

Change in the Size Distribution of UK Firms

Geoffrey B. Robson⁺
Colin C. Gallagher*

ABSTRACT. This paper examines the extent of change and stability in the population of UK firms through time in terms of its size distribution, as defined by number of employees. It was empirically found that the distribution of employment by firm size remained surprisingly constant over the 1987–1989 period. A major implication of this finding is that in times of very high net job creation (involving high gross job creation and loss), factors are at work in the economy to keep the population distribution of firms (in terms of employment concentrations) more or less stable. It is hypothesised that a 'natural' concentration exists for each different size band, and that as change takes place, the proportion of total employment based in the size band will tend towards this natural level.

The rise in the proportion of employment in small firms, and the comparatively high job creation ability of small firms in recent times has come about in part because of negative rather than positive macro-economic influences. In recession, small firms in aggregate in spite of their individual volatility, are the most resilient. In prosperous times they do not increase their proportion of employment share, while in times of recession they do. Our results imply that large firms have a very significant, if not the most significant, bearing upon aggregate employment trends. On the other hand, small firms inherently have more potential to create jobs than large firms.

The majority of public expenditure and legislative support for UK business is directed at large firms, as a result of culture and tradition. Even with the benefit of this support, large firms in recent decades have still performed badly, in job generation terms. In contrast, small firms have shown an inherent advantage in their ability to create jobs. A shift of government expenditure and legislative support from large to small firms would further enhance and realise the potential of small firms to benefit the economy and create jobs.

1. Introduction

This paper examines the extent of change and stability in the size distribution of the population of UK firms through time, where size is defined by number of employees. The distribution of the UK firm population by size has been calculated for the two points in time of 1987 and 1989.

A theory is proposed to explain why changes take place in the distribution over time, and this is contrasted with alternative explanations of change. Observed changes in the proportion of total UK private sector employment in small firms over the 1979–1989 period are also explained in the light of this theory and some 'predictions' of the likely employment distribution and job creation behaviour of UK firms over the 1989–1992 period are made. Finally, some implications for policy makers which can be derived from the theory are outlined.

2. The job creation performance of firms, 1971 to 1989

A series of studies have been carried out in recent years to examine the job generation behaviour of British firms over four two year periods. All used the very large business database of the Dun and Bradstreet (D and B) credit rating and information services organisation, which holds over 450,000 records of UK businesses. It is estimated that the firms recorded on this database account for over 70% of UK private sector gross domestic product (Robson and Gallagher, 1992a) and it is this dataset which has been used in this analysis together with data from published Value Added Tax (VAT) statistics. The extensive validation and grossing up procedures which were applied to the data have been described in Daly, Campbell, Robson and Gallagher (1991).

A number of criticisms have been made in the

Final version accepted on April 13, 1993

⁺ Lecturer * Emeritus Professor
School of Business Management
University of Newcastle upon Tyne
Newcastle upon Tyne NE1 7RU
England

past about possible biases in the data (Storey and Johnson, 1986, 1987) and these have since been adequately refuted (Gallagher and Doyle, 1986; Doyle and Gallagher, 1987; Robson and Gallagher, 1992; Robson, 1992). As a result of ongoing systematic improvements to the data by D and B in recent years and the technical developments implemented by the researchers in its management, it now provides a sound base from which to estimate job creation and firm size distribution trends at the economy level.

The four earlier job generation studies covered the periods 1971–81, 1982–84, 1985–87 and 1987–89, and have been described by Gallagher and Stewart (1986), Doyle and Gallagher (1986), Gallagher, Daly and Thomason (1991) and Daly, Campbell, Robson and Gallagher (1991). Over the four time periods a number of strong and definite patterns emerged in terms of firm population change, and the relative contributions of firms in different size ranges to overall aggregate employment change. Irrespective of time period, the smallest firms always showed the highest volatility (i.e. the highest growth, contraction and death rates). Similarly, the largest firms were always the most stable. However, while in general the larger firms individually were always better at retaining their employees, with low volatility or churning, they were not as successful in aggregate in restraining their overall job loss as were their small firm counterparts.

One remarkable finding was that the same general relationships in term of the contributions of differing size cohorts of firms to job creation were observed over all of the four periods studied, even though the net inflows and outflows into and from the employed work-force varied significantly. For example, over the first two periods of 1971–81 and 1982–84 there was a net employment loss from the economy, whereas from 1987–1989 there was a net employment gain of around 1.1 million. Also, in each of the first three periods of 1971–81, 1982–84, and 1985–87, at least one size cohort was a net loser of jobs. In addition, in those times of high aggregate net loss, the fertility index was negative for all but one size band. In marked contrast, for the 1987–1989 study, all size bands were net creators of jobs.

However, fundamental to the continued promotion and understanding of small firms was the

finding that irrespective of the general economic climate, small firms (defined as being of between 1 and 19 employees) are always 'net creators' of jobs. More jobs are always created from the birth and expansion of small firms that are lost through their contraction and death. They also 'create' the highest proportion of net and gross new jobs in relation to the proportion of aggregate employment which they represent at the start of any period examined and this performance is also repeated across different sectors, as described by Daly, Campbell, Robson and Gallagher (1992).

