier findings. Part 4 tests the model on data for the 1990s, retests for key variables rejected on 1980s data and introduces new variables to reflect developments in theory and the evolution of UK regional economies. The final part of the paper compares the explanation of new firm formation in the 1980s with the estimates for the later period. In this section implications for policy and future directions for research are considered.

Measurement of New Firm Formation

We follow earlier practice in the UK literature (e.g. Ashcroft, Love and Malloy, 1991; Keeble and Walker, 1994) and measure firm formation using VAT registration data, which is now obtained from the Small Business section of the Office of National Statistics. The data are reported as count data and no information about other factors of interest, such as firm size, survival duration and de-registration is provided. It should be noted that VAT measurement was not uniform across the years as the registration threshold in turnover was raised substantially above the usual adjustment for inflation between 1991-1992 and 1993-1994. This had the effect of producing an artificial decrease in the number of firms created. There was also a definitional change in 1994 where the number of reporting units was reduced as branches of establishments ceased to be treated as separate entities. For these considerations the VAT registration data used in our analysis is for the period 1994 to 1999.

In this analysis we focus on a 'gross' measure of new form formation because *a priori* determinants of new starts differ from closures, even though there is evidence that firm births and deaths are interdependent (Johnson and Parker, 1996). The relationship between firm creation and firm closure, and the life span or survival of firms, is a separate research issue (Brixy and Grotz, 2006).

British counties are used as the spatial units of analysis. However, in the mid 1990s there was a change in UK county definitions with the movement towards single tier authorities, which poses problems for a comparison between the1980s and 1990s. The boundaries of some authorities changed as a result. To ensure comparability, a bridge was constructed from the new to the old definitions, and where it was necessary authorities were apportioned using the lower territorial units to form the previous counties.

There is a wide variation in rates of new firm formation across industrial sectors as Table 1 shows. It follows that firm formation rates would be higher/lower in areas that happen to have a higher/lower proportion of

industries with greater firm formation rates, other things remaining equal. Regional variation in the location of sectors with different formation rates may well be a reflection of differences in regional competitive advantage. It is therefore a worthy subject for explanation in itself. However, we contend that a different set of explanations is likely to be required from those necessary to account for regional variations in new firm formation in given sectors. For example, we might expect path dependency to play a significant role in the former compared to the latter. Accordingly, we follow the earlier literature (Johnson, 1983; Storey and Johnson, 1987; Ashcroft, Love and Malloy, 1991) and adjust for the effect of industrial structure on the firm formation rate in each county. Specifically this is done by applying shift-share analysis so that:

$$Ar = NSr + Sr + Fr$$

where[2]

Ar = the actual number of firms formed in a county/region during a specific period,

NSr = the number of new firms that would have been expected if the structure of the county's employment had been that of the UK as a whole *and* if each sector in the county had the same formation rate as its UK counterpart,

Sr = the 'structural component', i.e. the element in the difference between Ar and NSr attributable to the difference in industrial structure between the county and the UK,

Fr = the 'fertility component', i.e. the element in the difference between Ar and NSr attributable to the difference in firm formation rates within industries between the county and the UK.

Thus:

$$Ar - Sr = NSr + Fr$$

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[2] The shift-share components are formally defined in the Appendix.

NSr + Fr is the numerator of the dependent variable in our estimating equations. But *NSr + Fr* is directly related to the scale of the region or county and so must be normalised to allow spatial comparison. Previous research has used the regional stock of VAT registered businesses (Storey & Johnson, 1987), male employees (Johnson, 1983), labour force/working population (Ashcroft *et al*, 1991) or both stocks of labour and firms (Armington & Acs, 2002). We normalise by working pop: it is a measure of scale, but also a source from which new firm formation may flow.

**Table 1: VAT Registrations by UK industry sector, 2004**

Sector	Registrations (R)	Employment (E) '000s	R/E
Electricity, gas and water supply	190	155.02	1.23
Manufacturing	9,875	3,092.13	3.19
Construction	21,860	1,178.33	18.55
Wholesale, retail, hotels restaurants	56,545	6,418.52	8.81
Transport, storage communication	9,250	1,544.14	5.99
Banking, finance and insurance	67,305	5,193.45	12.96
Public administration; Other community, social, personal services	12,660	8,210.45	1.54

New firm formation in British counties in 1980s and 1990s

UK new firm formation varies across time as well as across space. This is clearly evident from Figure 1, which depicts absolute, or structurally unadjusted, rates for the period 1981 to 1999. The cyclical pattern in absolute firm formation rates reflects variation in the UK macro economy and would appear to be pro-cyclical. New firm formation also tends to vary across UK counties over time and there is a suggestion that spatial variations are also pro-cyclical, at least in the 1980s, with high firm formation counties tending to do relatively better as the overall performance of the UK economy improves.

