# Department of Economics

## Job Creation, Job Destruction and the Contribution of Small Businesses: Evidence for UK Manufacturing

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# Job Creation, Job Destruction and the Contribution of Small Businesses: Evidence for UK Manufacturing*

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**Abstract**

We use the ARD micro level data set for UK manufacturing to document job creation and job destruction (JC&D). Due to data limitations, previous UK studies were unable to use entry and exit in calculations of JC&D and/or were are at the firm rather than establishment/plant level and/or used data that understate the number of small businesses in the economy. Our data can overcome these problems being based on plant and establishment-level data from the UK *Census of Production*. We compute JC&D levels and rates and the contribution of small businesses for UK manufacturing between 1980 and 1991 and compare our findings with previous UK studies and other countries. We find: a) establishment (plant) job creation and destruction rates of 10.0% and 13.5% (11.2% and 14.7%) respectively, higher than other studies; b) large establishments (plants) are responsible for about 60% (55%) of job destruction; and c) small establishments (plants) are responsible for between 50% and 68% (57% and 70%) of job creation, depending on calculation method.

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## 1. Introduction

Job creation and destruction (JC&D) has generated much recent interest, in part due to the development of data sets to measure it and the development of theories to model it. There is however surprisingly little empirical work for the UK and what work there is obtains very different results (table 1). As a reference point, row one reports JC&D rates of 9.1% and 10.3% for US manufacturing, 1973-88, from Davis, Haltiwanger and Schuh (DHS, 1996). Row 2 shows the figures from Konings (1995) who uses a sample of 993 large manufacturing firms, 1972-1986, and reports JC rates of 1.6% and JD rates of 5.6%. Blanchflower and Burgess (BB, 1996) use three cross-sections of establishment data for around 2,000 establishments in 1980, 1984 and 1990, and report JC&D rates of around 4% and 7%. Gallagher, Daly and Thomason (GDT, 1990) use Dun and Bradstreet firm data to calculate JC&D for 1985-87 and find rates of 18.4% and 16.5%.[1]

Table 1
JC&D in manufacturing: methods and rates

| Study | Years | Data | JCRate | JDRate | JC method | JD method |
|---|---|---|---|---|---|---|
| Davis et al (1996, table 2.1) | 1973-88 | US Census, approx 160,000 plants per year | 9.1 | 10.3 | $\Delta N_{S+}+E$ | $\lvert\Delta N_{S-}+X\rvert$ |
| Konings (1995) (p.10) | 1972-86 | Unbal Panel of 993 large firms | 1.6 | 5.6 | $\Delta N_{S+}$ | $\lvert\Delta N_{S-}\rvert$ |
| Blanchflower and Burgess (1996, Table 7). | 1979-80, 83-84, 89-90. | 3 X-sections of approx 2,000 estabs | 3.8 | 6.9 | $\Delta N_{S+}$ | $\lvert\Delta N_{S-}\rvert$ |
| Gallagher et al, (1990, table 2) | 1985-87 | 1985, 6, 7, Dun and Bradstreet firms, 185,000 panel | 18.4 | 16.5 | $\Delta N_{S+}+E$ | $\lvert\Delta N_{S-}+X\rvert$ |

**Notes**: $\Delta N_{S+}$ and $\Delta N_{S-}$ denotes changes in employment in expanding and contracting surviving firms, E and X denote employment in entrants and exitors. DHS rates are weighted by average employment t-1 (see equation 2 below). BB and Konings rates are shares of t-1 employment. Gallagher, Daley, Thomason do not report overall rates, so rates here are total creation and destruction as share of t-1 employment. BB rates are average of three cross-sections (JC 1980, 84 and 90: 2.48, 3.92, 5.02 and JD 7.25, 7.94, 5.40.). Gallagher et al are for manufacturing and services.

One source of differences is likely due to the different methods of calculating JC&D (shown in the final columns of table 1). The DHS method is based on plants. Using the US Longitudinal Research Database (LRD), they calculate JC as employment of new entrants plus increases in employment in surviving (expanding) plants. Likewise JD is employment in exitors plus decreases in employment in surviving (contracting) plants.

[1] Hart and Oulton (1998) using the OneSource database for 1990-92 report birth and death rates of 5.3% and 25.6% (manufacturing and services), but do not report creation and destruction separately for surviving firms so we cannot calculate overall JC&D rates (note that 1991-2 was a severe recession in the UK).

Neither Konings nor BB have been able to use this method. Konings (1995) sample is of large continuing firms and so he excludes entry and exit. Thus we would expect his calculations to understate JD and JC and not surprisingly, his numbers are comparatively low.[2] Blanchflower and Burgess (1996) use three cross-sections of establishments, calculating previous employment from self-reported employment in previous years. Since these reports are only available for survivors, this is also likely to understate JC&D since there is no entry or exit data; again their numbers seem comparatively low.[3] Gallagher, Daly and Thomason (1991) are the only study to include entrants and exitors. However, they look at firms not plants and DHS criticise the US version of their data (Dun and Bradstreet) as significantly misrecording births and deaths.[4]

These different data sets have had to be used because longitudinal databases with sufficient coverage have, until now, not been available for the UK. The main innovation in this paper is to calculate JC&D using just such a database, namely the ARD (*Annual Respondents Database*). The data are the micro data from the UK *Annual Census of Production* (ACOP) / *Annual Business Inquiry* (ABI) and so are a representative longitudinal database similar in design to the LRD in the US. The data has at least three advantages relative to previous work. First, being based on the main UK production survey it is more representative than other studies. Second, we can identify entry, exit and survival and so can calculate JC&D incorporating entry and exit. Third, we have arranged the data at establishment and plant level and hence it is compatible with other work, in particular DHS.[5]

With these data we have two main objectives. First, we aim to document JC&D in the UK, 1980-1991. We compare our data with previous findings and also with other countries, most notably the US. Not surprisingly, we find that previous UK studies have understated JC&D rates. In fact we find that UK rates are higher than those for the US (our rates for manufacturing are 10.0% and 13.5% for the 1980-91). We also document regional and industrial JC&D and its fractal nature.

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[2] In addition, as he acknowledges, his sample covers 60% of manufacturing workers in 1978, but then falls "significantly" after 1982 due to changed reporting. He also uses firm and not establishment/plant data and to the extent there is closure and opening within multi-establishment/plant firms this will also understate establishment/plant-based JC&D.

[3] One might also be cautious about the errors induced by recall bias. Blanchflower and Burgess (1996) report that the derived employment change for the 1979/80 (derived from recall questions asked to the 1980 cross-section) is –1.6% compared with an actual GB employment change of –0.8%. For 1983/4 the derived figure is –1.5% (actual +0.9%) and for 1989/90 the derived is +0.1% (actual +1.0%). This suggests that recall bias might be a problem.

[4] DHS (1996, p.71) discuss validation work on the US D&B data indicating that, for example, 81% of mass layoff events in the D&B data between 1982-84 were mistakenly identified. It is not know if this criticism applies to UK data. Gallagher and Stewart (1986) compare the coverage of Dun and Bradstreet in 1981 and the *Census* for 1979 and report that D&B covers 26% of establishments of size 1-19 employees, 75% of establishments 20-999 and 129% of establishments of over 1000. We use *Census* data.

[5] The data has not been used to look at JC&D. Other work using the ARD has looked at productivity, (Disney et al (2000), Griffith (1999), Harris and Drinkwater (1999), and Oulton (1997, 1999)), entry and exit (Disney et al, 1999), and skill upgrading (Haskel and Heden, 1999).

Second, we use our data to calculate how much small businesses contribute to job creation. This is an important policy area since a good deal of policy effort is directed specifically at assistance for small firms (e.g. the new UK Phoenix Fund and Small Business Service). It is also controversial. Birch (1979) argued that 66% of all new US jobs 1969-76 were created within firms of fewer than 20 employees. Using the same method for the UK, Gallagher et al (1990, p.94), argue that "virtually all net job creation is attributed to the smallest size band [5-19 staff]". DHS argue that the Birch method is incorrect and in turn Gallagher et al (1995) argue that DHS are mistaken. We find different results to Gallagher et al. Our main results here are that smaller plants have high job creation rates but also high job destruction rates. Overall, small (employment under 100) establishments (plants) were responsible for around 38% (44%) of jobs destroyed over the 1980s and between 68% and 50% (70% and 57%) of jobs created (depending on calculation method).

The rest of the paper proceeds as follows. Section 2 describes the data and section 3 various measures of JC/JD. Section 4 looks in particular at the role of small businesses. Section 5 summarises.

## 2. Data

As Hart and Oulton (1998) point out, calculating JC&D is a deceptively complicated procedure. JC arises from expansion of existing units (the distinction between establishments and firms is explored below) and births. JD arises from the contraction of existing units and deaths. Thus one needs a data set that is (a) longitudinal and (b) tracks all business units and (c) identifies births and deaths. In addition, one has to decide whether to work at the establishment or firm or some other level (for example a multi-establishment firm opening and closing plants of *x* employees gives zero JC&D at the firm level).

