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Aggregate Job Creation, Job Destruction and Job Turnover in the Irish Manufacturing Sector*

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Abstract: Using an annual employment survey data set we construct aggregate job flow rates for the Irish manufacturing sector for the period 1974 to 1994. We report the existence of simultaneous job creation and job destruction, inducing job turnover well above that necessary to accommodate net employment changes at the aggregate or even very refined sectoral level, over the entire sample period. This job turnover is caused by a large proportion of the total plant population making mostly persistent adjustments to its employment level. The properties of the aggregate job flows in the Irish manufacturing sector conform well to the stylised facts derived from studies of aggregate job flows in the manufacturing sectors of other developed countries. Moreover, these properties hold regardless of whether we restrict our sample to continuing plants or entering and exiting plants.

I INTRODUCTION

The relatively recent emergence of studies on job flows has unveiled the existence of a large amount of ongoing reshuffling of employment beyond that necessary to accommodate net employment changes at the aggregate or even very refined sectoral level. The heterogeneity of firm level labour demand behaviour over the whole business cycle implied by this

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finding, which lies in contrast to traditional representative firm models found in standard textbooks, has kindled much interest in job flows among economists. Through the use of establishment level employment data sets, the characteristics and cyclical properties of aggregate job flows have now been documented for numerous countries; Contini and Revilli (1987) for Italy; Davis and Haltiwanger (1992) for the US; Boeri and Cramer (1992) for Germany; Baldwin, Dunne and Haltiwanger (1994) for the US and Canada; Salvanes (1996) for Norway; Konings (1995) for the UK; and Albæk and Sørensen (1995) for Denmark, to name a few.[1] These studies have confirmed the existence of large magnitudes of simultaneous, though cyclically asymmetric, aggregate job creation and job destruction internationally. To date, however, there has been no parallel study for Ireland.[2]

The purpose of this paper is to document the properties of the job flows of the Irish manufacturing sector. These are constructed by aggregating the number of jobs created and jobs destroyed from the plant level using an annual employment panel survey. Our data set is a particularly attractive one in that it covers virtually all plants in the manufacturing sector over the period 1974 to 1994 and, hence, allows us to undertake a study of aggregate job flows over a long time period while encountering few problems of sample selection bias. Where possible, we compare our results to those derived from studies of other countries. Such a comparison is of particular interest given that Ireland has implemented a strong interventionist industrial policy, mainly via an extensive provision of grants, since the 1950s in an effort to attract foreign direct investment and promote indigenous industry growth. One might thus expect different employment behaviour by plants located in Ireland, and hence different aggregate job flow properties, relative to plants in other developed countries.

We proceed as follows. In Section II our data set is described. In Section III we document the properties of the Irish aggregate job flows using a variety of indices and measures. The importance of plant turnover in the aggregate job flows is investigated in Section IV. We conclude in Section V.

II DATA SOURCE

Our data source is the annual employment panel survey carried out by Forfás since 1973, covering all known active manufacturing and internationally-traded service companies. The response rate to this survey has on

1. For a survey of studies for these and other countries see OECD (1996). Roberts (1995) studies aggregate job flows in developing countries, while Konings, Lehmann and Schaffer (1996) document aggregate job flows in a transition economy.

2. Some limited summary statistics on job flows were provided by Forfás (1995).

average been extremely high, generally over 99 per cent. The unit of observation is the individual plant, for which the number of permanent full-time and part-time employees is reported. Each plant is, amongst other things, identified by a unique plant number and its 4-to-5 digit NACE code sector of location.[3] These identifiers are only changed if there is an actual change of ownership. While our inability to distinguish births and deaths from take-overs may create some problems in terms of overstating the aggregate flows resulting from "births" and "deaths", we suspect that, as a whole, take-overs would result in only negligible measurement errors in our flow calculations. In measuring employment at the plant level to arrive at aggregate job flows we only consider permanent full-time employees. Additionally, in order to conduct more accurate international comparisons, we only include plants from the manufacturing sector.