But this relationship appears to break down in the 1990s when spatial disparities in new firm formation rates, as measured by the coefficient of variation, rose – see Figure 1.

Figure 1: Firm formation in UK counties 1981 to 1999: UK average per thousand of working population and coefficient of variation
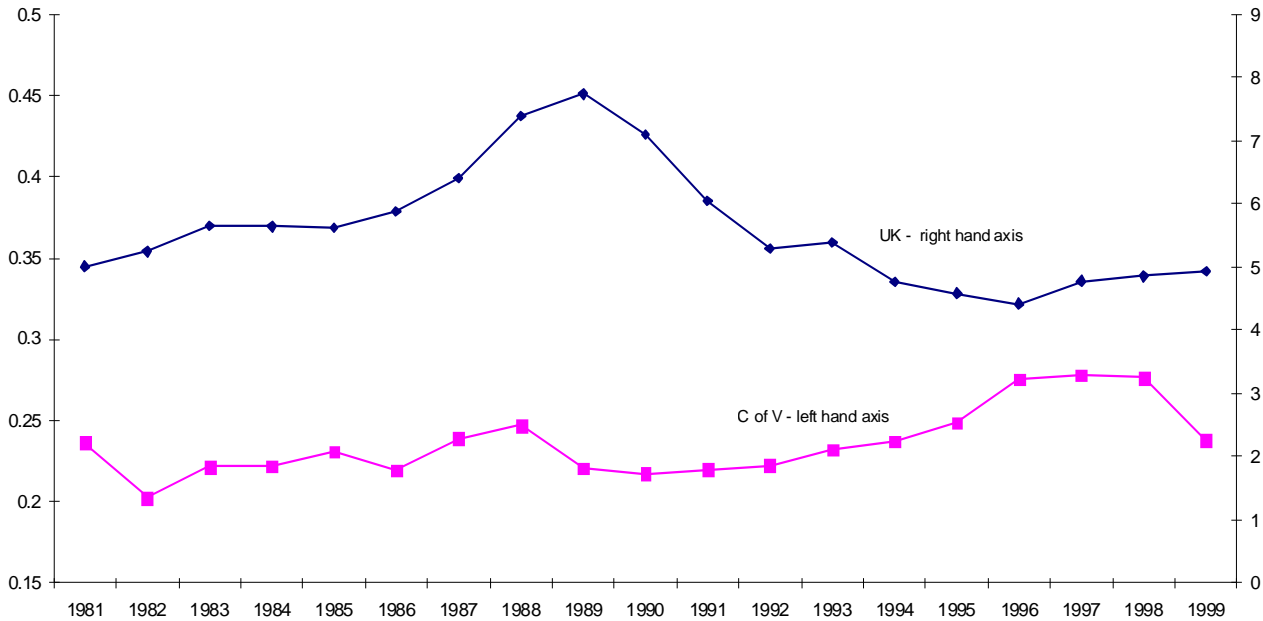

Figures 2 and 3 provide further information on spatial variations in new firm formation across the UK counties for 1984-1989 and 1994-1999, respectively. The figures present a percentile map[3] of county new firm formation rates adjusted for industrial structure in the two periods. Percentile maps specifically allow for outliers to be identified and provide an indication of the degree of spatial concentration in the generation of new firms. What the two figures suggest is that the spatial distribution of new firm formation became more heterogeneous in the 1990s compared with the 1980s. There are clear clusters of counties with similar values in the 1980s but the pattern is patchier in the 1990s. There are two upper outliers in the 1990s, (London and Orkneys) but no observations classified as outliers in the 1980s. Scotland fares far better in the 1990s, while there appears to be greater differentiation in Wales in that period. The south east of England exhibits greater

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[3] Strictly speaking a box map, which is a form of quartile map where in addition to the four quartile categories a further two categories are added at the high and low ends of the distribution to accommodate those observations that may be classified as outliers.