On this basis the best UK data set would appear to be *Annual Respondents Database* (ARD). The ARD consists of the micro data from the *Annual Census of Production* (ACOP) (after 1997 the *Annual Business Inquiry,* ABI) collected into a longitudinally linkable database. *Census* surveys are drawn from the current business register held by the statistical office. The ACOP until 1994 was drawn from a register maintained by the Office for National Statistics (ONS), in 1994 this register was re-organised and combined with others to become the *Inter Departmental Business Register* (IDBR). Both stages of the register make use of VAT records, historical information and other surveys including commercial data (such as Dun and Bradstreet). The IDBR additionally uses PAYE tax data. Thus all the other UK data sets used in table 1 would in effect be subsets of the register in use at the time.[6]

[6] The Blanchflower and Burgess (1996) manufacturing data was drawn from the ACOP register. Without access to the other data sets it is hard to know for sure but, the Konings (1995) data is almost certainly in the ARD since the ARD covers all large manufacturing firms. The Gallagher et al (1986)

Census results have been published since 1907, but we have usable micro data since 1980.[7] For the purposes of JC&D there are three major complications.

First, the *Census of Production* is not in fact a full census of businesses on the register, but a sample. Thus we have to be sure that the sample data we use is representative of survivors, entrants and exitors. The sampling works as follows. All firms over a threshold (typically over 100 employees in our time period) are surveyed, but a sample is taken of smaller establishments (with the sampling rules changing every so often, Oulton, 1997, Barnes and Martin, 2002). These surveyed businesses form what is called the "selected" sample and they account for over 80% of total employment. The rest of the units on the register are not sampled, and their information (the "non-selected" sample) on industrial classification, region and employment comes from the business register.[8] Register employment information comes from separate inquiries and may, for firms, below 10 employees, be imputed from turnover data (Perry 1995). In addition, there were changes in the register in 1983-4 and 1984-5 as the ONS added VAT data for the first time causing more small firms to be included and causing relatively higher entry or exit rates for those years. For this reason when averaging results over the whole period covered, we exclude both of these periods.

Second, we have to decide what level of aggregation to work at. There are three potential levels on the ARD: (1) the "local unit", an address, equivalent to the US "plant"; (2) the "establishment" and (3) the "enterprise group". "Local units" are the lowest level of disaggregation. "Establishments" are defined as the lowest unit within the business able to complete a survey form. Many establishments are the only location within their company, in this case they are also a local unit. But, some businesses, particularly multi-plant, report establishments which are collections of local units that they control. An "enterprise group" links enterprises that are under common ownership or control (where an enterprise may consist of a number of establishments or local units). Each local unit is therefore assigned three identification numbers, identifying its local unit, establishment and enterprise group. For example, two establishments owned by the same group would have separate

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data, being drawn from Dun and Bradstreet is also almost certainly contained in the ARD as well since the register uses D&B (and other) data. Hart and Oulton (1998) use the OneSource database, an extract of Companies House (where all UK Companies are obliged to register their existence and accounts) data for 1991 and 1992. The data contains longitudinal markers and has birth and death information and Hart and Oulton set out a clear and detailed discussion of these and other data sets. For the purposes of JC&D, there are two problems with the OneSource data. First, the unit of reporting is the company and second, only 58% of companies report employment (accounts data do not oblige companies to do so) and so Hart and Oulton are forced to interpolate employment for the other companies. In any case, the register used by ONS should include any company registered at Companies House that is significant in employment and turnover terms, and in addition will cover the self-employed who would not be at Companies House.

[7] The pre-1972 paper records were destroyed. Employment for the 1970s non-selected data (see below) is missing and hence we cannot weight these data satisfactorily.

[8] In addition to those units that were "non-selected" for the survey, some units that did not respond also have only register data available.

local unit and establishment numbers but the same enterprise group number. Until 1987, all sampling was on the basis of establishments. Since 1987 sampling has been on the basis of enterprises, but large enterprises continued to report in practice on the basis of the previous establishment split[9]. The business register aims to keep information on addresses and employment of local units. The only local units that complete a survey form are those where the establishment and local unit coincide and the establishment is selected for the survey.

We could then calculate JC&D at the local unit/plant, establishment or enterprise group level. If one is trying to test a particular model then theory should dictate which is most appropriate. Our motive here is however to examine how the measures differ. One possibility is to work at the enterprise level. Relative to the establishment level this understates JC&D since a group might close an establishment under its control and open another one with no loss of jobs. It overstates the contribution of exit since a merger of two groups, which would cause the disappearance of a group identifier, would be interpreted as exit. In addition, other work, DHS for example, is not at such a high level of aggregation, but a lower level and it would therefore be desirable to work at a lower level for compatibility reasons.

This leaves the choice of local unit or establishment level. The advantage of working at establishment level is that we do use data that is actually returned by establishments, as opposed to data from the register, which, as mentioned above, may not be so accurate. The disadvantage is that, as is the case for firms, we will understate JC&D if many local units open and close who are part of establishments (although Oulton, 2000, shows that 65% of establishments had no change in the number of local units underneath them 1980-89).

In the light of this we have calculated JC&D at both establishment and local unit/plant levels. In fact, the split does not make very much difference. The numbers of jobs created and destroyed using local units are somewhat higher than the numbers using establishments, as might be expected due to within-establishment changes from local units. But the rates are very similar (the average establishment JC&D rates are 10.0% and 13.5%, against 11.2% and 14.7% for local units) and the regional, industrial and size profiles are the same. Thus the results in the body of the paper are for establishments, whilst the Appendix has results for local units.

The third major data complication is that the enterprise, establishment and local unit identification codes underwent a major change in 1993/4. The ONS provides a conversion table for establishment identifiers, but not for local units. This makes the identification of entry and exit at the local unit level over that period almost impossible. Thus this paper uses data from 1980-92 which can be used to make sensible local unit/establishment comparisons.[10]

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[9] An "enterprise" is in effect a company. See Barnes and Martin (2002) for more details.

[10] Around 100,000 local units are surveyed each year, of whom roughly 80,000 survive between years. But the change in the identification numbers in 1993 was so drastic that only 7 apparently

To calculate JC&D we use employment for each establishment. To calculate the contribution of entry, exit and survival we use the establishment identification numbers: if between years a new establishment number appears, we count this as entry. If one disappears we count this as exit and if the number survives, this is survival. We can therefore calculate changes in employment at surviving establishments, entrants and exitors. We have therefore to guard against data error that might cause reference numbers to appear and disappear and we checked for seeming strange changes, duplicated identification numbers etc.

As an initial check on the data, table 2 sets out some summary statistics. The first column shows manufacturing employment from the Annual Employment Survey (AES) which was used as the main source of manufacturing employment data and the second and third column changes and percentage changes. The fourth column shows total manufacturing employment from the ARD and then changes and percentage changes. As the data shows, the level of employment is about the same with the ARD slightly understating employment relative to the AES. The ARD does however track changes in employment fairly closely and since JC&D mainly relies on employment changes, we can be reasonably confident that the data used here is representative (in fact the ONS has recently dropped the AES and now uses the ARD/ABI for employment estimates).

Table 2
Employment in Manufacturing

| | **Published** | | | **ARD** | | |
|---|---|---|---|---|---|---|
| | *Employment (000s)* | *Change* | *(%)* | *Employment (000s)* | *Change* | *(%)* |
| 1980 | 6,840 | | | 6442 | | |
| 1981 | 6,087 | -753 | -11.0 | 5773 | -669 | -10.4 |
| 1982 | 5,863 | -224 | -3.7 | 5376 | -397 | -6.9 |
| 1983 | 5,525 | -338 | -5.8 | 5100 | -276 | -5.1 |
| 1984 | 5,409 | -116 | -2.1 | 5075 | -25 | -0.5 |
| 1985 | 5,365 | -44 | -0.8 | 4925 | -150 | -3.0 |
| 1986 | 5,239 | -126 | -2.3 | 4903 | -22 | -0.4 |
| 1987 | 5,152 | -87 | -1.7 | 4923 | 20 | 0.4 |
| 1988 | 5,195 | 43 | 0.8 | 4992 | 69 | 1.4 |
| 1989 | 5,187 | -8 | -0.2 | 4973 | -19 | -0.4 |
| 1990 | 5,100 | -87 | -1.7 | 4810 | -163 | -3.3 |
| 1991 | 4,704 | -396 | -7.8 | 4529 | -281 | -5.8 |

**Source:** Annual Abstract of Statistics (CSO/ONS) and authors' own calculations using the ARD.

survived to 1994. We tried reconciling local units using for example postcodes and industries but were still left with an abnormally low survival rate (one reason might be that postcodes change over time for example).