3. The stability of the firm population, 1987–1989

For the purposes of this study, the population of firms was grouped into twenty narrowly defined size cohorts. In the 1987–89 job generation study it was found that over the period there had been considerable change and movement between these size cohorts due to firm births, deaths, contractions and expansions. Indeed, 1.2M net new jobs were created of which more than 45% were contributed by the 1 to 9 employee size cohort. The initial expectation from this finding was that such a large 'small firm contribution' would inevitably have increased the concentration of employment in small firms and hence resulted in a significant change in the size distribution of UK firms.

Table I shows the distribution of the population of firms at both the beginning and at the end of the 1987–1989 period. In spite of the high known turbulence within the population, a most striking feature is the great similarity in the overall structure of the firm population distribution at the two points in time. This strong stability was quite unexpected. Table I also shows an absolute increase in the numbers of firms between 1987 and 1989.

One criticism would be that due to the time period under study being so short, distribution stability would have been expected. However, as is discussed later in this paper, significant change in the UK firm size distribution has been observed over the 1979–1986 period. If this 7 year duration had been broken down into discrete 2 year sub-periods, then for some, substantial change would have been observed.

A major initial conclusion is that in times of

TABLE I
U.K. firm size distribution at end 1987 and at end 1989

Firm cohort size	1987		1989	
	no. of firms	percent employment	no. of firms	percent employment
1..4	445596	8.4	452314	7.6
5..9	234079	10.8	250067	10.5
10..14	101159	8.0	106071	7.7
15..19	49997	5.7	50976	5.3
20..24	14198	2.1	21475	2.9
25..29	8636	1.6	11096	1.8
30..39	13908	3.2	15474	3.2
40..49	7780	2.3	8489	2.3
50..69	10268	4.0	10484	3.8
70..99	7068	3.9	7427	3.8
100..199	7227	6.7	7906	6.7
200..299	2014	3.3	2212	3.4
300..499	1411	3.6	1606	3.8
500..699	456	1.8	530	2.0
700..999	354	2.0	358	1.9
1000..1499	270	1.9	304	2.1
1500..1999	131	1.2	158	1.4
2000..4999	301	4.1	318	4.1
5000..9999	123	3.4	127	3.1
10000+	179	22.0	196	22.3
TOTAL	905156	100.0	947587	100.0

Note: Percentage figure refers to the proportion of total employees employed in said cohort

high net job creation, involving both high gross creation and loss, and where also significant structural change is taking place, forces are at work in the economy to keep the overall firm population distribution stable. The question arises therefore: How can small firms create a disproportionately high share of jobs, and yet the firm size distribution in terms of employment remain stable? First, an increase in the concentration of employment in small firms need not only arise through the net job creation of small firms — it may also arise through a high incidence of middle and large sized firm contraction and death. It is only through components of change analysis which tracks individual firms through time that the job generation performance of cohorts of firms can be measured. Second, referring specifically to the 1987–89 job generation results, it must be noted that while much job creation arose through the birth and modest expansion of firms in the 1 to 9 cohort, a relatively poor performance was

observed for the 10 to 19 size cohort; this being due in part to the high contraction and death rates of firms initially in this band. Through the theory to be discussed in section 5, a reasonable conclusion is that the growth of a large number of firms into the 10 to 19 cohort may have yielded some adverse effects on the incumbent firms therein. Third, it is important to note that for the (most fertile) 1 to 4 cohort, births of firms actually exceeded deaths (in a ratio of approximately 3:2), even though death rates, measured as a percentage of initial stock, were higher in this cohort than in any other. This served to counteract expansions from this cohort greatly exceeding contractions of larger firms into this cohort, and hence led in part to the distribution stability observed. Also, given that the distribution of firms by firm size is highly skewed, (more than 50% of firms have less than 4 employees) any increase in the proportion of employment in small or micro firms arising through larger firm contraction will not arise

predominantly through the gain of employment in the lower size cohort, (where there can only be a minor effect in terms of firm numbers) but more through the loss of employment from higher size cohorts. On the other hand, if larger firms are performing well which according to our findings is a symptom of a non-recessionary climate, then increased micro firm concentrations will only ensue through significant growth in the number of such firms. Obviously this will in general only occur through the birth of 'micro' firms at a rate which significantly exceeds their death rate. However, in the three earlier job generation studies it had been found that the ratio of small firm births to small firm deaths had remained more or less constant. Thus it is very unlikely that in times of non recession the proportion of employment based in small firms will increase significantly, if at all.

A further important conclusion from previous job generation work (Gallagher et al., 1991, Doyle and Gallagher, 1987) was that small firm net positive job creation, accompanied by (comparatively)

large firm job loss must in general be a permanently necessary condition, if the overall stability of the firm population size distribution is to be maintained. If this were not the case, and if, for example, all firms grew by an equal percentage, then the result would be an 'explosive' exponential increase in employment in large firms and a rapid and gross distortion of the firm population size distribution.