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differentiation in the 1990s and appears to be relatively worse off, while the south west also appears to lose out in the 1990s. Overall, for England, the firm formation rates suggest a core and periphery structure in the 1990s centred on London, while in the 1980s the south of England especially had high rates of firm formation uniformly, with a north-south divide more clearly apparent across Britain as a whole.

Figure 2: Percentile Map of U.K. New Firm Formation rate adjusted for industry structure, *NSr + Fr,* **1984-1989**
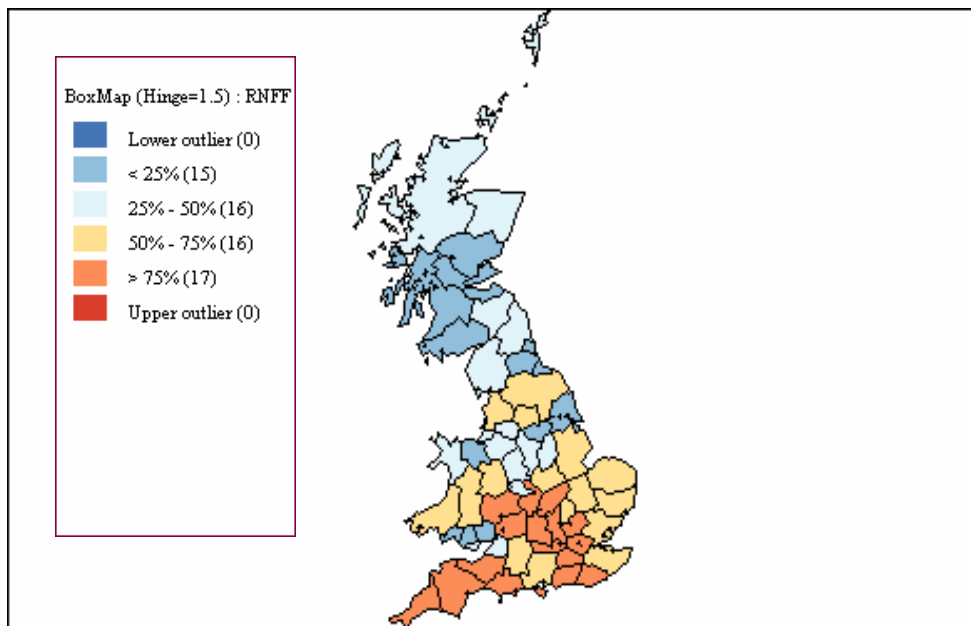
Figure 3: Percentile Map of U.K. New Firm Formation rate adjusted for industry structure, *NSr + Fr,* **1994-1999**
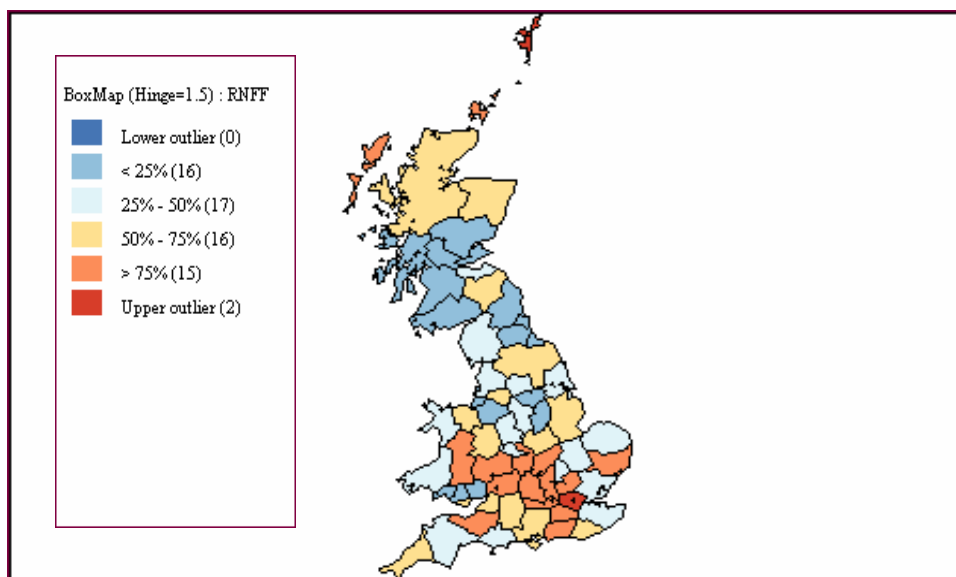
Figure 4 contains further information on the spatial pattern in the 1990s across England and Scotland by presenting the fertility and structural components of counties per thousand of working age population ranked by the fertility component. Several facts stand out. First, there is considerable variation across the counties. Secondly, positive/negative structural and fertility components tend to go together but with a significant number of exceptions. Thirdly, counties with positive fertility components where local industries are generating new firms faster than their national counterparts are mainly in the midlands and south of Britain (17 from 21), while negative fertility components are more prevalent in the north of Britain (17 from 32). However, the pattern is not as strong as to suggest a simple north south divide in the 1990s. Moreover, with the exception of the extreme dominance of London, the traditional British urban industrial areas do less well while the more rural and sparsely populated areas do better. This is similar to the 1980s, although there has clearly been some loosening of the spatial pattern of new firm formation between the 1980s and1990s.