## 3. Some facts about JC&D in UK manufacturing

### 3a JC&D numbers

Jobs are created when a surviving establishment expands employment or a new establishment enters. Thus job creation in sector $I$ at time $t$, $JC_{It}$ is

$$JC_{It} = \sum_{\substack{i \in S_I, \\ \Delta N_{S_I} > 0}} (N_{it} - N_{it-1}) + \sum_{i \in E_I} (N_{it}) \tag{1}$$

where $i$ denotes the establishment, $S_I$ the set of survivors in sector $I$ and $E_I$ the set of entrants in sector $I$. The first term is the set of survivors where employment is expanding and the second employment in entrants (where the entrants are observed for the first time in t). Job destruction is similarly measured

$$JD_{It} = \sum_{\substack{i \in S_I, \\ \Delta N_{S_I} < 0}} \left|(N_{it} - N_{it-1})\right| + \sum_{i \in X_I} (N_{it-1}) \tag{2}$$

where the first term is an absolute measure that sums over the survivors with contracting employment and the second over the exitors ($X_I$) from t-1 to t.

Table 3 sets out the data for the numbers of JC&D. Consider the first row. Between 1980 and 1991, UK manufacturing lost 1.9m jobs (column 1). That net figure hides huge gross changes: 6.06m jobs were created over that period and 7.97m destroyed (column 2 and 3). This then confirms the DHS observation that there is much simultaneous creation and destruction. Columns 4 and 5 shows how was breaks down between expanding firms, who created 3.4m jobs, and entering firms, who created 2.6m jobs. Similarly, the last two columns show JD consisting of 4.5m in contracting survivors and 3.5m in exits.

Table 3
Job Creation and Destruction in UK Manufacturing: Numbers

| Year | ΔN | JC | JD | JC | | JD | |
|---|---|---|---|---|---|---|---|
| | | | | expanding | Entry | contracting | exit |
| Total | -1,911,519 | 6,055,486 | 7,967,005 | 3,436,627 | 2,618,859 | 4,460,267 | 3,506,738 |
| Average | -193,012 | 504,449 | 697,461 | 329,059 | 175,390 | 426,666 | 270,795 |
| 1981 | -667,775 | 314,907 | 982,682 | 181,770 | 133,137 | 716,483 | 266,199 |
| 1982 | -397,342 | 349,727 | 747,069 | 230,134 | 119,593 | 522,557 | 224,512 |
| 1983 | -276,386 | 339,756 | 616,142 | 223,757 | 115,999 | 431,063 | 185,079 |
| 1984 | -24,183 | 808,582 | 832,765 | 228,537 | 580,045 | 311,803 | 520,962 |
| 1985 | -150,229 | 706,861 | 857,090 | 246,556 | 460,305 | 308,473 | 548,617 |
| 1986 | -21,588 | 536,230 | 557,818 | 321,304 | 214,926 | 331,081 | 226,737 |
| 1987 | 20,231 | 667,100 | 646,869 | 463,134 | 203,966 | 331,228 | 315,641 |
| 1988 | 68,533 | 701,837 | 633,304 | 493,958 | 207,879 | 349,380 | 283,924 |
| 1989 | -18,160 | 659,103 | 677,263 | 419,396 | 239,707 | 356,034 | 321,229 |
| 1990 | -164,895 | 530,635 | 695,530 | 353,873 | 176,762 | 376,247 | 319,283 |
| 1991 | -279,725 | 440,748 | 720,473 | 274,208 | 166,540 | 425,918 | 294,555 |

**Source:** Authors' own calculations using the ARD.
**Note:** Selected and non-selected data for the period 1980-1991. Year given is end of range, i.e. 1981 means 1980-81. Figures in right-hand panels are totals for each year according to role. ΔN = JC – JD and totals for JC, JD are sums of that due to entry/exit and expansion/contraction. An entrant is an establishment that is new in time *t*, an expanding/contracting survivor was present in *t* and *t-1*, and an exitor was present in *t-1* but absent in *t*. Averages for 1980-91 are for 1980-81 through to 1990-91, excluding 1983-84 and 1984-85 due to register changes, see text. Note that the totals do not exclude these years.

Row 2 shows the annual average for 1980-91 (omitting 1983-4 and 1984-5) and the next panel shows results for the individual years. A number of features stand out. First, looking at the averages, in UK manufacturing over the 1980s there were on average around 9,700 jobs created *each week* and around 13,000 jobs destroyed (obtained by dividing the averages by 52). Recalling that these data only measure employment at the Census point in time, this understates higher frequency job creation and destruction. Second, it is noteworthy that the 1980-81 recession was a period of huge JD. Second, 1984 and 1985 shows abnormally high JC&D (columns 2 and 3). This is due to the register changes at that time which artificially inflated entry and exit (columns 5 and 7). Third, during the expansion years of the mid-to-late 1980s JC is above average whilst JD remains fairly static.

3b JC&D: rates

Calculation of rates is of course normally done with respect to a base year, but in the case of an entrant there is no base year. Thus DHS use average employment as a base (similar to the "arc" elasticity method). Define the employment growth rate for establishment *i* in sector *I* as

$$g_{iIt} = \frac{(N_{iIt} - N_{iIt-1})}{(1/2)(N_{iIt} + N_{iIt-1})} \qquad -2 \le g_{iIt} \le +2 \qquad (3)$$

where note that *g* is bounded by the rates for an exiting establishment (-2) and an entering establishment (+2). Thus the job creation rate for sector I is

$$JCR_{It} = \sum_{\substack{i \in S_I, \Delta N_{S_I} > 0 \\ i \in E_I}} \frac{(1/2)(N_{it} + N_{it-1})}{(1/2)(N_{It} + N_{It-1})} g_{iIt} \tag{4}$$

which is the weighted average establishment employment growth rate for expanding survivors and entrants, the weights being the average establishment size as a fraction of average establishment size for the whole sector. Likewise the JD rate is

$$JDR_{It} = \sum_{\substack{i \in S_I, \Delta N_{S_I} < 0 \\ i \in X_I}} \frac{(1/2)(N_{it} + N_{it-1})}{(1/2)(N_{It} + N_{It-1})} \left| g_{iIt} \right| \tag{5}$$

Three more definitions that will be useful are the net employment growth rate: the difference between the job creation and destruction rates,

$$NEG_{It} = JCR_{It} - JDR_{It} \tag{6}$$

the gross job reallocation rate, namely the sum of JCR and JDR,

$$JRA_{It} = JCR_{It} + JDR_{It} \tag{7}$$

and the excess job reallocation rate which is

$$XRA_{It} = JRA_{It} - \left| NEG_{It} \right| \tag{8}$$

This tells us the excess of job changes necessary to "accommodate" employment changes.

Table 4 provides information on these rates. The first row shows the average rates, where again the averages leave out the 1983-4 and 1984-5 years. The job creation rate is 10.0% and the destruction rate is somewhat higher at 13.5%: thus over the 1980s in UK manufacturing in each year on average 1 in 10 jobs are newly created and 1 in 7 jobs are destroyed. The other rows in the top panel show the rates over the 1980s. Note that the destruction rate never fell below 11.4%, even in the boom of the late 1980s. The creation rate was very low in the early 1980s, was high 1983-84 and 1984-85 (although this is likely to reflect register changes) and then settled down. Note finally that the excess job reallocation rate, the rate over and above that required to accommodate employment changes, was low in the early 1980s and then climbed. Controlling then for employment changes, there are still huge changes in employment opportunities.

Table 4
Job Creation and Destruction: Rates

| Year | JCR | JDR | JRA | NEG | XRA | Lower Bound |
|---|---|---|---|---|---|---|
| Average | 10.0 | 13.5 | 23.5 | -3.5 | 19.6 | 13.7 |
| 1981 | 5.2 | 16.1 | 21.2 | -10.9 | 10.3 | 16.1 |
| 1982 | 6.3 | 13.4 | 19.7 | -7.1 | 12.5 | 13.4 |
| 1983 | 6.5 | 11.8 | 18.3 | -5.3 | 13.0 | 11.8 |
| 1984 | 15.9 | 16.4 | 32.3 | -0.5 | 31.8 | 16.4 |
| 1985 | 14.1 | 17.1 | 31.3 | -3.0 | 28.3 | 17.1 |
| 1986 | 10.9 | 11.4 | 22.3 | -0.4 | 21.8 | 11.4 |
| 1987 | 13.6 | 13.2 | 26.7 | 0.4 | 26.3 | 13.6 |
| 1988 | 14.2 | 12.8 | 26.9 | 1.4 | 25.5 | 14.2 |
| 1989 | 13.2 | 13.6 | 26.8 | -0.4 | 26.5 | 13.6 |
| 1990 | 10.8 | 14.2 | 25.1 | -3.4 | 21.7 | 14.2 |
| 1991 | 9.4 | 15.4 | 24.9 | -6.0 | 18.9 | 15.4 |

**Source:** Authors' calculations using the ARD.
**Note:** Selected and non-selected data for the period 1980-1991. Year given is end of range, i.e. 1981 means 1980-81. Data are size-weighted sums of establishment level annual rates (see text). Average for 80-91 excludes 84 and 85. The lower bound is the maximum of JC and JD.