4. Production and non production population distributions

The firm population was broken down into the two broad sectors of production and non production, where a broad 'production' sector was defined by the UK Standard Industrial Classification first digit numbers 0 to 5. In a similar way, non production was defined by first digit numbers 6 to 9.

Tables II and III show the population size distributions of both groups of firms at the beginning and at the end of the 1987–1989 period.

TABLE II
Total employment in production and non production (Thousands)

Cohort size	1987				1989			
	Prod'n	Non Prod'n	Total	Percent	Prod'n	Non Prod'n	Total	Percent
1..4	313	900	1213	8	303	897	1200	8
5..9	554	1001	1555	11	564	1085	1649	10
10..14	514	640	1153	8	512	705	1217	8
15..19	401	419	820	6	396	440	836	5
20..24	157	144	301	2	229	227	456	3
25..29	121	104	225	2	155	135	290	2
30..39	255	204	459	3	283	227	510	3
40..49	190	144	333	2	203	162	365	2
50..69	336	245	581	4	336	260	596	4
70..99	330	240	570	4	342	262	604	4
100..199	560	400	960	7	610	445	1055	7
200..299	269	211	480	3	293	234	527	3
300..499	304	222	526	4	344	257	601	4
500..699	156	108	264	2	167	141	308	2
700..999	170	124	294	2	167	128	296	2
1000..1499	173	102	275	2	184	147	332	2
1500..1999	91	87	178	1	137	79	216	1
2000..4999	343	253	596	4	351	299	651	4
5000..9999	246	239	484	3	251	243	494	3
10000+	1951	1225	3176	22	2091	1417	3508	22
	7432	7010	14443	100	7917	7792	15709	100

TABLE III
Percentages of total employment in sector by cohort for 1987 and 1989

Firm size	1987			1989		
	Prodn %	Non Prodn %	Total %	Prodn %	Non Prodn %	Total %
1..4	4.2	12.8	8.4	3.8	11.5	7.6
5..9	7.5	14.3	10.8	7.1	13.9	10.5
10..14	6.9	9.1	8.0	6.5	9.0	7.7
15..19	5.4	6.0	5.7	5.0	5.7	5.3
20..24	2.1	2.0	2.1	2.9	2.9	2.9
25..29	1.6	1.5	1.6	2.0	1.7	1.8
30..39	3.4	2.9	3.2	3.6	2.9	3.2
40..49	2.6	2.0	2.3	2.6	2.1	2.3
50..69	4.5	3.5	4.0	4.2	3.3	3.8
70..99	4.4	3.4	3.9	4.3	3.4	3.8
100..199	7.5	5.7	6.7	7.7	5.7	6.7
200..299	3.6	3.0	3.3	3.7	3.0	3.4
300..499	4.1	3.2	3.6	4.3	3.3	3.8
500..699	2.1	1.5	1.8	2.1	1.8	2.0
700..999	2.3	1.8	2.0	2.1	1.6	1.9
1000..1499	2.3	1.5	1.9	2.3	1.9	2.1
1500..1999	1.2	1.2	1.2	1.7	1.0	1.4
2000..4999	4.6	3.6	4.1	4.4	3.8	4.1
5000..9999	3.3	3.4	3.4	3.2	3.1	3.1
10000+	26.2	17.5	22.0	26.4	18.2	22.3
	100.0	100.0	100.0	100.0	100.0	100.0

The overall structural stability of each distribution is immediately apparent in terms of the change in the proportion of total employees in the twenty narrowly defined size-cohorts. Such stability was not expected at this broad sector level, especially in the light of the known high level of small firm volatility. Tables II and III also indicate both an absolute and cumulative decrease in the proportions of total employment accounted for by the smallest cohorts of firms in both sectors. Finally, a slight shift of employees from small to large firms was observable in both sectors. A further major finding of this analysis therefore, is that in times of very high net job creation (and of course gross job creation and loss), forces are also at work in the economy which tend to keep the population distribution of firms within major sectors more or less stable — at least in the short to medium term.

It can also be seen that in the smaller cohorts, the distribution is highly skewed towards non-production firms, such that they outnumber pro-

duction in the 1 to 4 cohort by 3:1. However at around twenty employees, production firms account for only about 50% of total employment, and this proportion continues to increase up to around 200 employees, where the proportion in production approaches 60%. As we move further up through the cohorts to the 10,000+ range, no strong pattern emerges. Production holds the greater proportion of employment throughout but the difference in proportions between production and non-production fluctuates considerably, especially in the 1000+ range.