So, overall, the county firm formation rate in Britain has tended to be pro-cyclical, with spatial variations widening as the macro-economy booms. But county variations rose in the 1990s compared to the 1980s the spatial pattern appears to have evolved with a north-south divide less evident. The London economy dominated new firm formation in Britain and even more so in the 1990s. Outside of London there is continuing evidence that more rural and sparsely populated areas do better, while traditional urban industrial areas do worse.

Figure 4: Fertility and Structural Components, Firm Formation per thusand of working age population, 1994-99
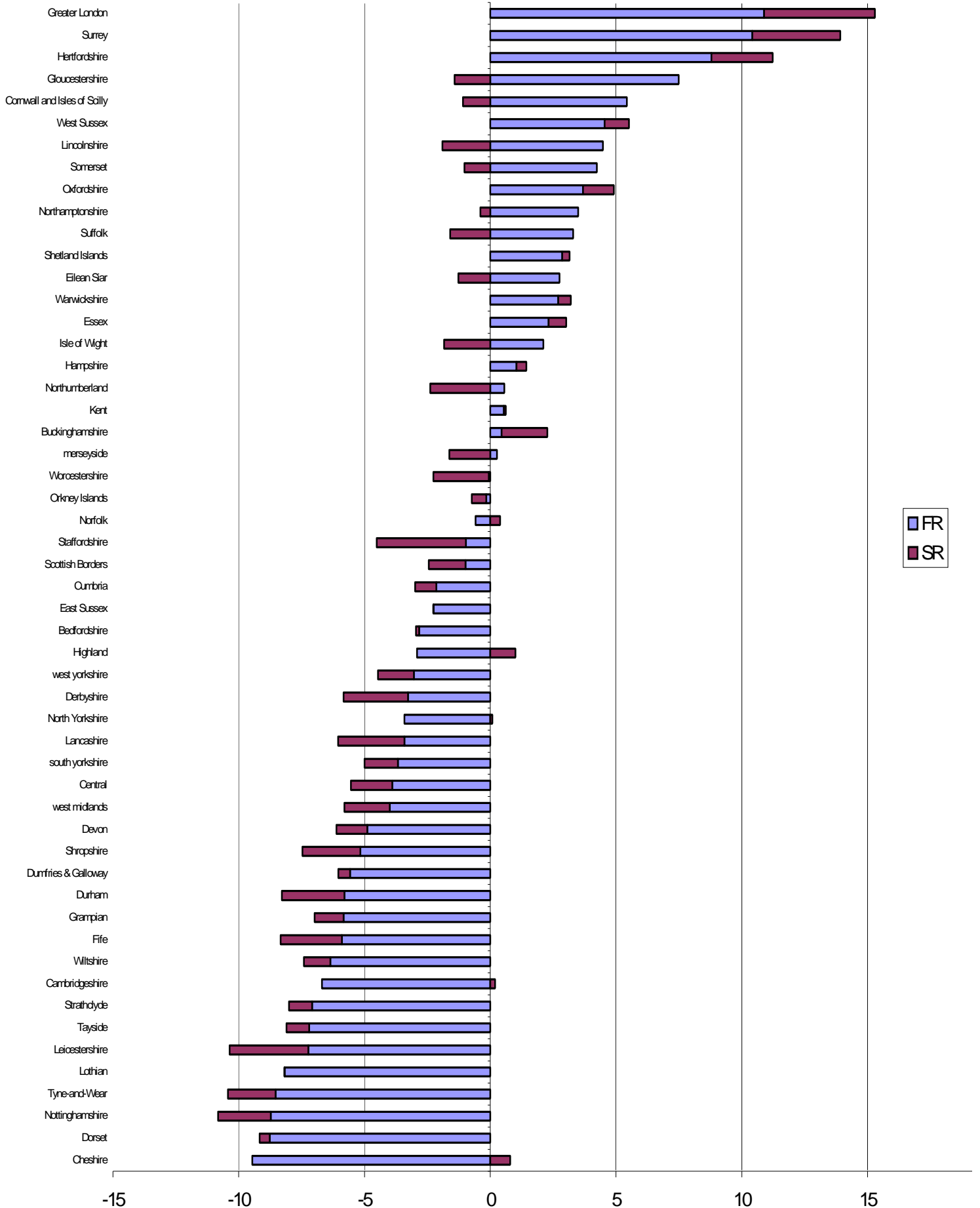
Modelling new firm formation and research findings for the 1980s