Figure 1 shows changes in JC&D and employment rates over time. The falls in employment in the early 1980s and 1990s are both associated with declines in creation and rises in destruction.

Figure 1
Net and Gross Job Flow Rates in Manufacturing:
Annual, 1980 to 1991

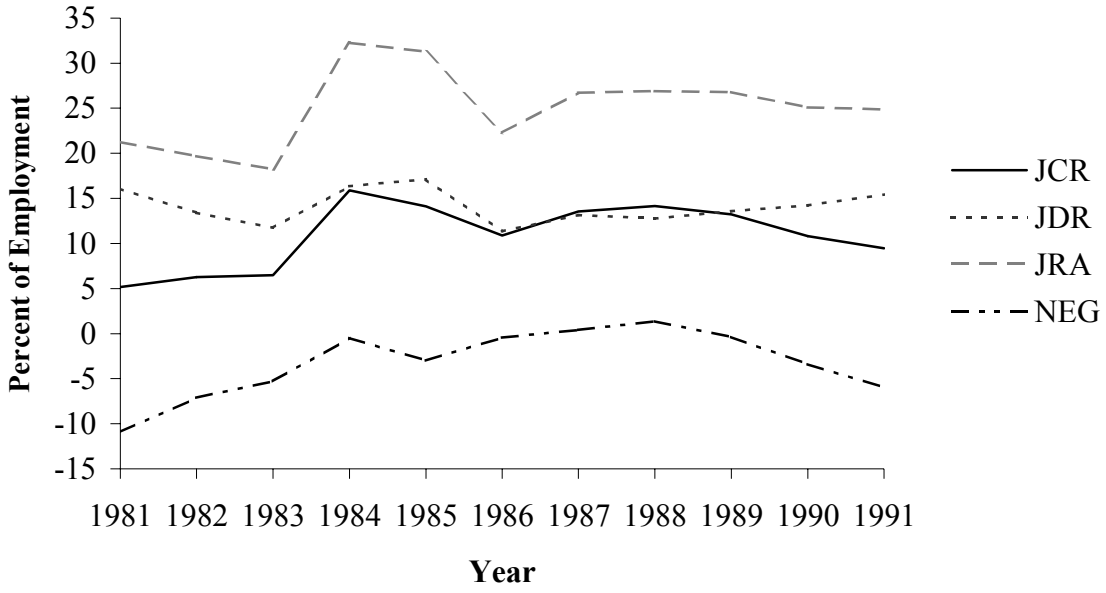


Table 5 sets out international comparisons of JC&D rates. The UK has slightly higher JC&D rates than the US. This might be expected since UK manufacturing has declined faster than the US. However the excess job reallocation rates for the UK are still higher than the US and are more like those in Canada.[11]

Table 5
International comparisons of manufacturing JC&D

| Country | Period | JCR | JDR | NEG | JRA | XRA |
|---|---|---|---|---|---|---|
| UK | 1980-91 | 10.0 | 13.5 | -3.5 | 23.5 | 19.6 |
| USA (DHS) | 1973-88 | 9.1 | 10.2 | -1.1 | 19.4 | 15.4 |
| Canada | 1979-84 | 10.6 | 10.0 | 0.6 | 20.5 | 19.9 |
| Australia | 1984-85 | 16.1 | 13.2 | 3.9 | 29.3 | 25.4 |
| Norway | 1976-86 | 7.1 | 8.4 | -1.2 | 15.5 | 14.3 |
| Columbia | 1977-89 | 13.2 | 13.0 | 0.2 | 26.2 | 26.0 |
| Chile | 1976-86 | 13.0 | 13.9 | -1.0 | 26.8 | 25.8 |
| Morocco | 1984-89 | 18.6 | 12.1 | 6.5 | 30.7 | 24.2 |

**Source:** Table 2 above (UK data) and DHS, table 2.2.
**Note:** Selected and non-selected data for the period 1980-1991. Size-weighted sums of establishment level annual rates (see text). XRA calculated using values from DHS table, hence this is approximate

Table 3 suggested that many jobs arise from entry and exit. To look at this further, figures 2 and 3 show the distribution of JC&D according to entry, exit and growth of surviving firms. Consider figure 2. With the "arc" growth rate measure, entrants have a growth rate of 2. As the histogram shows, entrants account for 35% of JC[12]. The rest of the lines show the fraction of JC accounted for by each different growth rate. JC in surviving establishments is concentrated at the lower end of the growth rate scale. In other words the fraction of JC accounted for by establishments with growth rates of less than 100% is 48% and over half of that is in establishments with rates of 25% or less. In sum, JC is concentrated in entrants and existing plants expanding by a little. Figure 3 shows a similar picture for JD. In this case, shutdowns account for 39% of JD, similar in scale to the contribution of entrants to JC. Again it is true that JD is concentrating where the growth rates are low. This is even more pronounced than for JC as 32% of JD is in plants with rates of 25% or less. So in surviving plants it seems likely that changes in employment will be relatively modest, rather than plants doubling in size from one year to the next.

[11] The US excess job reallocation is 15.4%, compared with the UK's 19.6% (this is computed for each year and then averaged and so does not equal the average job reallocation less net employment growth).
[12] Note that this is based on totals for all JC and its components that exclude 1983/4 and 1984/5. As such the shares shown in the figure and quoted differ from those that would be obtained using the totals from table 3 directly. This also applies for JD shares shown in figure 3.

Figure 2
Distribution of Job Creation

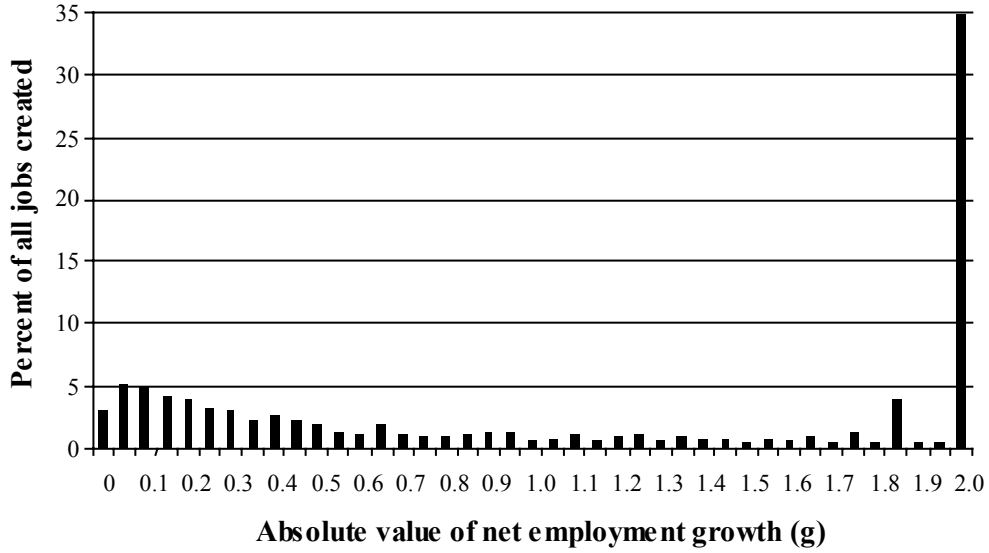
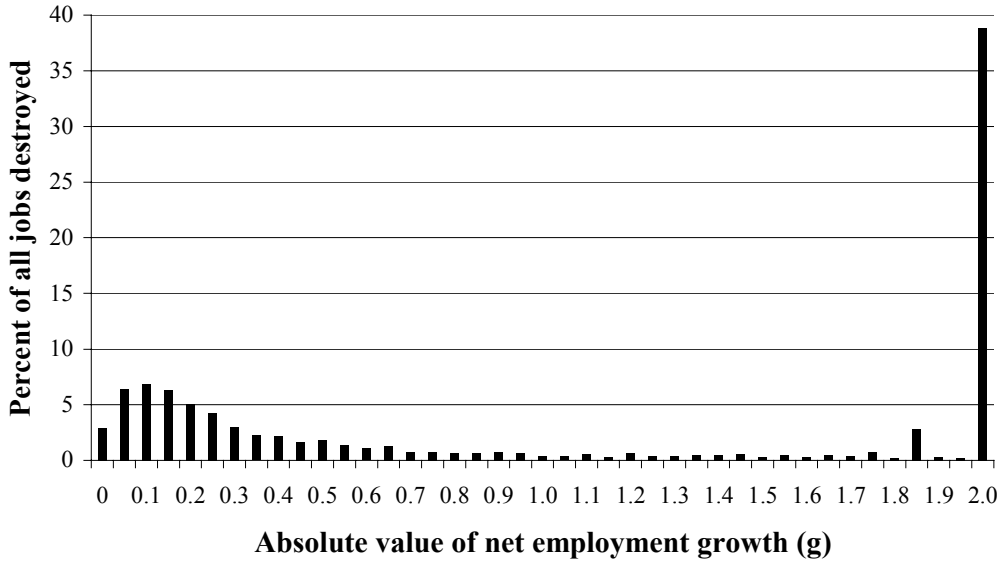



Figure 3
Distribution of Job Destruction




**Source:** Authors' own calculations using the ARD.
**Note:** Figure 2 shows the share of all jobs created according to the absolute value of the establishment's growth rate, for all job creating establishments. Figure 3 shows the same for job destruction. Both show averages across all years from 1980-1981 to 1990-1991. We exclude 1983-84 and 1984-85 due to register changes, see text.