Three structural breaks in the collection of data are worthy of mention. First, in 1990 all plants which had not responded to the survey were investigated and, if no longer in existence, their employment level was set equal to zero. Second, in the same year plants that came under the coverage of the Shannon Development Board (Mid-West Region) were assigned new identification numbers. The employment level under the old number was set equal to zero and reappeared under the new plant number in 1991. Unfortunately, we have no documentation that allows us to distinguish between the actual births and deaths and re-classifications.[4] These two aspects would tend to overstate the plant and job turnover rate in 1990 and we thus exclude figures for 1990 in all calculations of averages, correlations and other summary measures of our indices. Third, from 1994 onward, and to a slight extent in 1993, most plant births of less than 20 employees were no longer covered by the survey and thus, arguably, most births from that point onward are generally not captured by our data set, a factor that will tend to understate job creation and birth rate.[5]

3. One should note that we cannot determine the age of those plants that already existed in 1973 as we have no documentation concerning their date of start-up. Given this feature we cannot undertake an analysis of job flows by plant age without encountering problems of sample selection bias. For a discussion of the importance of those plants incumbent to our data set and some limited analysis by plant age see Strobl (1996).

4. In order to check the importance of these features we investigated the number of deaths in 1989, 1990 and 1991 and found these to be 429, 808 and 448, respectively. In the Mid-West region the number of deaths for 1989, 1990, and 1991 were 28, 437 and 56, respectively. Similarly, the number of births in 1990, 1991 and 1992 were found to be 325, 346 and 298, respectively, and the total number of births in the Mid-West region in 1990, 1991 and 1992 were found to be 56, 123 and 52, respectively. Thus the structural break is likely to have exaggerated our measure of job turnover in the Mid-West region and the overall figure in 1990.

5. Ninety per cent of the total number of births over the period 1974 to 1992 were by firms of less than 20 employees.

Throughout this paper we will be making references to results on aggregate job flows derived from studies of the manufacturing sectors in other countries; namely the UK; US; Canada; Australia; Norway and Denmark.[6] It must however be realised that data sets across countries are not strictly comparable. The data sets used for the construction of the US and Canadian job flows consist of employment surveys of plants which in number are substantially less than the total population of plants in the respective manufacturing sectors.[7] The UK results are particularly difficult to interpret, in a relative sense, in that they are derived from almost exclusively large plants (average employment size 4,530) and do not cover births and deaths. The data set used for the Australian results is based on 4-digit ASIC sectors rather than plant level data. Perhaps the most comparable results are those of Norway and Denmark. These data sets, like the Irish one, place no size restrictions on the plants included and cover the whole manufacturing sector. However, they do, unlike the Irish one, account for take-overs. In contrast, the Irish data set has a 40 per cent and a 110 per cent greater period of coverage than the Norwegian and Danish data sets, respectively. It becomes clear that interpretations of differences or similarities in results across countries must be made with caution. On the one hand, they may be due to genuine similarities or differences of Irish relative to other countries' plants/firms, while on the other hand they may be attributable to data set differences or, of course, some combination of both. Despite these reservations, the strong prevalence of some features across countries merits international comparisons.

III AGGREGATE JOB FLOWS

We construct the aggregate job flows for the Irish manufacturing sector in the spirit of Davis and Haltiwanger (1992). A plant's size at time t, x_{et}, is defined as its average employment (n) between t–1 and t:

$$x_{et} = \frac{n_{et} + n_{et-1}}{2} \tag{1}$$

We define the employment growth rate of a plant as follows:

6. For the remainder of this paper all results presented for countries other than Ireland are taken from Baldwin, Dunne and Haltiwanger (1994) for the US and Canada for the sample period 1973 to 1987, Salvanes (1996) for Norway for the sample period 1977 to 1986, Konings (1995) for the UK for the sample period 1973 to 1987, Borland (1996) for Australia for the sample period 1978 to 1992, and Albæk and Sørensen (1995) for Denmark for the sample period 1981 to 1991.

7. However, the US and Canadian aggregate job flows provided here have been adjusted by Baldwin *et al.* (1994) to be comparable to each other.

$$g_{et} = \frac{n_{et} - n_{et-1}}{x_t} \quad (2)$$

This measure is symmetric about zero and lies in the closed interval [–2,2]. The left endpoint corresponds to the growth rate of a plant that dies, while the right endpoint corresponds to a plant birth. The growth rate above is monotonically related to the conventional growth rate in that these two measures are approximately equal for values near zero.

