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Technical Appendix to

RESTRUCTURING AND PRODUCTIVITY GROWTH IN UK MANUFACTURING*

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Appendix B: Robustness Checks to Findings in Section 4

In this Appendix, we consider a number of robustness checks, focussing first on the sensitivity of the relative contributions of exit, entry and survival to overall productivity growth. Table B1 examines various alternative assumptions, using the FHK decomposition (see (5) and row 1) as the base calculation.

First, it can be noted that *not* correcting labour inputs for hours makes little difference to the results, either for $\Delta\ln(Y/L)$ or for $\Delta\ln TFP$ (row 2). Weighting establishments by output (row 3), rather than employment, has little effect on entry, and reduces the within effect somewhat. The main effect however is to raise the cross (covariance) term (row 3). As FHK

Table B1

Table B1 $\Delta ln(Y/L)$ and $\Delta lnTFP$ Decompositions: Alternative treatment of Hours, Weights, Sub periods (all using FHK method: recall that Table 7 results are employment weighted incorporating hours)

	Within	Between	Cross	Net entry
$\Delta\ln(Y/L)$				
1980-92, Table 7	48	4	−1	49
1980-92, Omitting hours correction	47	4	−2	50
1980-92, Output weighted	42	−4	15	48
1980-2, (Average *pg* 7.06% pa.)	59	−2	2	41
1982-9, (Average *pg* 4.75% pa.)	64	0	−7	43
1989-92, (Average *pg* 2.36% pa.)	61	5	−9	43
$\Delta\ln TFP$				
1980-92, Table 7	5	15	26	54
1980-92, Omitting hours correction	2	26	22	50
1980-92, Output weighted	3	11	35	51
1980-82, (Average *TFPg* 0.17% pa.)	−194	18	254	22
1982-89, (Average *TFPg* 2.46% pa.)	38	8	15	39
1989-92, (Average *TFPg*–1.16% pa.)	152	−49	−15	13

Note: See notes to Table 7. *p* stands for productivity and *g* for growth.

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remark, this is likely due to the effects of downsizing which raises $\Delta\ln(Y/L)$ by lowering $\ln L$, rendering the employment-weighted cross term negative whilst the output weighted cross term is positive.

To explore the effects of different time periods, Table B1 also sets out the FHK results for $\Delta\ln(Y/L)$ and $\Delta\ln TFP$ using three subperiods, two slumps, 1980–2 (row 4) and 1989–92 (row 6) and one boom 1982–9 (row 5). For $\Delta\ln(Y/L)$ the results are remarkably consistent; the net entry effect remains at over 40% regardless of period (Oulton finds a net entry effect of 31%, 1979–82). For $\Delta\ln TFP$, the picture is more variable. In the boom period, 1982–9 the net entry effect is 40%, less than that for the 1980–92 period as a whole. In the recession periods the net entry effect is less, but the other effects are highly unstable. We suspect this reflects the problems in accurately measuring $\Delta\ln TFP$ in recession periods where it is hard to measure capital and underworking. In addition, the 1980–2 period shows $\Delta\ln TFP$ as only 0.17% so that calculating the shares of each effect as a fraction of 0.17 involves dividing by a small number which is likely to give high and unstable shares (as the Table illustrates). $\Delta\ln TFP$ in 1989-92 is –1.16%; since negative TFP growth is hard to interpret the results from this period are very tentative too. Noting that FHK find similarly variable results for TFP for their subperiods as well, see their Table 7, we do not believe we can reliably infer the differing contributions of entry and exit to $\Delta\ln TFP$ over the cycle.

The lower entry effect in the sub-periods raises the suspicion that the effect is purely a product of the length of the time period chosen. The somewhat smaller entry effect in Oulton (2000, 31%), for example, may stem from his having utilised the somewhat shorter period 1979–89 in his calculations (see footnote 26). We can test this simply by calculating the decompositions for sequentially shorter periods. This information is provided in Table B2, which successively shortens the period from 1980–92 down to the single year's transition, 1991–2. The first column provides the original result contained in Table 7. As can be seen, for $\Delta\ln(Y/L)$, the entry contribution is remarkably robust as the period is shortened, only falling dramatically for periods of less than 5 years duration. For $\Delta\ln TFP$, the result survives until the period is shortened to less than 8 years, when the contribution becomes much more volatile, as explained above. It can be noted, also, that for $\Delta\ln(Y/L)$, the pure 'within' effect only rises above 52% in one sub-period (1990–2) and averages 50% over all the twelve calculations. On a similar basis, for $\Delta\ln TFP$, the average 'within' contribution is 26%, although we reiterate that *TFP* calculations exhibit high volatility over short periods.