3c Persistence of job creation and destruction

Given we know that large numbers of jobs have been created (destroyed), a pertinent question is: establishment *i* created (destroyed) 100 jobs in year *t*, what proportion of them are still there (not there) one or two years later? To address this, DHS introduce a measure of persistence. Following DHS we define *x* year persistence for establishment *i* in year *t* as:

$$persistence_{i,x} = \frac{N_{t+x,i} - N_{t-1,i}}{N_{t,i} - N_{t-1,i}}$$
$$where \qquad (9)$$
$$0 < persistence_{i,x} \leq persistence_{i,x-1} < 1$$

where $N_i$ is employment in establishment *i*. The numerator is the change in employment between the base year for job creation *t-1* and the year we are considering for persistence, *t+x*. The denominator is the number of jobs created between *t-1* and *t* and likewise for destruction. The inequality under (9) is best illustrated by means of an example.

Table 6
Persistence: An example

| **Year** | **Establishment employment** | | |
|---|---|---|---|
| | **A** | **B** | **C** |
| 1 (*t-1*) | 100 | 100 | 100 |
| 2 (*t*) | 90 | 90 | 90 |
| 3 (*t+1*) | 110 | 80 | 95 |
| 4 (*t+2*) | 90 | 95 | 90 |
| One-year persistence | 0% | 100% | 50% |
| Two-year persistence | 0% | 50% | 50% |

In Table 6, establishment A destroys 10 jobs between years t-1 and t. It then creates 20 and destroys 20 in the next two years. It has a destruction persistence rate of 0% after both one and two years. This demonstrates two points. First, the destruction persistence rate in t+1 and t refers to the 10 jobs initially destroyed. Second, the destruction persistence rate after two years must be less than or equal to that in the first year. Establishment B destroys 10 jobs between years t-1 and t, destroys another 10 the following year and then creates 15. The inequality in (9) restricts the one-year persistence rate to be 100% since all of the jobs destroyed between t-1 and t have remained destroyed. In other words we are interested in the jobs destroyed between years 1 and 2, not those destroyed

afterwards. Finally establishment C destroys 10 jobs, creates 5 and then destroys 5, giving one and two-year destruction persistence rates of 50%. [13]

Table 7 below shows results for persistence from 1980 to 1991. The first row shows the average one- and two-year persistence rates for jobs created and destroyed between 1980 and 1991. The rows that follow show the rates for individual years. Overall, destruction appears to be more persistent that creation.

Table 7
Persistence of job creation and destruction

| Year | Creation | | Destruction | |
|---|---|---|---|---|
| | One year | Two year | One year | Two year |
| Average | 58.8 | 45.6 | 70.5 | 57.1 |
| 1981 | 47.9 | 37.7 | 74.2 | 55.2 |
| 1982 | 76.7 | 41.3 | 78.0 | 72.1 |
| 1983 | 60.7 | 45.5 | 70.8 | 58.9 |
| 1984 | 54.7 | 45.5 | 68.1 | 58.4 |
| 1985 | 57.3 | 46.8 | 63.1 | 49.6 |
| 1986 | 54.2 | 46.1 | 69.3 | 52.8 |
| 1987 | 59.5 | 50.8 | 67.7 | 52.5 |
| 1988 | 61.1 | 49.9 | 69.6 | 55.2 |
| 1989 | 56.8 | 46.8 | 71.8 | 59.5 |
| 1990 | 59.1 | | 72.6 | |

**Source:** Authors' own calculations on the ARD
**Note:** Selected and non-selected data for the period 1980-1991. Persistence rates are expressed as percentages of jobs created or destroyed between a given year and the previous year that are still present one or two years later. See text and (9) for further details.

3d Disaggregated JC&D.

The figures above suggest a good deal of simultaneous JC&D. It might however be the case that certain industries or regions are expanding (accounting for JC) and others contracting (accounting for the JD). As DHS make clear this is not the case on US data. Indeed the key feature of disaggregated JC&D is its fractal nature. Table 8 shows a similar picture for the UK. The first row shows JC&D rates in the two digit industry of footwear and clothing for 1980-91, showing the simultaneous JC&D in what is usually thought of as a declining industry. Included in footwear and clothing is outerwear and the second row shows high rates for this industry. Finally, the third row shows that rates are not as high for men's outerwear.

[13] With our data we do not know about individual employees, only jobs. Hence we cannot say an individual got a job one year and still had it the next. What we can do is look to see that the total employment of the establishment is at least as big as it was before.

Table 8
Job Creation and Destruction Rates in footwear and clothing

| 1980 – 1991 | JCR | JDR | JRA | NEG | XRA | LB | Emp Share |
|---|---|---|---|---|---|---|---|
| Footwear and Clothing | 11.4 | 16.7 | 28.1 | -5.2 | 22.5 | 16.8 | 6.05 |
| Outerwear | 12.4 | 18.0 | 30.4 | -5.7 | 24.6 | 18.1 | 4.37 |
| Men's Outerwear | 11.4 | 17.6 | 29.0 | -6.2 | 20.8 | 18.6 | 0.72 |

**Source:** Authors' own calculations using the ARD.

The rest of this section looks at the disaggregated data more generally. Table 9 presents data by region. The regional data show very similar JC&D rates across regions, with the exception of the South East who have a high JDR. There are quite different employment growth rates across regions.

Table 9
Job Creation and Destruction Rates by UK Regions

| 1980 - 1991 | JCR | JDR | JRA | NEG | XRA | LB | Emp Share |
|---|---|---|---|---|---|---|---|
| South East | 10.3 | 15.0 | 25.3 | -4.7 | 20.4 | 15.1 | 26.48 |
| East Anglia | 9.7 | 12.4 | 22.1 | -2.7 | 18.5 | 12.8 | 3.46 |
| South West | 10.2 | 11.9 | 22.1 | -1.8 | 19.3 | 12.4 | 6.75 |
| West Midlands | 9.7 | 13.2 | 22.8 | -3.5 | 17.6 | 14.1 | 13.58 |
| East Midlands | 9.4 | 12.3 | 21.7 | -2.9 | 18.2 | 12.6 | 9.49 |
| Yorkshire & Humberside | 9.7 | 12.2 | 21.9 | -2.6 | 17.8 | 13.0 | 9.68 |
| North West | 9.8 | 13.9 | 23.7 | -4.1 | 19.3 | 14.0 | 11.81 |
| North | 10.5 | 14.0 | 24.5 | -3.5 | 20.3 | 14.4 | 4.97 |
| Wales | 12.2 | 14.2 | 26.3 | -2.0 | 19.4 | 16.6 | 4.16 |
| Scotland | 9.5 | 13.3 | 22.8 | -3.8 | 18.9 | 13.3 | 7.44 |
| Northern Ireland | 10.8 | 12.5 | 23.3 | -1.6 | 20.3 | 13.2 | 2.16 |

**Source:** Authors' own calculations using the ARD.
**Note:** Selected and non-selected data for the period 1980-1991. Average annual rates are taken for 1980-81 through to 1990-91 (which are size-weighted sums of establishment level annual rates, see text. We exclude 1983-84 and 1984-85 due to register changes, see text.