To obtain the aggregate job creation and job destruction rates the growth rate of each plant was computed, categorised as either positive or negative,[8] size-weighted and then summed within this category:[9]

$$POS_t = \sum_{e \in E_t} \left(\frac{x_{et}}{X_t} \right) g_{et}, \text{ For } g_{et} > 0 \quad (3)$$

$$NEG_t = \sum_{e \in E_t} \left(\frac{x_{et}}{X_t} \right) |g_{et}|, \text{ For } g_{et} < 0 \quad (4)$$

where E_{it} can be defined to be the whole manufacturing sector at time t or a chosen subset of plants in the manufacturing sector, X_t is the (average) size of the whole manufacturing sector over the period t–1 to t, and POS_t and NEG_t are the job creation and job destruction rate, respectively. This leads to three further identities:

$$NET_t = POS_t - NEG_t \quad (5)$$

$$SUM_t = POS_t + NEG_t \quad (6)$$

$$RES_t = SUM_t - |NET| \quad (7)$$

where NET_t is the net employment growth rate of the manufacturing sector, SUM_t, commonly termed the job reallocation rate, is a measure of total job turnover and RES_t is the rate of job reallocation beyond that necessary to accommodate net changes in the manufacturing sector between t–1 and t.

The computed aggregate job flow rates in the Irish manufacturing sector are reported in Table 1[10] and graphed in Figure 1. The magnitude of

8. Plants experiencing zero growth over a time interval do not add to the aggregate job flows.

9. Alternatively, the number of jobs created (destroyed) could have been summed and then divided by the average size of the sector in question in order to obtain the aggregate job creation (destruction) rate.

10. All tables are located in Appendix B.

simultaneous job creation and job destruction over the entire period is striking. Table 1 reveals that, on average the job creation rate was 8.4 per cent and the job destruction rate was 8.9 per cent over the period 1974 to 1994. These results imply an average job life of 11.2 years.[11] Further investigation reveals that, on average, the job turnover can be attributed to employment adjustments by more than 60 per cent of the plant population at each point in time. This fact, in conjunction with the simultaneity of job creation and job destruction, suggests considerable heterogeneous plant behaviour at any one point in time.

Overall, the aggregate job flows induced an average net negative growth of 0.5 per cent. Over our sample period this translates into a net cumulative loss of 10 per cent, i.e., 22,112 jobs, of employment in the manufacturing sector. It is apparent from Figure 1 that the job destruction rate rises while the job creation rate falls in periods of net negative employment growth. Similarly, job destruction drops while job creation rises in times of positive net employment growth. Assuming that net employment growth is an indicator of the business cycle, we can conclude that job destruction moves counter-cyclically while job creation is pro-cyclical. This is confirmed by the correlation coefficients of the job creation rate and job destruction rate with the net growth rate, given in the last row of Table 1.[12] A comparison of the coefficients shows that job destruction is more cyclically responsive than job creation. Moreover, according to Figure 1 job destruction exhibits greater volatility than job creation; this is verified by their variances reported in Table 1. Given this asymmetry in time series volatility, the correlation between the job turnover and the net growth rate is negative.[13] In other words, in a recession there is more total and, as the correlation of RES_t with the net growth rate in Table 1 reveals, more excess job turnover.

For the sake of documenting the international experience, we depict in Table 2 the Irish job creation and job destruction rates alongside those of the manufacturing sectors of Norway (N), Denmark (D), UK, US and Canada (C). One might expect large international discrepancies in results on aggregate

11. Assuming stationarity and a stable distribution of job creation and destruction the average job life is just the inverse of the job destruction rate.

12. All correlations (Pearson) in this paper are with respect to the aggregate net growth rate. Given the small number of obsevations over time available from the Irish data set and, especially, from the data sets of the other countries addressed in this paper, we do not employ tests for statistical significance for any of the correlations calculated.

13. Using the definition of the Pearson correlation coefficient and (4) and (5), the numerator of the correlation coefficient reduces to :

$$p(SUM,NET) = \frac{COV(SUM,NET)}{\sqrt{VAR(SUM)VAR(NET)}} = \frac{VAR(POS) - VAR(NEG)}{\sqrt{VAR(SUM)VAR(NET)}}$$

job flows not only due to data set differences but also because the industrial structures, institutions and industrial policy are likely to differ widely across countries. However, as documented in Tables 2 and 3, the existence and large magnitude of simultaneous job creation and job destruction over the entire business cycle and the asymmetric cyclical reaction of job creation and job destruction are common features of the manufacturing sectors for each of the countries in question.[14, 15] Moreover, excess job reallocation, a measure of the severity of the simultaneity of job creation and destruction, is substantial in all countries. One should note, however, that job reallocation is not uniformly counter-cyclical across countries.