New firm formation can play a key role in regional development (Ashcroft and Love, 1996; Fritsch and Mueller 2004; van Stel and Suddle, 2005). To better appreciate the role that new firm formation can play in regional development we need to understand the determinants of the regional/county demand and supply of goods and services through new firm formation. It seems reasonable to argue that for most goods and services demand is neutral with respect to the form of supply such as new firms or existing businesses. Therefore for a given level of demand for goods and services regional new firm formation should vary according to variations in a new firm formation (NFF) supply function. The NFF supply function is likely to depend on price, cost, resource availability and skill considerations both absolutely and relative to supply through existing firms.

Ashcroft, Love and Malloy (1991) suggest that regional variations in the supply of new firms may be accounted for by the aggregation of variations at the individual or firm level in: the expected return to be made from starting a new firm, the expected labour earnings foregone by doing so, and a vector of variables embracing the wealth and skills of potential founders and others that proxy the ease or difficulty of regional supply through new firms. The micro-foundations of this approach are effectively based on the self-employment choice literature where utility maximising individuals choose an employment status that offers them the highest expected utility[4] (Rees and Shah (1986), Gill (1988), Dolton and Makepeace (1990), de Wit (1993), and Clark and Drinkwater (2000). Ashcroft, Love and Malloy (1991) operationalise this approach by adopting a measure of expected profit in new firm formation, defined as the difference between county GVA and the wage bill normalized by the stock of firms in the county. Expected labour earnings foregone are defined as average wage earnings for the county and the probability of

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[4] Specifically, $E^* = \delta_1(\ln(y_{se}) - \ln(y_{pe})) + \delta_2 A + \varepsilon$. Given that δ_1 is positive, individual i chooses self-employment if and only if E* is positive, otherwise wage-employment is chosen. The equation indicates that the choice is assumed to depend on the difference between the logarithms of the potential income in the two alternatives $(\ln(y_{se}) - \ln(y_{pe}))$, a vector of observable characteristics of the individual (A), and a disturbance term (ε).

obtaining the earnings is proxied by the county unemployment rate as well as the change in the unemployment rate. The wealth that would facilitate the financing of new firms is proxied by the proportion of homeowners in the county. The skills of the founders are defined by a) the share of 16-year olds staying at school, b) the proportion of managerial and professional class among the population and c) the proportion of small enterprises (up to 9 employees) in the stock of enterprises. A full description of the data sources is given in the Appendix.

Ashcroft, Love and Malloy found that the variation in new firm formation across counties in the 1980s[5] was positively related to wealth as proxied by home ownership[6], entrepreneurial skills in the population, as proxied by the share of small firms, and the share of population in socioeconomic groups 1 and 2 - managerial and professional. The variation in new firm formation was, as expected found to be negatively related to the expected income foregone, and negatively related to the probability of attaining that income[7]. But it was found *not* to be related to the proxy for expected returns from starting a business, and the proxy for educational attainment of potential founders – the percentage of county pupils aged 16 staying on at school. The results are presented in Table 2.