Table 10
Job Flow Rates by Two-Digit Industry, 1980 to 1991

| Industry | JCR | JDR | JRA | NEG | XRA | LB |
|---|---|---|---|---|---|---|
| Metalliferous ores | 11.0 | 30.1 | 41.1 | -19.2 | 6.4 | 37.9 |
| Metals | 6.3 | 13.9 | 20.2 | -7.6 | 12.4 | 13.9 |
| Mineral extraction | 11.2 | 14.5 | 25.7 | -3.2 | 21.5 | 14.9 |
| Non-metallic mineral products | 9.7 | 12.6 | 22.3 | -2.9 | 17.3 | 13.7 |
| Chemicals | 8.1 | 10.2 | 18.3 | -2.1 | 14.9 | 10.8 |
| Man-made fibres | 7.3 | 16.6 | 23.9 | -9.3 | 14.6 | 16.6 |
| Other metal goods | 10.8 | 13.9 | 24.6 | -3.1 | 19.9 | 14.7 |
| Mechanical engineering | 10.3 | 14.8 | 25.0 | -4.5 | 20.5 | 14.8 |
| Office machinery and data processing | 17.3 | 15.0 | 32.3 | 2.2 | 23.2 | 20.7 |
| Electrical and electronic engineering | 9.5 | 13.5 | 23.0 | -4.0 | 18.9 | 13.5 |
| Motor vehicles and parts | 7.2 | 13.2 | 20.4 | -6.0 | 13.8 | 13.4 |
| Other transport equipment | 8.1 | 13.3 | 21.4 | -5.2 | 14.5 | 14.1 |
| Instrumental engineering | 10.5 | 12.7 | 23.3 | -2.2 | 19.6 | 13.5 |
| Basic foods | 11.8 | 12.8 | 24.7 | -1.0 | 22.0 | 13.6 |
| Other food, drink and tobacco | 8.1 | 11.5 | 19.5 | -3.4 | 16.1 | 11.5 |
| Textiles | 8.5 | 14.0 | 22.5 | -5.5 | 16.9 | 14.1 |
| Leather and leather goods | 11.7 | 17.0 | 28.8 | -5.3 | 23.5 | 17.0 |
| Footwear and clothing | 11.4 | 16.7 | 28.1 | -5.2 | 22.5 | 16.8 |
| Timber and wooden furniture | 14.2 | 15.6 | 29.8 | -1.4 | 25.4 | 17.1 |
| Paper and paper products; printing and | 10.3 | 11.9 | 22.2 | -1.6 | 19.0 | 12.7 |
| Rubber and plastics | 10.2 | 11.6 | 21.9 | -1.4 | 17.1 | 13.3 |
| Other manufacturing | 16.3 | 19.3 | 35.6 | -3.0 | 29.1 | 21.1 |

Shares of Manufacturing by Two-Digit Industry, 1980 to 1991

| Industry | JC Share | JD Share | Emp Share |
|---|---|---|---|
| Metalliferous ores | 0.03 | 0.03 | 0.02 |
| Metals | 2.38 | 3.43 | 3.22 |
| Mineral extraction | 0.24 | 0.26 | 0.24 |
| Non-metallic mineral products | 3.86 | 3.77 | 4.16 |
| Chemicals | 4.56 | 4.15 | 5.80 |
| Man-made fibres | 0.13 | 0.27 | 0.23 |
| Other metal goods | 7.35 | 7.39 | 6.80 |
| Mechanical engineering | 13.02 | 14.21 | 12.78 |
| Office machinery and data processing | 1.57 | 0.98 | 0.96 |
| Electrical and electronic engineering | 10.43 | 10.23 | 10.79 |
| Motor vehicles and parts | 3.96 | 5.40 | 5.61 |
| Other transport equipment | 4.08 | 5.57 | 5.59 |
| Instrumental engineering | 1.77 | 1.62 | 1.70 |
| Basic foods | 8.30 | 6.65 | 7.08 |
| Other food, drink and tobacco | 3.78 | 4.00 | 4.80 |
| Textiles | 4.03 | 4.49 | 4.51 |
| Leather and leather goods | 0.53 | 0.55 | 0.42 |
| Footwear and clothing | 7.55 | 7.60 | 6.08 |
| Timber and wooden furniture | 5.94 | 5.11 | 4.10 |
| Paper and paper products; printing and | 9.33 | 8.27 | 9.22 |
| Rubber and plastics | 4.25 | 3.59 | 4.30 |
| Other manufacturing | 2.93 | 2.43 | 1.60 |

**Source:** Authors' own calculations using the ARD.

**Note:** Selected and non-selected data for the period 1980-1991. Top Panel: Averages are taken for 1980-81 through to 1990-91. Average of annual rates by SIC 80 2-digit industry class (which are size-weighted sums of establishment level annual rates, see text). Averages are taken for 1980-81 through to 1990-91. We exclude 1983-84 and 1984-85 due to register changes, see text. Bottom Panel: Share of industry's total JC, JD and Employment, by SIC 80 2-digit industry.

Table 10 shows the differences across two digit industries. Two features emerge from the data. First it is not the case that some industries account for all the job destruction and some all the creation e.g. computers and textiles respectively. The JDR in textiles for example is lower than that in computers (office machinery). Second, industries with high creation rates tend to have high destruction rates as well (e.g. computers/office machinery).

**4. Do small businesses create jobs?**

As DHS point out, there are a number of difficulties of interpretation involved in calculating the contributions of small businesses to overall employment growth. These are illustrated in Table 11. The economy consists of firms A, B and C. In year 1, firm A is small, with 20 employees (let us define small as 99 employees or less) and firm B and C are large having 200 and 1000 employees. Suppose that in year 2 firm A has expanded to 30 employees whereas firm B has shrunk to 80 and firm C has expanded to 1,120. Those who were small firms in year 1(firm A) have created 10 jobs. Those large firms in year 1 (firms B and C) have destroyed 120 jobs and created 120 jobs. Overall then, in this economy, job destruction is 120, job creation is 130 and the overall employment change is 10.

There are however a number of different calculations in the literature regarding small firms. First, some calculations ignore the longitudinal nature of the data and instead calculate the fraction of JC&D accounted for by small firms using size bands. Here, in year 1 small firms (firm A) account for 20 jobs and in year 2 (firm A and B) for 110 jobs. Hence small firms have apparently created 90 jobs. Thus ignoring longitudinal data will be a problem if firms migrate between size bands. As we saw above, many episodes of JC&D consist of large changes in which case firms are likely to do just this. Hence one should use longitudinal data.

Table 11
Job Creation and Destruction by Size: Example

| | Firm A | Firm B | Firm C | Economy employ |
|---|---|---|---|---|
| Year 1 | 20 | 200 | 1,000 | $\Sigma N$=1,220 |
| Year 2 | 30 | 80 | 1,120 | $\Sigma N$=1,230 |
| $\Delta N_i$ | +10 | -120 | 120 | $\Sigma\Delta N$=+10 |

Second, a common method even using longitudinal data of calculating the fraction of JC&D accounted for by small firms is to calculate the change in employment in small firms and express this as a fraction of the *overall* change in employment. In this example it would be $\Delta N_A/\Sigma\Delta N$=10/10=100% which suggests that small firms are responsible for all of the change in total employment. Inspection of the table reveals this is misleading: large firm C has created 120 jobs.

This suggests it would preferable to express job creation as a fraction of *total jobs created* rather than total change in jobs, in which case small firms account for 10/(10+120) = 7.7% of total jobs created. One should calculate JD similarly. in which case large firms are responsible for 120/120=100% of JD.

Gallagher, Daly and Thomason's (1990) calculations illustrate this issue. They claim that small firms (sized between 5 and 19) account for 96% of the *total net* change in jobs between 1985 and 1987 (see their figure 1 and table 2). They obtain this figure as follows. They calculate the number of jobs generated by firms of different size classes (precisely as in our example). They find that small firms destroyed 1.199m jobs and created 1.495m jobs, with the rest of firms in the economy creating 1.580m jobs and destroying 1.570 jobs (see their Table 2). Net employment change for small firms is therefore +0.296 jobs and for large firms is +0.010 and the total net change in employment is 0.307 (the numbers do not quite add due to rounding). They then calculate the share of small firms in total net employment change as 0.296/0.307 = 96% which is the equivalent of the 10/10 figure above[14]. The share of small firms in total job creation is however 1.495/(1.495+1.580)=48% and in job destruction is 1.199/(1.199+1.052)=43%. Thus small firms account for almost all of total net employment growth but under half of job creation.

A final problem arises either when one is calculating shares of JC&D by size or if one wants to calculate whether small firms have higher JC&D rates then large firms. Measurement error or transitory shocks make it more likely initially small firms will grow and initially large firms will shrink. For this reason, it may be preferable to express growth rates on the basis of *average* employment rather than base year employment (see DHS for more discussion).

In all of our calculations we use longitudinal data and so avoid the first problem set out above. Table 12 then seeks to answer the question, what is the share of small establishments in JC&D? The top row of the left panel uses initial size to group establishments and suggests that establishments of size 0-19 are responsible for 51% of JC and 14% of JD, which is disproportionate to their employment share (column 3). The right panel uses average size to group establishments[15] and suggests here that 0-19 establishments are responsible for 27% of job creation and 27% of job destruction. This is still disproportionate to their employment share, but clearly different to the initial size classification. The final two rows show the shares of "small" and "large" establishments, where "small" and "large" are taken to be under and over 100. The JD figures are uniform: large establishments account for just under 66% of JD and small establishments a little over 33%. The JC figures do depend on the size calculation. Using initial size, the small firms account for around 66%

[14] Daly, Campbell, Robson and Gallagher (1991) use an identical method to calculate that firms employing 0-10 workers were responsible for over 50% of net employment growth 1987-89.

[15] Average size is employment measured over the entire lifetime of the plant (which could be one year of course). We repeated the calculation using the size in each adjacent year for which we calculated JC&D, and obtained similar results.

of JC, whereas the figure is under 50% for average size.[16] Thus on either measure it is true to say that large establishments account for most JD. Small establishments account between 66% and 50% of JC depending on the measure.