Employment adjustment by plants could constitute responses to temporary aggregate, sectoral or idiosyncratic shocks or could be adjustments of a permanent nature indicating structural changes. To investigate whether the observed large job turnover constitutes temporary or permanent employment adjustments by plants we calculate the persistence of jobs created and jobs destroyed in Table 4. For each year t $FPOS_t$ is the fraction of jobs created at t that still persist at t+1 and $FPOS2_t$ is the fraction of jobs created at t that still persist at t+2. $CFPOS2_t$ measures the fraction of jobs created that persist at t+2 conditional upon surviving the first year. Similarly, $FNEG_t$ is the fraction of jobs destroyed in year t that remain destroyed at t+1, $FNEG2_t$ is the fraction of jobs destroyed in year t that remain destroyed at t+2, and $CFNEG2_t$ the fraction of jobs remaining destroyed after two years conditional on having done so after one.[16] We find that in aggregate the average persistence of jobs created after one and two years is less than the equivalent persistence measures of jobs destroyed. After one year on average 65 per cent of those jobs created persist and slightly over half remain after two years. The probability of a job created surviving two years conditional on having survived the first is thus on average 81 per cent. On the other hand, more than three-quarters of the jobs that were destroyed remain so after one year and the persistence rate only falls another 5 per cent a year thereafter. This results in a high average conditional destruction probability of 93 per cent. Thus job creation appears to be a more temporary phenomenon. Results obtained for other countries are displayed in Table 5. For the US and the UK,

14. The fact that the UK job flows are somewhat lower is likely to be due to the fact that the data set employed did not include births and deaths and was plagued by an oversampling of large plants.

15. In a study of aggregate job flows in the developing countries of Chile, Columbia and Morocco, Roberts (1995) found that for these countries job creation showed greater fluctuations than job destruction.

16. It must be kept in mind that these indicators of job flow persistence will involve some degree of error because our data does not allow us to distinguish between the type only the number of jobs at each plant over time.

as in Ireland, the one and two year persistence rates are greater for job destruction than job creation. In terms of job creation there is little difference in magnitude of the persistence rates except for the two year persistence rate of the UK. In contrast there appears to be greater divergence in the case of job destruction. Overall, however, there are remarkable similarities in magnitude across countries in terms of job flow persistence.

Our results on job flow persistence indicate that job creation and destruction constitute more permanent than temporary employment adjustments. From Table 1 we know that these positive and negative adjustments occur extensively and simultaneously. Of course, the simultaneity of job creation and destruction could be due to the fact that some sectors contain only expanding or entering plants and other sectors only exiting or contracting plants, i.e., where the magnitude of the aggregate job flows is solely due to inter-sectoral employment shifts. In other words, there may have been a change of the sectoral composition of the Irish manufacturing sector over our sample period. The job turnover could, however, also be due to simultaneous job creation and job destruction within sectors, i.e., intra-industry job turnover. We use the following decomposition of total job turnover, SUM_t, due to Dunne *et al.* (1989), to examine this issue:

$$SUM_t = |NET_t| + \left[\sum_i |NET_{it}| - |NET_t|\right] + \sum_i \left[SUM_{it} - |NET_{it}|\right] \qquad (8)$$

where the first term is the job turnover due to net aggregate employment changes in manufacturing, the second term constitutes job turnover due to employment shifts across the i sub-sectors not reflected in aggregate net employment changes, and the final term measures the intra-industry job turnover in excess of inter-sectoral employment shifts. The average, minimum and maximum as percentages of total job turnover of the three terms in (8) are depicted in Table 6 for the standard 2 to 3 digit NACE sector (10 sectors) and a 4 to 5 digit NACE sector (208 sectors) classification. Accordingly, and as was already implied by the large magnitude of RES_t over our entire sample period, net aggregate employment changes can only account for a small proportion of total job turnover.[17] While inter-sectoral shifts in excess of net aggregate changes account for a greater proportion than net aggregate employment changes, excess intra-sectoral job turnover account at any point in time for at least half of total job turnover. Even if we use the maximum of sectoral disaggregation as allowed by our data set classification i.e., 208, 4 to 5 digit NACE sectors, intra-sectoral job turnover