Model specification and estimates for the 1990s

Our procedure here was as follows:
1. Applying the basic model to 1990s data, comparing like with like as far as possible.
2. Re-testing for variables rejected by 1980s model and introduce new variables to test additional hypotheses of the impact on county firm

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[5] Strictly speaking 1981 to 1986.

[6] House price data were only available at regional and not county level. In any event there is some doubt as to whether house prices should be included because they are a composite indicator of the desirability of a location, and subsume the effects of many variables.

[7] However, while the effect of the change in the unemployment rate was statistically significant the level of the unemployment rate was not.

formation of urban agglomeration effects, the scale of the public sector, and ethnic background.

Table 2: Determinants of firm formation in 1980s, from Ashcroft *et al*, 1991

Dependent variable: RNFF	Estimated Coefficients
Constant	31.326* (2.028)
Expected profit	-0.000 (-0.015)
Expected Earnings	-0.005** (-3.26)
Unemployment rate	-0.142 (0.448)
Change in unemployment rate	0.508* (2.177)
Homeownership rate	0.406*** (5.429)
Proportion of small enterprises	1.9*** (5.489)
Managerial/Professional class	0.615** (2.681)

t-statistic in parentheses
Adjusted R-square 0.80

The 1980s model applied to 1990s data

Table 3 presents the results of the estimation of the 1980s model specification applied to 1990s data. County variations in NFF are significantly related to wealth (as proxied by the importance of home ownership), and entrepreneurial skills in the population (proxied by importance of small firms). None of the other variables in the basic model was statistically significant. It is apparent from these results that the model that accounted for regional variation in firm formation rates in 1980s does not work as well for the 1990s and therefore needs to be modified.

Table 3: Determinants of firm formation, 1994-1999 – Basic 1980s Model

Dependent variable: RNFF/work pop	Estimated Standardised Coefficients
Constant	(-3.25)
Expected profit	0.1391 (1.51)
Expected Earnings	0.1591 (1.33)
Unemployment rate	-0.2162 (-1.70)
Homeownership rate	0.3269[**] (2.84)
Proportion of small enterprises	0.2378[*] (2.12)
Managerial/Professional class	0.1228 (0.98)

t-statistic in parentheses
Adjusted R-square 0.66

Revised model specification for the 1990s

Armington and Acs (2002) note that the research focus in the literature on new firm formation has shifted towards an exploration of the importance of *human capital* issues and away from questions of the role of, and consequences for, unemployment. High technology start-ups are increasingly common and education and skills are at a premium in such activities. They find significant evidence that human capital[8] is important to new firm formation rates at the labour market area (LMA) level in the United States during the period 1994-96. This finding is supported by their more detailed later research on new firm formation in the US service sector (Acs and Armington, 2004). In the present study we proxy county human capital by the proportion of sixteen-year olds staying on at school.

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[8] Using the 1990 proportion of adults who were college graduates and the proportion of adults aged over 25 with no high school degree. The latter was positively related to new firm formation but the authors argue that "after controlling for the proportion of adults with college degrees, the additional effect of a greater share of less educated workers is to facilitate the start-up process by providing cheap labour for the new firms." (p. 42)

Armington and Acs (2002) note that regions that are rich in human capital will also have more start-up activity the greater the potential for knowledge spillovers. Moreover, Krugman's (1991a), (1991b) new economic geography theory links firm birth rates positively to *agglomeration effects* arising from pooled labour, non-pecuniary transactions and knowledge spillovers. Other studies have noted the link both in theory and in practice between agglomeration and new firm formation (Reynolds et al., 1994; Audretsch & Fritsch, 1994; Keeble & Walker, 1994; Fritsch, Brixy & Falck, 2006). Population density at the county level is one straightforward way to account for agglomeration effects, and we adopt that measure in the present estimation. However, there may be significant variations of population density within a county due to urban concentration and industrial clustering. A more comprehensive measure of urbanization that allows for this was not available due to a mismatch between the measures adopted at the Scottish and English levels by the Scottish Executive and the ONS.