Table 12
The contribution of small and large establishments to JC&D

(cells show the fraction of total JC and total JD accounted for by establishments of each size band, where the size band is calculated in different ways)

| | Initial size | | | Average size | | |
|---|---|---|---|---|---|---|
| | **JC** | **JD** | **Emp** | **JC** | **JD** | **Emp** |
| 0 to 19 employees | 50.79 | 14.14 | 13.88 | 26.43 | 21.43 | 11.25 |
| 20 to 49 | 10.81 | 12.10 | 8.64 | 13.29 | 9.69 | 9.16 |
| 50 to 99 | 7.14 | 9.77 | 7.98 | 10.06 | 8.98 | 8.60 |
| 100 to 499 | 15.43 | 25.66 | 26.93 | 24.74 | 26.22 | 28.83 |
| 500 to 999 | 5.47 | 10.84 | 12.73 | 9.23 | 10.38 | 12.98 |
| 1,000 to 4,999 | 7.73 | 17.55 | 19.70 | 11.22 | 15.33 | 18.76 |
| 5,000 to 9,999 | 1.38 | 4.73 | 4.95 | 3.65 | 3.98 | 5.00 |
| 10,000 or more | 1.25 | 5.21 | 5.19 | 1.39 | 4.00 | 4.16 |
| Under 100 | 68.74 | 36.01 | 30.50 | 49.77 | 40.10 | 29.01 |
| Over 100 | 31.26 | 63.99 | 69.50 | 50.23 | 59.90 | 69.73 |

**Source:** Authors' own calculations using the ARD.
**Note:** Selected and non-selected data for the period 1980-1991. Averages are taken for 1980-81 through to 1990-91. Average of annual creation, destruction and employment levels respectively as a share of total creation, destruction and employment by size classes. We exclude 1983-84 and 1984-85 due to register changes, see text. Classification methods are: Initial size (also known as Birch/SBA); uses the size of the establishment in the first year for which changes are being analysed. Average size; employment measured over the entire lifetime of the plant.

How do these calculations compare with other UK studies? As discussed above, Gallagher et al report as a proportion of net JC&D, rather than gross, as is done here. Blanchflower and Burgess (1996) report the shares of JC&D for large and small establishments (under and over 99) of 47% and 24%[17] using initial size to calculate their size bands. These figures are rather smaller than ours, but this is likely to be because they do not have entry and exit, which is concentrated in these small size categories.

We next examine whether small or large firms have larger or smaller JC&D rates. The results are set out in table 13, and again use initial and average size as size measures (as in table 4.2 of DHS). Once again the results show the importance of the size calculation. At initial sizes, 0-19

[16] For the US, 1973-1988, DHS table 4.3 shows that using average size plants of under 100 accounted for 32.3% of JC and 30.4% of JD (their employment share is 22.7%). Thus UK small plants seem to account for rather more creation and destruction than in the US. For Canada, 1978-92, Picot, Baldwin and Dupuy (1995, table 1) the shares in JC&D of under 100 firms to be 69% and 61% (using average sizes for weights) (the employment share being 44%).
[17] This is the average share for their 1979-80, 1983-84 and 1989-90 cross sections.

establishments have larger JC rates than larger firms. At average sizes they have larger JC rates but also larger JD rates as well. Thus on either measure it seems fair to conclude that smaller establishments have both higher and lower JC&D rates compared with large establishments.

Table 13
Small and large establishments: job creation and destruction rates

(cells show the JC&D rates for establishments of each size band, where the size band is calculated in different ways)

| | Initial size | | | Average size | | |
|---|---|---|---|---|---|---|
| | **JCR** | **JDR** | **NEG** | **JCR** | **JDR** | **NEG** |
| 0 to 19 employees | 36.7 | 13.1 | 23.6 | 22.6 | 22.6 | 0.0 |
| 20 to 49 | 12.7 | 19.0 | -6.4 | 14.6 | 14.8 | -0.2 |
| 50 to 99 | 8.6 | 16.8 | -8.2 | 11.6 | 14.3 | -2.7 |
| 100 to 499 | 5.7 | 13.0 | -7.4 | 8.2 | 12.4 | -4.1 |
| 500 to 999 | 4.2 | 11.6 | -7.4 | 6.8 | 10.8 | -4.0 |
| 1,000 to 4,999 | 3.8 | 11.5 | -7.7 | 5.7 | 10.7 | -5.0 |
| 5,000 to 9,999 | 2.6 | 12.7 | -10.1 | 5.8 | 11.1 | -5.3 |
| 10,000 or more | 2.4 | 12.9 | -10.4 | 3.8 | 12.3 | -8.5 |

**Source:** Authors' own calculations using the ARD.
**Note:** Selected and non-selected data for the period 1980-1991. Averages are taken for 1980-81 through to 1990-91. Average of annual rates by size classes (which are size-weighted sums of establishment level annual rates, see text). We exclude 1983-84 and 1984-85 due to register changes, see text. Classification methods are: Initial size (also known as Birch/SBA); uses the size of the establishment in the first year for which changes are being analysed; and Average size: We use the average size of an establishment over all observations in the period 1980-1991 to determine its size band. See text for more detail of these measures

## 5. Conclusion

We have documented job creation and destruction using a new data set which aims to improve on previous studies. We find:

(1) Average establishment (plant) JC&D rates of 10.0% and 13.5% (11.2% and 14.7%).
(2) Regardless of measure, large (size over 100) establishments (plants) account for around 62% (55%) of jobs destroyed
(3) Depending on method, small establishments (size under 100) account for between 68% and 50% (70% and 57%) of jobs created.
(4) Small establishments have both higher JC rates and higher JD rates than large establishments.
(5) Regarding comparison with US plants, the UK has higher JC&D rates and small businesses account for more JC&D than in the US.

We are currently assembling data on services and more recent data and will look at this in future work.

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## Appendix: JC&D using local unit/plant data

As discussed above, some establishments report on a combination of local units/plants. Hence the numbers of JC&D might be higher using local unit data if there are many changes in local unit employment within establishments. But the rates might be similar since although there might be more changes of employment within units, there are more employment units to count. In this appendix we re-calculate the main Tables in the body of the text and show that using local unit data raises somewhat the numbers of JC and JD but does not greatly alter the rates, nor the shares by small and large establishments.

Appendix Table 1 sets out the analogy to Table 3 in the text, but using local units. Looking at the top line, the overall change in employment is rather larger, due to some rather larger recorded employment falls in the 1990s. This might in turn be because employment in local units within an establishment does not always sum up to employment in the establishment, likely due to measurement error in the reporting of local unit information. Whereas JC and JD using establishments was around 6.0m and 8.0m, here it is 7.1m and 9.3m. Whilst the numbers for expansion, entry, contraction and exit are rather larger than for establishments, the shares in JC and JD are very similar.

Appendix Table 1
Job Creation and Destruction in UK Manufacturing: Numbers calculated using Local Units

| Year | ΔN | JC | JD | JC | | JD | |
|---|---|---|---|---|---|---|---|
| | | | | Expanding | Entry | contracting | exit |
| Total | -2,078,591 | 7,187,282 | 9,265,873 | 4,384,001 | 2,803,281 | 5,706,335 | 3,559,538 |
| Average | -188,614 | 557,343 | 745,957 | 375,167 | 182,176 | 491,989 | 253,968 |
| 1981 | -669,702 | 353,644 | 1,023,346 | 246,516 | 107,128 | 746,984 | 276,362 |
| 1982 | -389,204 | 391,233 | 780,437 | 298,657 | 92,576 | 559,487 | 220,950 |
| 1983 | -231,755 | 391,655 | 623,410 | 320,208 | 71,447 | 453,602 | 169,808 |
| 1984 | -32,186 | 887,413 | 919,599 | 337,268 | 550,145 | 394,757 | 524,842 |
| 1985 | -160,263 | 726,442 | 886,705 | 295,063 | 431,379 | 391,689 | 495,016 |
| 1986 | -40,198 | 578,447 | 618,645 | 381,184 | 197,263 | 407,498 | 211,147 |
| 1987 | 10,205 | 677,505 | 667,300 | 447,558 | 229,947 | 425,309 | 241,991 |
| 1988 | 50,721 | 729,099 | 678,378 | 509,691 | 219,408 | 429,032 | 249,346 |
| 1989 | 24,387 | 724,554 | 700,167 | 480,971 | 243,583 | 427,866 | 272,301 |
| 1990 | -134,904 | 605,934 | 740,838 | 418,385 | 187,549 | 468,643 | 272,195 |
| 1991 | -292,896 | 492,684 | 785,580 | 327,707 | 164,977 | 522,668 | 262,912 |
| 1992 | -212,796 | 628,672 | 841,468 | 320,793 | 307,879 | 478,800 | 362,668 |

**Source:** Authors' own calculations using the ARD.
**Note:** Local unit data for the period 1980-1992. Year given is end of range, i.e. 1981 means 1980-81. Figures in right-hand panels are totals for each year according to role. ΔN = JC – JD and totals for JC, JD are sums of that due to entry/exit and expansion/contraction. An entrant is a local unit that is new in time *t*, an expanding/contracting survivor was present in *t* and *t-1*, and an exitor was present in *t-1* but absent in *t*. Averages for 1980-91 are for 1980-81 through to 1991-92, excluding 1983-84 and 1984-85 due to register changes, see text. Note that the totals do not exclude these years.