17. RES_t is of course just the sum of the second and third term of Equation (8) divided by total manufacturing size.

accounts on average for over half of total job turnover.[18] Thus, even at a very disaggregated sectoral level, there is considerable plant heterogeneity within sectors. Correlations displayed in the last row of Table 6 show that the proportion due to inter-sectoral employment shifts increases while that due to intra-sectoral employment changes falls during recessions. Thus, in bad times the reshuffling of employment opportunities across industries gains importance relative to that within industries.

IV THE ROLE OF PLANT TURNOVER

The large excess job turnover, both across and within industries, taking place in the Irish manufacturing sector over our sample period imply considerable ongoing structural changes. Moreover, the degree of persistence of these job flows even two years after their occurrence suggests a substantial degree of permanence. An important element of Irish industrial policy has been the strong encouragement of indigenous firm start-up and foreign direct investment over our sample period. Thus we now turn to investigate the role of plant births and plant deaths, of both unsuccessful entrants and inefficient incumbent plants, in the job churning observed in aggregate.

We define the plant population size in the Irish manufacturing sector as:

$$a_{Et} = \frac{p_{Et} + P_{Et-1}}{2} \tag{9}$$

where p_{Et} is the number of plants in establishment category E at time t and a_{Et} is the average number of plants in establishment category E over the time period t–1 to t. Plant turnover may then be defined as follows:

$$pto_{Et} = \frac{b_{Et} + d_{Et}}{a_{Et}} \tag{10}$$

where b_{Et} and d_{Et} are the number of births and deaths, respectively, and pto_{Et} is the plant turnover rate in establishment group E over the time period t–1 to t. The birth rate can be found by eliminating d_{Et} in the numerator and, similarly, the death rate is derived by eliminating b_{Et} from the numerator.

We depict the plant turnover, birth, and death rates in Figure 2.[19] Accordingly, the plant turnover rate increased until the late 1980s but since then has been on a trend of decline. The birth rate increased over the 1970s;

18. Dominance of intra-sectoral turnover in total job turnover was found for instance for the UK by Konings (1995), for Norway by Salvanes (1996), and for Australia by Borland (1996).

19. It is likely that the spike in the death rate in 1990 and the fall of the birth and death rates in 1994 is in part attributable to the structural breaks in the data set mentioned in Section II.

however, it has been on a slight but steady decline thereafter. On a rise until the late 1980s, the death rate now shows no clear trend. The graph reveals that the number of plants consistently increased until the 1990s, but is now falling, as the death rate generally dominates the birth rate. The summary statistics given in Table 7 reveal that plant turnover has been substantial, on average 12.4 per cent. Similarly, the death rate was on average 5.3 per cent, while 7.0 per cent of the plant population was on average "new". The correlations with respect to the net growth rate given in the last row of Table 7 show that both the death and birth rate, and consequently the plant turnover rate, are counter-cyclical; the death rate being slightly more so than the birth rate.[20] Thus, both birth and death occurrence increases, and may be a sign of greater structural change, during bad times.

To investigate the sectoral composition of the large plant turnover in aggregate we define the net growth rate of plant population as:

$$pnet_t = \frac{b_t - d_t}{a_t} \tag{11}$$

and adopt (8) to decompose total plant turnover via:

$$pto_t = |pnet_t| + \left[\sum_i |pnet_{it}| - |pnet_t|\right] + \sum_i \left[pto_{it} - |pnet_{it}|\right] \tag{12}$$

where the first term is the plant turnover due to aggregate net changes in the plant population, the second term is the part of plant turnover that is due to a shift of plant population between i industries in excess of the net aggregate changes, and the final term is the intra-industry plant turnover; summary measures of these are provided in Table 8. Accordingly, aggregate net changes in plant population account on average for nearly 21 per cent of total plant turnover. Under the broader sectoral classification scenario inter industry shifts in plant population can only account for a small proportion of plant turnover. In contrast, the average shifting of plants across industries is greater than net aggregate changes in plant population using the more disaggregated definition of sectors. The most important determinant of total plant turnover is that which takes place within industries; it constitutes on average over half of plant turnover regardless of what sectoral classification is employed. The cyclical properties of the three components reveal that, in contrast to job turnover, during bad times intra-industry plant turnover rises, while the shifting of plant population across industries is virtually independent of the business cycle.