4.1. *Changes in the proportions of employees in sectors over the period*

Up to around 500 employees, the proportions held in both sectors at the start of the period remained similar to those at the end. In spite of the turbulence which occurred within the lowest cohorts over the period, the sectoral make-up of both the 1 to 4 and 5 to 9 cohorts varied by a

matter of only one or two percent. However at above 1000 employees, significant change can be observed in the sectoral constitution of a number of cohorts. The non production proportion in the 1500 to 1999 band fell by around 10% but increased by around 5% in the 2000 to 4999 range. Therefore, the *a priori* assumption that the proportions of non production employment, particularly in the lower cohorts, have markedly increased, was not substantiated. In sum, the proportion of total employment in non production increased from 48.5% to 49.6% over the period, while that of production decreased slightly from 51.5% to 50.4%.

5. The forces which create equilibrium in the population

What can be the case of this overall equilibrium? What forces are at play in the economy which act to compensate for these known movements and shifts in population? One initial possibility is that a 'natural' concentration exists for each different size band, and that as change takes place, the concentration of employment in the size band will tend towards this natural level. These natural concentrations, however, need not be static and can be fundamentally changed by other factors. Inherent within this theory is the assumption that firms in any sector generally tend to be in competition with other firms in their sector which operate at an employment size close to their own. Of course, if this were the case then for any size cohort of firms, increased numbers of firms therein would tend to squeeze the margins available to each firm and hence prohibit growth. For the case of decreased concentrations the reverse would be anticipated,

If for example increased concentrations in micro firms arose mainly through the contraction of firms from a neighbouring higher size cohort, then on the one hand, 'gaps' may be left within the higher size band, into which firms based in the lower cohort could grow as well as perhaps yielding the incumbent firms in the higher cohort more room for expansion. On the other hand, the 'extra' potential of firms in the lower cohort to grow may be completely offset by the increased competition for the resources needed for growth, arising from increased concentrations in the lower

cohort. Therefore, (assuming *ceteris paribus* conditions), it is likely that after a short period, a concentration change in the reverse direction to that stated above will occur.

The tendency towards a natural level would affect a cohort's job creation performance with in general, higher concentrations of firms tending to reduce expansion and birth rates, whilst increasing stability, contraction, and the death rates of firms in the cohort. It is the authors' contention that this tendency may therefore give extra insight into the past job creation performance of certain size cohorts.

To elaborate, the performance of the 20 to 49 size group is discussed. For this particular cohort, better than average job creation performance over the 1982–1984 period, (Gallagher and Doyle, 1987) was followed by very poor performance over the 1985–1987 period (Gallagher et al., 1991) and subsequently by average performance over the 1987–1989 period (Daly et al., 1991). Some of the factors which may have contributed to the poor performance of the 1985–87 period are given in three groups. The first consists of reasons which logically tie in with the 'natural concentration' theory described above. The second group consists of anticipated causes which at face value appear to be independent of the concentration of firms within the size cohort of interest but are at least partially dependent upon economic factors. The third group are independent of economic circumstances and although contributing to the demise of medium sized firms, would not be thought to contribute to the increased failure rate and general poor performance of such middle sized firms over the period of interest. However, if measures were adopted to improve the ability of medium sized firms to overcome these problems, their job creation performance would improve.

Group 1 'Natural concentration' causes of poor job creation performance

- i. Poor birth rates (because of an existing high firm concentration)
- ii. A high number of entries during the prior period into the medium sized range, causing greater competition, and therefore higher death and contraction rates
- iii. A lack of suitable labour, through increased

- competition, as labour needs become more specific, (which prohibits growth).
- iv. Insufficient demand to support increased medium sized firm output
 - v. The poor performance of old inflexible bureaucratic middle sized firms in some sectors, in relation to younger more technologically aware (and often smaller) counterparts.
 - vi. Poor competition by new middle sized firms in some sectors, to old established medium sized firms.
 - vii. A lack of availability of loan capital for expansion.

Group 2 Factors related to the general economic climate and time period

- i. Excessive borrowing by growing firms, rendering them likely to suffer the adverse consequences of high interest rates.
- ii. Falling demand for the products and services of medium sized firms.

Group 3 Factors independent of time and of the economic environment

- i. Poor or unsuitable management during a transition phase.
- ii. Inappropriate organisational structures (predominantly in those firms which have simply expanded upon their prior small firm structure).
- iii. Better (and improving) state treatment of large and/or small firms.
- iv. The effect of new technology, creating smaller 'optimal' employee levels (perhaps having even more effect upon larger firms).
- v. Increased legal requirements and bureaucracy (compared to small firms).
- vi. The greater industrial relations problems of medium sized firms, compared to small firms.