Another factor that may bear effect on regional variation in firm formation is the differential *ethnic mix* of the population and the proportion of immigrants from different ethnicities in the county. Clark and Drinkwater (1998) follow Metcalf *et al* (1996) and highlight self-employment as a means of avoiding labour market discrimination for ethnic minority groups. But they also note that ethnic minority groups may have specific group characteristics that enhance the return from entrepreneurship. Such groups may have different cultural resources and norms with respect to entrepreneurship. First generation immigrants may engage in self-employment as a way to enter the labour market and may be less likely to have assimilated some or all of the characteristics of local populations. To test for potential the differential effect of different immigrant groups, we used the data on ethnicity and country of origin provided in the 1991 Census. All identified ethnic groups and regions of origin were included in estimations to test for the impact on the new firm formation rate of county variations in the proportion of the ethnic group and country of birth to resident population.

Finally, we test for the impact of county variations in the scale of the public sector on new firm formation. Henley and Thomas (1998) note the importance of the public sector to regional employment, particularly in those areas that have benefited from the UK government's policy to encourage the dispersal of government office activity away from central London. Such activity offers direct jobs and may yield positive income and linkage multiplier effects. However, the demand for public sector worker may bid up local wages and so diminish the competitiveness of private sector activities in the locality. Henley and Thomas find that there is a small positive short-run association between public sector employment growth and private sector employment growth, with a stronger association in Scotland and the north of England[9]. In this paper we test for any such effects on county new firm formation using the public sector share in overall county employment.

We therefore augment the basic model by hypothesising that the proportion of sixteen-year olds staying on at school, population density, the proportion of immigrants from ethnic minorities, and the share of public employment will in addition affect new firm formation across British counties.

Estimation of the revised model

In estimating the revised model we found a strong correlation between population density, presence of immigrants and share of public employment and therefore decided to combine these three variables together using Principal Components analysis. Principal components were extracted from three variables, percent foreign born in the county, percent public employment and population density. As a data reduction technique, Principal Components extracts the common variation among several variables. The technique is used here for parsimony and to ward off multicollinearity. The first principal component that can be thought of as a measure of urbanization factors was used in the estimation.

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[9] Overall a 10% growth is public service employment was found to be associated in the immediate short-run with a 0.8% growth in private sector employment.

The results of the estimation of the revised model on 1990s data are presented in Table 4. It is clear from these results that the basic model works better for 1980s than for 1990s, while the revised model outperforms the basic model in the 1990s. Expected profit, and expected earnings are significant with the expected signs. The negative effect of unemployment suggests that there were significant 'pull' effects of unemployment on new firm formation in the 1990s, with the supply side, or 'push', effects on new firm formation that are frequently also picked up by the unemployment variable not in evidence. This may be in part due to the low levels of unemployment that persisted in the 1990s compared to the persistently high levels in the 1980s. Hence the pressure from the labour market for displaced workers to create their own employment was much less in the 1990s than the 1980s, while the demand-pull effect was much greater.

Table 4: Determinants of Firm Formation, 1990s model specification

Dependent variable: RNFF	Standardised Estimated Coefficients
Constant	(-1.43)
Expected profit	0.16^* (2.10)
Expected Earnings	-0.41^{**} (-2.7)
Unemployment rate	-0.33^{**} (-3.02)
Principal component (population density, foreign born, employment in public, health, edu sectors)	0.53^{**} (3.9)
Homeownership rate	0.32^{**} (3.3)
Percent 16-year olds staying in school	0.26^{**} (2.88)
Managerial/Professional class	0.39^{**} (3.2)
Percent born in Pakistan	0.18^* (1.96)

t-statistic in Parentheses
Adjusted R-square 0.75

The influence on new firm formation of the counties' share of small enterprises ceases to be important when the other variables are included. As expected, human capital when proxied by educational attainment is important in the 1990s compared to 1980s, which suggests that informal education and tacit knowledge is becoming less important for new firm formation compared to formal education. Population density together with the percentage born in Pakistan[10] and share of public employment is found to be significant. This is consistent with the hypothesis of the importance of agglomeration effects, although the existence and degree of spillovers has not been explored here. Public sector employment has a significant effect when it is included by itself or as part of the principal component, with positive outcome. This result is potentially very important in the context of the crowding-out debate. This result is an indication that the issue of public sector impacts needs to be further explored at the regional level in the UK. Finally, home ownership *per se* continues to be important to new firm formation in the 1990s although perhaps less so than in the 1980s. If this represents an asset effect on firm formation does this suggest the existence of financial market imperfections with banks lending to founders using houses as prime collateral? Further research is clearly required here.