20. In contrast, births are positively correlated in Denmark, see Albæk and Sørensen (1995) for details.

Figure 2 and Table 7 clearly indicate the importance of plant turnover as a determinant of plant population in Irish manufacturing. In order to assess the role of this plant turnover in the aggregate job flows we decompose the aggregate job creation rate into the parts due to expanding continuing plants (EXP) and entering plants (EN), and the job destruction rate into the parts due to contracting continuing plants (CON) and exiting plants (EX) and depict these in Table 9. Accordingly, the proportion due to plant births (EN(%)) is on average 24.2 per cent of total job creation. In contrast, in Norway plant entry constituted on average 10.8 per cent of job creation, however this difference is likely to be at least in part due to the fact that our measure includes plant take-overs. Table 9 also reveals that plant exit plays a greater role in job destruction than plant entry in job creation, averaging over a third of total job destruction in manufacturing. Overall, plant turnover causes on average 24.8 per cent, however, has on occasion been the source of over 37 per cent, of total job turnover in the Irish manufacturing sector.

The cyclical properties given in Table 9 show that job creation and destruction due to incumbent plants are substantially more cyclically sensitive than job creation due to entering and job destruction due to exiting plants. As expected, job creation due to expanding plants is pro-cyclical and job destruction due to contracting plants is counter-cyclical. Job turnover due to plant exits is characterised by greater cyclical sensitivity, –0.66, than that due to plant entry, 0.30, while there is virtually no distinction between the response of expanding and contracting incumbents to the aggregate business cycle as indicated by the net employment growth rate. Thus the cyclical asymmetry between job creation and job destruction holds even when we decompose the job flows into those due to incumbents and those due to plant turnover. The fact that job creation due to plant entry is pro-cyclical while the birth rate increases during a recession suggests that even though the number of births increases in bad times, their average size decreases substantially. Examining job turnover, on the other hand, we find that the proportion due to plant turnover shows a greater response to aggregate net employment movements than employment adjustments by incumbent plants. Both of these are, as is the aggregate job turnover rate, found to be counter-cyclical.

Our results confirm that plant turnover contributes significantly to job turnover. The cyclical and volatility properties of the job flows due to incumbent plants and plant turnover are in line with those of the aggregate job flows and thus suggest that the cyclical asymmetry between job creation and job destruction and the lumping of job reallocation in recessionary periods holds regardless of whether we restrict our sample to continuing or exiting and entering plants.

V CONCLUSION

In this paper we have documented the characteristics of the aggregate job flows and thus provide a first insight into the employment dynamics of Irish manufacturing. Our findings show that in terms of labour demand the Irish manufacturing sector is not a static structure perturbed by aggregate shocks. Rather it is characterised by large amounts of simultaneous job creation and job destruction within even very disaggregated sectors due to incumbent plants and plant turnover, resulting in continuous structural changes of considerable persistence. Our results thus provide evidence for the prevalence of heterogeneous plant behaviour, a feature that traditional representative firm models found in standard textbooks fail to explain.

Finally, it must be noted that the results presented here are for the most part based on aggregate flows. As such they are constructed without regard to plant size, sector of location, or indigenous/foreign ownership type.[21] Further disaggregation of the aggregate job flows by these features will inevitably provide a more intricate understanding of the employment dynamics of Irish manufacturing. This will be a direction of future research.