Those points in the first group which are adverse to medium sized firm survival and expansion, and which support the natural concentration theory, are those whose effect upon medium sized performance would be anticipated to vary from period to period. However as before, these points are only relevant if it is assumed that an increase or decrease in concentration in this cohort has

arisen through good or bad job creation performance. A relatively good performance of this cohort, (assuming that the 1 to 19 cohort is always the most fertile) over the 82–84 period combined with the poorer performance of the neighbouring 50 to 99 cohort, will most probably have resulted in increased concentrations in the 20 to 49 cohort. The poor job creation performance of this cohort (compared with that of the 50 to 99 cohort) which was observed over the 1985–87 period was found to have arisen mainly through increased death and contraction rates — behaviour which will have led to decreases in concentrations in this cohort. Also, from Table I it is apparent that the much improved job generation performance of the 20 to 49 cohort over the 1987–89 period was accompanied by an increase in the proportion of total employment in this band of 1.1%. Unfortunately, these lines of argument ignore the effects of growth into the 20 to 49 range from the 1 to 19 cohort. Such effects would be relevant if it was found that expansion rates of firms of less than 20 employees varied significantly over time. Further research is required on this matter. The second group of factors would also be thought to vary from period to period and therefore have an effect on the job creation potential of this cohort.

Although the factors in the third group will strongly influence the performance of medium sized firms, their net effect would not be out of proportion without a significant shift in the nature of conditions facing firms of different size. These factors would not vary significantly in the short term, and therefore could not have contributed to the important change in performance of medium sized firms which was observed between the 1982–1984 and 1985–1987 periods. We thus conclude that most of the factors which have caused the change in performance of medium sized firms over time are likely to have been a direct consequence of the change in the number and concentration of medium sized firms in the overall firm population.

One implication of this conclusion is that when medium sized firm concentration increases, it may be necessary to provoke measures which will aid structural shifts. This implies that changes should be made to the third group of factors if medium sized firms are to become net creators of jobs in subsequent periods. Otherwise an increased con-

centration in the size band will inevitably lead to its decreased overall job creation performance.

In a similar way it can be argued that for the smallest cohort of less than 10 employees, the natural proportion of firms in the absence of any state intervention, (and a recessionary economic climate), would be lower than is the current situation. However, further analysis would be needed to determine the true effect of current state intervention. Indeed some commentators would contend that the traditional level of UK state support for small firms has always been minimal, and has had only a very slight impact upon small firm behaviour and performance.

If support for the small firm sector had increased over the 87–89 period, yet had resulted in a constant proportion of employment in small firms, then in order to retain such concentrations of employment in small firms (in a non recessionary economic climate), it could be argued that small firm state support would need to be increased even further in the future. This would be important if the small firm base is viewed as important to the economy's general well being by providing flexibility, and acting as a seedbed and test-bed for new technologies and innovation. This argument only assumes that better conditions facing small firms leads to increased employment concentrations therein. The fact that increased concentrations in small firms can arise through the contraction of larger firms is not particularly relevant in this context.

6. The natural concentration relationship and firm population ecology

Since the earliest days of economic analysis, theories of firm creation and behaviour have been proposed, and the most widely quoted in recent years have been of the biological type. Individual and firm population behaviour are compared and contrasted to the behaviour of living organisms within an ecological system. Gallagher et al. (1991) in their recent paper provided a review of the most widely used analogies and models of firm behaviour and with regard to biological analogies in particular concluded that;

The development of theories of firm growth can be viewed against the back-cloth of historical social attitudes. The

'Newtonian' view of the economy as a mechanistic system gave way to a 'Darwinian' view based upon the competition of the young for resources. In spite of its limitations, this view had the merit that it led researchers to start to view the diversity of firms in the economy as a 'population', which could be studied in ways similar to other populations. (Gallagher et al., 1991, p. 271.)

The biological analogy has become more relevant with the incorporation of dynamic system theory where population structure and behaviour can change through time. The dynamic characteristics of firm populations have now been statistically described in some detail (e.g. Doyle and Gallagher, 1986; Birch, 1987).

A thorough evaluation of the 'life cycle' view of firm development and growth was attempted by Shumpeter, as early as 1943. Batstone et al. (1988) also reviewed biological or life-cycle analogies of firm growth and pointed out that the stress of these 'evolutionary' approaches to firm growth is on the uncertainty of the market, which in effect alludes to the role of selection pressure in standard biological evolutionary theory.

Consider the population of firms within an economy. At this level of abstraction, it is reasonable to suggest that although the methods of creation and stages of development of firms may differ significantly between different parts of the economy, certain basic 'population processes' will be common to all of them. The size of this population can change through time by firm births and deaths, mergers acquisitions and divestments, and immigration and emigration. Of new firm formations (i.e. births) only a small proportion survive the first few years, and of these, only a very small fraction grow into large firms.