Conclusions

The view that the underlying determinants of the new firm formation are subject to change was given empirical support from the United States in the work of Armington and Acs (2002). Their study supports the theoretical contention that new starts are driven more by knowledge spillovers and technological considerations and less for labour market reasons such as high levels of unemployment. Our study in comparing new firm formation in the British counties in the 1990s with earlier work on the 1980s reveals both similarities and differences with the Armington and Ac's US evidence. Using

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[10] First-generation immigrants from Pakistan were the only ethnic group associated with a significant and positive effect on new firm formation. The absence of significance amongst the other ethnic groups may reflect relatively limited dispersion across counties than any necessary refutation of the ethnic differentiation hypothesis for those groups.

the same underlying model structure for the two periods we find that human capital as proxied by educational attainment did have a significant impact on county variations in new firm formation in the 1990s whereas no such effect was found in the 1980s. Agglomeration effects, as proxied by population density, also appear to have had a significant impact on the business birth rate in the 1990s and again no such effect was found in the 1980s. Intertwined with agglomeration effects in the 1990s is the positive impact of the presence of the public sector and the significance of ethnicity, as those counties with higher proportions of Pakistani born residents enjoyed, other things equal, more firm births.

But in another sense the determinants of new firm formation have not changed as much as implied by Armington and Acs. The micro foundations of self-employment choice where individuals select an employment status by maximising a utility function through the comparison of earnings in the two alternative states subject to a vector of personal attributes and circumstances appears to be mirrored at the aggregate regional level in the UK in both the 1980s and 1990s. The greater the returns from self employment or start-up relative to the returns from paid employment the greater the likelihood of start-up and the more business births there are likely to be at the regional level. Moreover, while our research suggests that the vector of entrepreneurial attributes and circumstances does appear to have changed in the UK between the 1980s and 1990s there are some constants. The managerial and professional skills dimension of human capital, independent of formal education, were as important in the 1980s as in the 1990s, suggesting the importance of an installed business base to regional new firm formation. And finally, the continuing importance of home ownership to new firm formation, all be it perhaps of lesser significance than in the 1980s, poses questions about the efficiency of the banking and financial system in supporting new firm formation across the regions of Britain and the UK.

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Appendix: Variable Composition and Data Sources

Variable	Composition	Data Source
RNFF: New Firm Formation adjusted for industry structure	$NS_r = \sum (\frac{E_r e_{in} f_{in}}{E_n})$ $Ar - Sr = NSr + Fr$ $S_r = \sum_{1}^{N} (e_{ir} - E_r \frac{e_{in}}{E_n}) f_{in}$ $F_r = \sum e_{ir} (f_{ir} - f_{in})$ 1992 SIC	Firm VAT registrations: ONS Small Business Office Employment: ONS annual Business enquiry/annual employment survey
Expected profit	(GVA in manufacturing – average earnings in manufacturing*number employed)/county stock of firms	GVA: Regional Tends (ONS) Average Earnings: ONS New Earnings Survey Stock of firms: ONS Small business Office
Expected Earnings	average wage earnings for the county	ONS: New Earnings Survey
Unemployment rate	county unemployment rate	ONS: Annual Employment Survey
population density	1997 population/county area	ONS: Annual Business enquiry
Percent employment in public, health, education	100*Number employed in public, health, education/total employed	ONS: Annual Business Enquiry
Homeownership rate	100*owner-occupied units/total number of units	1991 Census: Table S049 Dwelling Type and Accommodation Type By Tenure (Households And Dwellings)
Percent 16-year olds staying in school	100*16-year olds in school/total number of 16-year olds	DfES Statistics Bulletin, 'Participation in Education and Training by 16 and 17 Year Olds in Each Local Area
Percent Managerial/Professional class	100*number employed in managerial and professional classes/total number employed	ONS: Labour Force Survey
Percent foreign born population	100*Foreign born /Usual Resident Population	1991 Census: Small area statistics Table S07
Percent of small enterprises	100* Number of Enterprises with less than 10 employees/total number of enterprises	ONS: PA1003