APPENDIX A

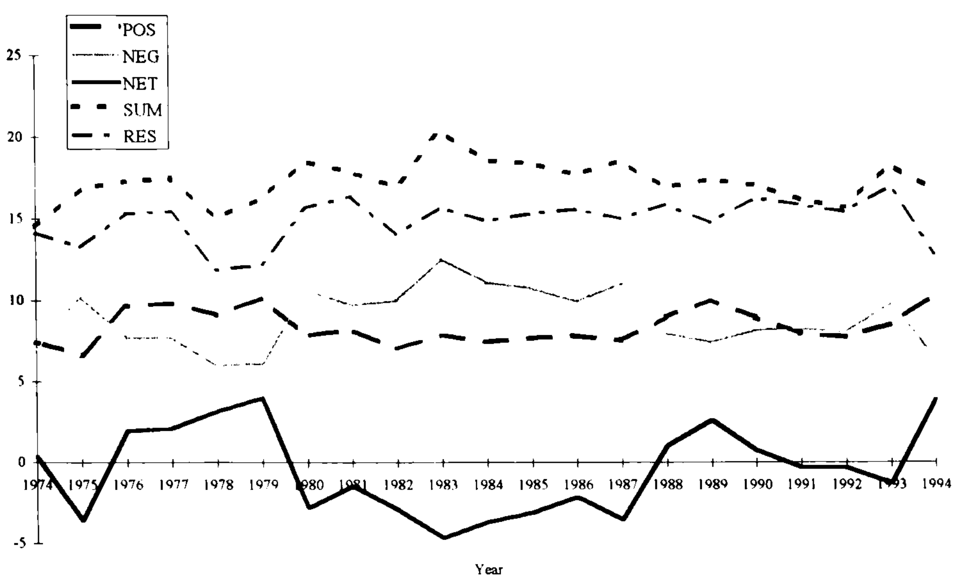

Figure 1: *Job Flow Rates in Irish Manufacturing 1974 to 1994*

21. For some preliminary results on job flows by plant size and by indigenous and foreign ownership disaggregation see Strobl *et al.* (1996) and Strobl (1996).

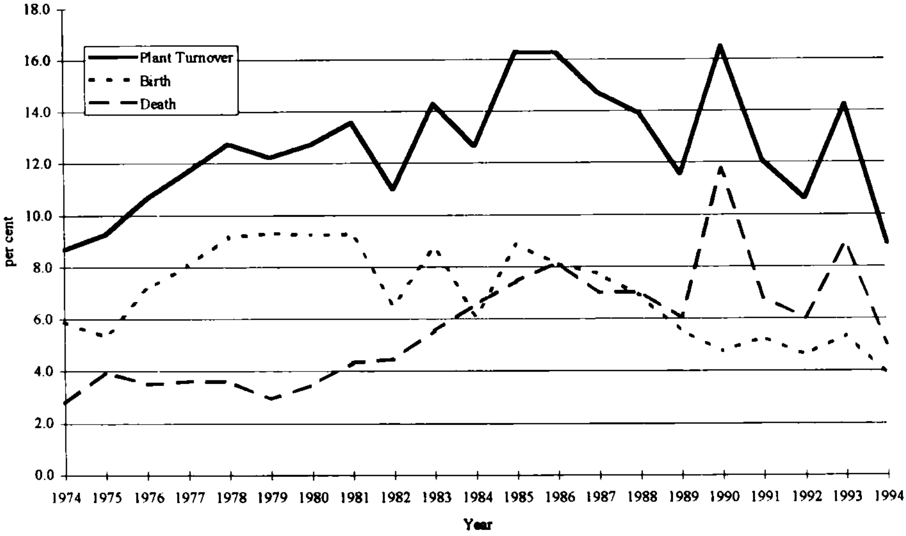

Figure 2: *Plant Turnover, Birth and Death Rates*

APPENDIX B

Table 1: *Aggregate Job Flow Rates*

Year	*POS*	*NEG*	*NET*	*SUM*	*RES*
1974	7.5	7.1	**0.4**	14.5	14.2
1975	6.6	10.2	**–3.6**	16.8	13.3
1976	9.6	7.7	**2.0**	17.3	15.3
1977	9.8	7.7	**2.1**	17.5	15.4
1978	9.1	5.9	**3.2**	15.0	11.9
1979	10.1	6.1	**4.0**	16.2	12.2
1980	7.8	10.7	**–2.8**	18.5	15.7
1981	8.2	9.7	**–1.5**	17.9	16.4
1982	7.0	10.0	**–2.9**	17.0	14.1
1983	7.9	12.5	**–4.7**	20.4	15.7
1984	7.4	11.1	**–3.7**	18.6	14.9
1985	7.7	10.7	**–3.1**	18.4	15.4
1986	7.8	9.9	**–2.1**	17.7	15.6
1987	7.5	11.0	**–3.5**	**18.5**	15.0
1988	9.0	7.9	**1.0**	**16.9**	15.9
1989	10.0	7.4	**2.6**	**17.4**	14.8
1990	8.9	8.2	**0.8**	17.1	16.3
1991	7.9	8.3	**–0.3**	16.2	15.9
1992	7.7	8.0	–0.3	15.7	15.4