Although in an accounting sense the decomposition is exact, it might be felt that at least some of the contribution of entry might conceptually be due to growth in productivity of entrants subsequent to entry and might therefore be regarded as a within effect. For example, establishments that entered in 1981 are counted as an entrant in the decompositions (since they are new in 1992) but their productivity in 1992 will also reflect any productivity growth between 1981 and 1992. Of course these establishments and/or the exiting establishments might have declining within establishment productivity until they exit and hence there might be a counteracting negative within effect from the exitors.

Table B2

The Contribution of Entry to Productivity Growth, by Length of Period (%)

	1980–92	1981–92	1982–92	1983–92	1984–92	1985–92	1986–92	1987–92	1988–92	1989–92	1990–92	1991–92
$\Delta\ln Y/L$	49	49	50	51	50	46	45	44	35	46	23	−1
$\Delta\ln TFP$	54	57	56	64	103	167	136	−129	7	8	63	−272

Table B3

Entry Productivity by Cohorts, from FHK Decomposition 1980–92

Cohort	Actual entry productivity contribution	% productivity contribution of entrants only	Entry cohort market share %	Average relative productivity
Cohort 81	0.0017	2.3	1.59	0.1062
Cohort 82	0.0019	2.7	1.58	0.1212
Cohort 83	0.0009	1.3	1.85	0.0504
Cohort 84	0.0112	15.6	5.52	0.2025
Cohort 85	0.0072	10.1	3.37	0.2154
Cohort 86	0.0050	6.9	3.54	0.1413
Cohort 87	0.0085	11.8	4.20	0.2020
Cohort 88	0.0104	14.5	3.90	0.2675
Cohort 89	0.0097	13.5	3.91	0.2486
Cohort 90	0.0098	13.7	3.95	0.2490
Cohort 91	0.0034	4.7	3.65	0.0924
Cohort 92	0.0021	2.9	2.91	0.0727
All cohorts	0.0719	100	39.96	0.1799

Note: Entry cohort market share is the share of each cohort in total employment in 1992. Column definitions: column 1 is the fourth term in (5), namely $\sum_{i \in N}\theta_{it}(p_{it} - P_{t-k})$, for each cohort, column 2 is the cell in column 1 as a proportion of the sum of cells in column 1, column 3 is $\sum_{i \in N}\theta_{it}$ for each cohort and column 4 is average $(p_{it} - P_{t-k})$ for each cohort.

We examined this post-entry productivity in two ways. First, in Table B3 we decompose the contribution of entrants to productivity into the contribution of each successive cohort of entrants. If the entry effect is due mostly to growth subsequent to entry then the contribution of the longer-established cohorts would be greatest. Column 1 shows the contribution of each cohort to the entry effect and column 2 shows each cohort's percentage of the overall entry effect (thus column 1 is the fourth term in (5), namely $\sum_{i \in N}\theta_{it}(p_{it} - P_{t-k})$, for each cohort). As the columns show, it is *not* the case that the longest lived cohorts contribute the most to the overall entry effect. Rather, the biggest contributors are the cohorts that entered in the mid 1980s. The calculation is obscured however by the fact that the contribution of each cohort to the final entry term is that cohorts' productivity in 1992 (relative to 1980) weighted by the cohort's share in 1992. Hence a long-established cohort might have a small market share by 1992. Columns 3 and 4 therefore show the market shares of each entering cohort in 1992 and each cohort's relative productivity. As column 3 shows, the distribution of market shares among cohorts is fairly even, regardless of cohort year, aside from the earlier cohorts having rather lower market shares. Column 4 confirms again that the most productive cohorts were in the mid to late 1980s. Overall then, there seems little evidence that the entry term is excessively driven by growth of long-surviving establishments in separate cohorts.

A second route to look at the balance between initial entry and subsequent growth is to examine the productivity growth of cohorts. Following Aw *et al.* (1997), for each cohort we regressed *TFP* on a constant, a set of time dummies and an exit dummy. The constant for each cohort tells us the average productivity level of each successive cohort whilst the time dummy in each year says how the entire cohort's productivity has evolved in each year relative to its base level (the initial time dummy is omitted). If the 1992 productivity of entrants was predominantly due to high productivity growth since entry, then the 1992 time dummy should be positive and significant. This was the case for five out of 12 cohorts (1980, 81, 84, 85 and 88), suggesting that the main determinant of the 1992 productivity of entrants was high productivity at entry.