6.1 *Intra-specific competition*

In order to study further the way in which the properties of the individual firm contributes to overall population dynamics, the proposition needs to be examined that each individual within a population affects, and is affected by, other individuals within the population. Biologists have identified a number of common features of intra-specific competition in natural populations, some of which may be relevant to a population of firms.

a. Scarce resources

One feature of intra-specific biological competition is that the resources for which the individual (firm) competes, are in limited supply. For our firm analysis, the relevant qualification is that the requirements of firms within a given size cohort would be essentially equivalent, and in limited supply. This of course is more likely to be the case for individual size cohorts than for the firm population as a whole. It is likely that the narrower the size range, the more homogeneous the requirements of the firms therein (at this stage we can ignore the differences which may exist between firms within a narrow size cohort which are due to the effects of sector or region).

b. Reciprocity

With reciprocity, the competing firms within a population size cohort are all essentially equivalent. This, again, is far more likely to be the case at the cohort, rather than the global level.

c. Population density

The effects of competition on any individual (i.e. the probability of that individual being adversely affected) is greater, the greater the number of competitors there are. The proposition made here is that the effects of intraspecific competition are density dependent, and these effects have a tendency to regulate population size. A population above or below its equilibrium size will be regulated towards the equilibrium by being subject to negative feedback. This aspect of the behaviour of an ecological population serves therefore, as a good analogy for the natural concentration model described above. However, in the biological world negative competition may also occur, in which mortality actually decreases with increasing density. Given our results, this does not appear to be a general feature of the business population although some specialist sectors are known to benefit from the effects of 'critical mass', as population density increases (examples are micro-electronics in Silicon Valley, heavy chemicals in the Ruhr and the finance sector in the London region). On the other hand, in human populations more children are born in times of high infant

mortality. Therefore, by analogy, an implication may be that if the prospects of survival of new firms were increased, fewer new firms would be established.

7. Long-term change in the size distribution of UK manufacturing firms

In 'Bolton 20 Years On' (Stanworth and Gray, eds.), trends in the distribution of UK manufacturing firms by employee size were presented for the years 1924–1988. This data, shown in Table IV, shows that there has been significant variation in the proportions of employment in firms of differing size. It must be noted that enterprises and establishments were defined by Stanworth and Gray as small if they had less than 200 employees, (which is different to the earlier definition used here). The percentage of employment in small (< 200) establishments was at a maximum in 1924 at 44 percent, and then gradually fell to 27 percent in 1972. Since 1972 there has been a slow

TABLE IV
Employment in UK manufacturing

	Small as % of total	
	Establishments	Enterprises
1924	44.1	—
1935	43.9	38.4
1948	36.9	—
1958	32.1	23.7
1968	29.9	19.2
1971	27.9	21
1972	27.4	21.5
1973	27.4	20.7
1975	28.9	21.9
1976	29.8	22.6
1977	29.5	22.5
1978	29.6	22.8
1980	31.9	24.3
1981	33.9	25.9
1982	35.3	26.7
1983	36.2	27.8
1984	37.8	30.3
1985	38.2	30.4
1986	39.2	30.5
1987	38.7	31.1
1988	39.2	31.2

Note: Small defined as less than 200 employees

Source: Stanworth & Gray (1991)

rise, reaching 39% in 1988, a level which mirrors that of the immediate post war period. However between 1963 and 1978, only small deviations from stability have been observed for the proportion of employment in small (<200) manufacturing concerns both at the establishment and at the enterprise level. Small changes over short periods in this context would be expected, for they could be disguising significant variation within and between sub-groups in both the 1 to 200 and 200+ size bands. One remarkable aspect of the 1978–88 period was a rise of over 8% in the overall proportion of manufacturing employment in small (< 200) businesses at both establishment and enterprise levels.

While Stanworth and Gray have presented the best data available, a number of shortcomings (outside of their control) are apparent in their data. First, is an inability to examine trends in other sectors, most notably services. Second, the recent trend towards self employment may have had an important impact upon their statistics. Third, the data would have been more useful had it been available in narrower cohort band widths. Finally, some of the apparent changes may have been due to better data collection and statistical procedures.

Nevertheless it is clear from their data that significant change can take place within the firm size distribution of a sector over a long run of years. On the other hand the distribution of firms at the enterprise level, which is the key 'decision making' level (Gallagher and Stewart, 1986) has only varied slightly in recent years. The comparatively large jump from 1983 to 1984 (of 2.5%) may have been due to a unique set of factors. Significant changes in the share of small manufacturing firms took place in the early years after the VAT (value added tax) series became available in 1979. Also very high lay-offs by large manufacturing firms took place during that year. Bannock (1989) has examined in some detail the proportion of total employment in small (<200) firms, using a number of data sources, and his findings are shown in Table V.

He concluded that the small (<200) firm proportion of total employment had risen from 49% in 1979 to 59% in 1986. Unfortunately this data cannot be compared directly with the statistics from the analyses conducted here, as

TABLE V
% of total employment accounted for by firms in particular cohort

	% of total employment	
	1979	1986
1..2	6.6	9.7
3..5	5.9	8.9
6..10	6.7	7.3
11..19	7.6	10.1
20..49	6.9	6.7
50..99	5.3	6.9
100..199	10.2	9.9
200..499	8.1	11.9
500..999	7.5	10.5
1000+	35.5	18.2
	100	100

Source: Bannock (1989)

Bannock's statistics include the self employed and some other employee movement. Nevertheless, significant change clearly took place in the proportions of workers in both small and large firms over the 1979 to 1986 period.