Appendix Table 2 shows the rates using local unit calculations. The average JCR and JDR are slightly higher than those in Table 4 (recall they were 10.0% and 13.5%) and the intertemporal pattern is similar.

Appendix Table 2
Job Creation and Destruction: Rates using Local Unit data

| Year | JCR | JDR | JRA | NEG | XRA | Lower Bound |
|---|---|---|---|---|---|---|
| Average | 11.2 | 14.7 | 25.8 | -3.5 | 22.0 | 14.8 |
| 1981 | 5.8 | 16.7 | 22.5 | -11.0 | 11.6 | 16.7 |
| 1982 | 7.0 | 14.0 | 21.0 | -7.0 | 14.0 | 14.0 |
| 1983 | 7.4 | 11.8 | 19.3 | -4.4 | 14.9 | 11.8 |
| 1984 | 17.3 | 17.9 | 35.2 | -0.6 | 34.5 | 17.9 |
| 1985 | 14.4 | 17.6 | 32.0 | -3.2 | 28.8 | 17.6 |
| 1986 | 11.7 | 12.5 | 24.2 | -0.8 | 23.4 | 12.5 |
| 1987 | 13.8 | 13.5 | 27.3 | 0.2 | 27.1 | 13.8 |
| 1988 | 14.7 | 13.7 | 28.4 | 1.0 | 27.4 | 14.7 |
| 1989 | 14.5 | 14.0 | 28.5 | 0.5 | 28.0 | 14.5 |
| 1990 | 12.3 | 15.0 | 27.3 | -2.7 | 24.5 | 15.0 |
| 1991 | 10.4 | 16.6 | 27.1 | -6.2 | 20.9 | 16.6 |
| 1992 | 14.1 | 18.8 | 32.9 | -4.8 | 28.1 | 18.8 |

**Source:** Authors' calculations using the ARD.
**Note:** Local unit data for the period 1980-1992. Year given is end of range, i.e. 1981 means 1980-81. Data are size-weighted sums of local unit level annual rates (see text). Average for 80-92 excludes 84 and 85. The lower bound is the maximum of JC and JD.

Appendix Table 3 shows the persistence rates for creation and destruction, which once again are very similar to those in Table 7.

Appendix Table 3
Persistence of job creation and destruction using local unit data

| Year | Creation | | Destruction | |
|---|---|---|---|---|
| | One year | Two year | One year | Two year |
| Average | 57.6 | 42.9 | 71.4 | 57.4 |
| 1981 | 48.5 | 37.3 | 74.1 | 55.9 |
| 1982 | 72.7 | 40.8 | 76.1 | 68.9 |
| 1983 | 59.3 | 44.4 | 70.1 | 57.6 |
| 1984 | 54.1 | 43.7 | 68.8 | 57.6 |
| 1985 | 56.0 | 45.3 | 64.4 | 51.2 |
| 1986 | 53.8 | 44.7 | 69.0 | 52.9 |
| 1987 | 58.2 | 48.9 | 67.9 | 52.9 |
| 1988 | 60.3 | 48.4 | 69.5 | 55.2 |
| 1989 | 55.6 | 45.0 | 70.9 | 58.2 |
| 1990 | 56.7 | 33.8 | 72.2 | 57.7 |
| 1991 | 53.3 | | 72.8 | |

**Source:** Authors' own calculations on the ARD
**Note:** Selected and non-selected local unit data for the period 1980-1992. Persistence rates are expressed as percentages of jobs created or destroyed between a given year and the previous year that are still present one or two years later. See text and (9) for further details.

Appendix Table 4 shows the rates in successively disaggregated industries within footwear and clothing, showing again similar rates and fractal patterns.

Appendix Table 4
Job Creation and Destruction Rates in footwear and clothing using local unit data

| 1980 – 1992 | JCR | JDR | JRA | NEG | XRA | LB | Emp Share |
|---|---|---|---|---|---|---|---|
| Footwear and Clothing | 13.0 | 18.2 | 31.2 | -5.2 | 25.6 | 18.4 | 6.0 |
| Outerwear | 13.9 | 19.5 | 33.4 | -5.6 | 27.6 | 19.6 | 4.3 |
| Men's Outerwear | 11.0 | 17.9 | 28.9 | -6.9 | 20.8 | 18.5 | 0.7 |

**Source:** Authors' own calculations using the ARD.

Finally, Appendix Table 5 and 6 show the local unit equivalents of the contribution of small and large establishments to JC&D (Table 12) and JC&D rates for small and large establishments (Table 13). Table 12 found that regardless of method, around 60% of JD was accounted for by establishments of over 100 and about 40% for under 100. Looking at Appendix Table 5, the methods give consistent results, but about 55% for larger local units and 45% for smaller local units. Table 12 showed that small establishments accounted for between 70% and 50% of JC: here small local units account for between 70% and 57%. The rates by large and small local units (Appendix Table 6) are very similar to those by large and small establishments (Table 13).

Appendix Table 5
The contribution of small and large local units to JC&D

(cells show the fraction of total JC and total JD accounted for by local units of each size band, where the size band is calculated in different ways)

| | Initial size | | | Average size | | |
|---|---|---|---|---|---|---|
| | JC | JD | Emp | JC | JD | Emp |
| 0 to 19 employees | 48.8 | 15.7 | 22.8 | 29.1 | 23.3 | 13.9 |
| 20 to 49 | 12.8 | 14.6 | 10.6 | 15.3 | 12.3 | 11.2 |
| 50 to 99 | 8.7 | 11.2 | 10.1 | 12.7 | 11.9 | 11.1 |
| 100 to 499 | 18.2 | 30.8 | 32.4 | 27.3 | 30.1 | 34.1 |
| 500 to 999 | 5.4 | 10.9 | 12.7 | 7.0 | 9.3 | 12.3 |
| 1,000 to 4,999 | 5.3 | 13.4 | 15.6 | 7.5 | 11.3 | 14.7 |
| 5,000 to 9,999 | 0.6 | 2.5 | 2.6 | 1.0 | 1.6 | 2.5 |
| 10,000 or more | 0.3 | 0.8 | 0.9 | 0.1 | 0.1 | 0.3 |
| Under 100 | 70.2 | 41.5 | 41.6 | 57.1 | 47.5 | 36.2 |
| Over 100 | 29.8 | 58.5 | 64.2 | 42.9 | 52.5 | 63.8 |

**Source:** Authors' own calculations using the ARD.
**Note:** Selected and non-selected local unit data for the period 1980-1992. Averages are taken for 1980-81 through to 1990-92. Average of annual creation, destruction and employment levels respectively as a share of total creation, destruction and employment by size classes. We exclude 1983-84 and 1984-85 due to register changes, see text. Classification methods are: initial size (also known as Birch/SBA); uses the size of the local unit in the first year for which changes are being analysed; average size; employment measured over the entire lifetime of the plant.

Appendix Table 6
Small and large firms: Job creation and destruction rates using local units

(cells show the JC&D rates for local units of each size band, where the size band is calculated in different ways)

| | Initial size | | | Average size | | |
|---|---|---|---|---|---|---|
| | **JCR** | **JDR** | **NEG** | **JCR** | **JDR** | **NEG** |
| 0 to 19 employees | 37.0 | 15.0 | 22.0 | 24.3 | 24.0 | 0.2 |
| 20 to 49 | 13.4 | 20.4 | -7.1 | 15.1 | 16.4 | -1.3 |
| 50 to 99 | 9.3 | 16.5 | -7.3 | 12.5 | 15.7 | -3.2 |
| 100 to 499 | 6.1 | 14.0 | -7.9 | 8.6 | 12.9 | -4.3 |
| 500 to 999 | 4.5 | 12.5 | -8.0 | 6.1 | 11.1 | -5.1 |
| 1,000 to 4,999 | 3.4 | 12.2 | -8.8 | 5.3 | 11.3 | -6.0 |
| 5,000 to 9,999 | 2.7 | 14.1 | -11.4 | 4.7 | 9.9 | -5.3 |
| 10,000 or more | 3.5 | 10.7 | -7.2 | 4.5 | 6.9 | -2.3 |

**Source:** Authors' own calculations using the ARD.

**Note:** Selected and non-selected local unit data for the period 1980-1992. Averages are taken for 1980-81 through to 1991-92. Average of annual rates by size classes (which are size-weighted sums of local unit level annual rates, see text). We exclude 1983-84 and 1984-85 due to register changes, see text. Classification methods are: initial size (also known as Birch/SBA); uses the size of the local unit in the first year for which changes are being analysed; and average size: the average size of an local unit over all observations in the period 1980-1992 to determine its size band. See text for more detail of these measures


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