8. Changes in the size distribution of service and manufacturing firms

It was shown earlier, that the proportion of employment in small (<200)-firms in manufacturing rose from 23% in 1978 to 31% in 1988. From Table V it can be deduced that given any initial ratio of total manufacturing employment to total services employment, small (<200) service firms did not increase their share of total services employment as much as small manufacturing firms over the period. These results suggest that relatively, the service firm employment distribution was shifting upwards towards large firms, whilst that of manufacturing was moving downwards towards small firms. It is common hearsay, (also supported by the research findings of Daly et al., 1991) that much of the recent rise in the small firm sector has been due to the birth of small 'non ambitious' or 'lifestyle' service firms in recent years, of which few would ever grow to over 200 employees. We would thus expect the employment distribution of service firms to have remained

stable, or even to have shifted towards very small firms.

It is likely that the change in the distribution of employment in manufacturing firms (by size) over the 1978–1988 period from large to small firms was predominantly due to the significant deaths and contractions of large manufacturing firms. This was both a symptom and cause of this recessionary period. The effects of rival economies (such as Japan), and technology related factors will also have been significant. In the absence of this 'unusual' behaviour of large firms, which was due to economic shock and recession during the 1978–1988 period, far more stability would have been observed in the firm population size distribution.

9. The causes of shifts in employment from large to small firms

Over the 1979–86 period (Table V), there was a general drift in employment from large to small firms, (although the years when most of this change took place cannot be accurately defined). This shift may have been caused by:

- a. Political and social changes in attitudes towards small firms, as a way to alleviate unemployment.
- b. A shift in tastes and demands from large to small firm product and the proliferation of consumer demand.
- c. The effect of foreign competition on large manufacturing industry.
- d. The effect of new technology which rendered small firms less prone to the 'economies of scale' disadvantages.

An in-depth discussion of these factors in relation to change in the size distribution of US firms, has been provided by Acs and Audretsch (1990).

A difficult period for large firms may by necessity, have led to a rise in the proportion of employment held in small firms. This rise and the increased proportion of employment share over 1979–1986 may be viewed in part as a direct consequence of the general recessionary economic conditions prevalent over that period.

On the basis of our earlier theoretical discussion similar conditions in the future would lead to a repetition of this pattern. In recessionary condi-

tions, high small firm job creation, (in contrast to large firm job loss) will lead to a higher proportion of employees in small firms. But (all other factors being unchanged) this will be a symptom of recession, and consequently may not offer any clues or insight into how recession may be overcome. In a similar way, in prosperous economic conditions the reverse will become the case, with the proportion of employment in large firms increasing. Support for this argument is provided by Schwalbach (1990) who found that in West German manufacturing the proportion of people employed in small firms actually fell over the 1977 to 1986 period. Contrary to the then prevalent recessions in the UK and the USA, where the proportions employed in small firms were increasing, this period was one of growth for the West German economy.

Added explanations for firm size distribution change during recession have been suggested by Daly et al. (1991). During a recession there can be positive influences which do not apply to all sizes of firms, and in this context would not benefit large firms. For example, large firms during recession may wish to withdraw from marginal or less profitable activities, leaving open niches for small firms either to provide specialised goods and services or to operate in a local market.

Large firms may also wish to subcontract peripheral activities such as cleaning or catering, offering opportunities for start-up or expansion of small business. In management strategy terms, the Peters and Waterman (1982) philosophy of 'stick to the knitting' became very popular with large corporations. Much recent industrial restructuring has involved the slimming down of large firms in order to concentrate upon and protect core activities during recession. Another important factor is the significant number of people made redundant by large firms (or at least fearing the possibility), who may view setting up business in the 'skill deficient' small firms sector as a viable and rewarding career move. All of these factors would tend to result in increased small firm concentrations in times of recession.

10. Employment and distribution change: 1987–1992

From the earlier results, it is apparent that it was only by 1987 that the UK firm population dis-

tribution had fully adjusted to the earlier shocks. At the start of the 1987–1989 period, it looked to be the case that large firms had temporarily 'regrouped' by removing inefficiencies, and by responding appropriately to new technologies and trade internationalisation. It was only then that they could begin expansion again. Because they were then in equilibrium with their environment, they performed well from an employment perspective over the 1987–1989 period. Unfortunately it now seems to be the case that some either expanded too far with some disastrous consequences or that new economic problems may have come into play over the 1989–92 period.

The three year period 1989–92 saw a significant rise in unemployment up to 3M, or 10% of the total work-force; the highest of any of the major economic powers, (Germany 4.6%, Japan 2.2%). Unemployment over this period increased by 1.2 M which in effect, reversed the excellent net positive job creation behaviour of small firms throughout the 1987–1989 period. Several significant job losses in large firms were responsible for a larger amount of employment decline. More recently, as a result of the continuity and severity of the recession, even more small firms than would have been anticipated have been adversely affected, (highlighted recently by the record liquidation and bankruptcy levels reached).

Because of falling demand in recent years, the effect of large firm contractions upon small firms in business terms may have counteracted the 'positive' effects of large firm redundancies, of 'releasing' potential new members into the small firm work-force. This may result in the final performance statistics showing that no 'broad' size grouping of firms actually created any net new jobs over the 1989–1992 period. On the other hand, even if all size cohorts of firms do eventually show negative net fertility indices, it can be predicted that those of the smallest size groupings will certainly be of a lesser absolute magnitude than those of the largest. Although the nature and extent of the interaction between firms of differing size needs further investigation, we can now predict with some confidence on the basis of past behaviour, that the proportion of total employment in small firms will have increased significantly over the 1989–1992 period.

11. Conclusions

a. The Bolton Committee (1971) concluded that the British small firm sector was at that time severely underdeveloped in comparison with those of Britain's major economic competitors. One of our major arguments here has been that the rise in the proportion of employment in small firms, and the comparatively high job creation ability of small firms in recent times has come about in part because of negative rather than positive macro-economic influences. However, this is certainly not the whole story, and the improvements which have been effected since then will have been the result of a variety of other important influences, and in particular,

- i The rising 'consciousness' of the impact on the economy of small firms.
- ii Specialisation, market differentiation, sub-contracting, and technology related factors.
- iii Positive measures introduced by government.

Theoretical and empirical research has now established the necessity of having a strong small firm base for a well functioning and growing economy. Small firms provide flexibility and diversity, provide relevant support and inputs to large companies, and they act as a seedbed for innovation, new technologies and product development. Even if the rise of small firms has come about partly because of a recessionary economic climate, many positive effects have arisen and will continue to benefit the future economy.

b. For many decades the majority to public expenditure and legislative support for UK business has been directed at large firms. This has been the result of culture, tradition, and even accident (where funding initiatives aimed at small firms have in practice been largely taken-over by large firms). Even with the benefit of this support, large firms in recent decades have still performed badly in job generation terms. In contrast, small firms have shown an inherent advantage in their ability to create jobs. It can now be argued that a shift of government expenditure and legislative support from large to small firms would further enhance and realise the potential of small firms to benefit the economy and create jobs. However, it

is important that the influence of large firms on small firm behaviour should be fully recognised; especially, for instance, any possible displacement effects among large firms which may result from such a shift. There is a danger that by viewing the small firm sector in comparative isolation, sub-optimal economic and political decisions may be reached. On the other hand the great majority of both direct and indirect aid to business and industry in practical terms has always been taken up by large firms. They have the infrastructure in place which enables them to benefit most from the wide range of governmental support and incentive schemes which are available, whether for capital equipment, training, or research and development. Given the existing high ratio of actual total state support for large firms compared to that for small firms, the effect on large firms of a modest funding shift would be insignificant, but in real terms could markedly improve small firm performance.

If those small firms which are dependent on large firms, and whose behaviour can yield positive or neutral effects upon large firms could be targeted for preferential development, then both large and small could benefit. What should obviously be avoided, is any shifting of resources which would have a negative net economic and employment effect. It may be that certain technologies and efficiencies can be best developed within small firms, while others can be best developed in large firms. Any re-direction of regulatory support and funds which will enable these different sizes of firms to play such natural roles, could be beneficial all round. However for this to happen, the whole nature and structure of current state support in all of its forms would need to undergo significant evaluation to enable a more careful pin-pointing of areas for support to take place.

c. It was empirically found that over the 1987–1989 period the distribution of employment by firm size remained surprisingly constant. This occurred even though the vast majority of net new jobs were created by small (1 to 9 employee) firms over this period. A major implication of this finding is that in times of high net job creation, factors are at work in the economy to keep the population distribution of firms more or less stable.

d. This finding supports a 'physical' type of explanation of the behaviour of firms. It can be hypothesised that if the number and concentration of firm in a size group should increase over a period, then, in general, the concentration of firms in this grouping would be expected to fall in the subsequent period. The unusual job creation behaviour of the 20 to 49 size cohort which has been observed over the 1982–1989 period, can now be explained on the basis of this hypothesis. The assumption of a general tendency towards distribution stability may be useful in the prediction of any particular cohort's survival and job creation performance in future time periods.

e. Stability will not of course necessarily be the case for all time periods. In particular, in times of recession, or where significant economic or cultural shock has had a crippling influence upon large firm employment levels, stability would not be expected. In these cases an increase of employment share held by small firms can come about through large and medium firm contraction.

f. In recession small firms in aggregate in spite of their individual volatility, are the most resilient. In prosperous times they do not increase their proportion of employment share, while in times of recession they do. Our results, when examined together with the historical VAT statistics, imply that large firms do of course have a significant bearing upon aggregate employment trends. On the other hand, small firms inherently have more potential to create jobs than large firms. A shift of support from large firms to small firms may enhance and better realise such potential.

Acknowledgements

This work was supported by the UK Department of Trade and Industry, Small Firms Statistics Unit. The help of Dun and Bradstreet is gratefully acknowledged.

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