Table 1 (continued): *Aggregate Job Flow Rates*

Year	*POS*	*NEG*	*NET*	*SUM*	*RES*
1993	8.5	9.8	–1.3	18.3	17.0
1994	10.3	6.4	3.9	16.8	12.9
AVE	*8.4*	***8.9***	*–0.5*	*17.3*	***14.9***
VAR	*1.2*	***3.6***	*7.8*	*1.9*	*1.9*
CORR	*0.87*	*–0.96*	—	*–0.61*	*–0.46*

Table 2: *International Comparison of Aggregate Job Flow Rates*

	POS						*NEG*					
Year	*IE*	*N*	*D*	*UK*	*US*	*C*	*IE*	*N*	*D*	*UK*	*US*	*C*
1974	7.5	*	*	3.1	11.9	11.1	7.1	*	*	1.5	6.1	6.6
1975	6.6	*	*	2.6	9.0	9.7	10.2	*	*	1.0	9.3	7.7
1976	9.6	*	*	1.0	6.2	9.4	7.7	*	*	4.4	16.5	11.9
1977	9.8	7.5	*	1.3	11.2	9.4	7.7	6.8	*	3.5	9.4	9.3
1978	9.1	7.6	*	2.5	11.0	7.8	5.9	8.9	*	2.6	8.6	10.1
1979	10.1	7.2	*	2.1	10.9	13.3	6.1	8.5	*	2.6	7.3	8.3
1980	7.8	6.8	*	2.2	10.3	12.1	10.7	7.0	*	3.0	7.0	8.5
1981	8.2	6.6	11.6	0.9	8.0	9.8	9.7	8.1	13.4	7.8	9.1	10.1
1982	7.0	5.2	11.4	0.9	6.3	9.8	10.0	8.1	10.8	12.1	11.4	9.6
1983	7.9	6.2	11.6	0.7	6.8	7.6	12.5	12.6	11.4	11.3	14.5	15.4
1984	7.4	7.5	15.4	0.4	8.4	10.7	11.1	8.5	8.8	7.3	15.5	12.9
1985	7.7	8.6	14.5	1.1	13.3	12.4	10.7	7.9	9.2	6.0	7.6	9.3
1986	7.8	9.6	12.0	1.1	7.9	12.0	9.9	8.6	11.2	8.6	11.1	9.4
1987	7.5	7.5	10.5	2.1	7.9	12.9	11.0	7.9	12.7	6.0	12.1	10.5
1988	9.0	7.8	10.9	*	*	*	7.9	13.8	12.6	*	*	*
1989	10.0	6.8	11.9	*	*	*	7.4	14.4	10.8	*	*	*
1990	8.9	8.6	11.6	*	*	*	8.2	10.9	12.0	*	*	*
1991	7.9	8.1	10.4	*	*	*	8.3	10.3		*	*	*
1992	7.7	7.7	*	*	*	*	8.0	10.8	*	*	*	*
1993	8.5	*	*	*	*	*	9.8	*	*	*	*	*
1994	10.3	*	*	*	*	*	6.4	*	*	*	*	*

Table 3: *International Correlations of Aggregate Job Flow Rates*[22]

	POS	*NEG*	*SUM*
IE	0.87	–0.96	–0.61
N	0.43	–0.92	–0.67
D	0.97	–0.97	0.00
UK	0.85	–0.99	–0.95
US	0.92	–0.96	–0.54
C	0.82	–0.86	–0.24

22. Correlation with respect to the country's own net growth rate

Table 4: *Job Persistence Indicators*

	FPOS	*FPOS2*	*CFPOS2*	*FNEG*	*FNEG2*	*CFNEG2*
1974	0.53	0.44	0.83	0.74	0.69	0.93
1975	0.73	0.61	0.84	0.60	0.53	0.88
1976	0.66	0.57	0.87	0.67	0.61	0.92
1977	0.72	0.63	0.87	0.66	0.60	0.92
1978	0.71	0.50	0.71	0.71	0.68	0.96
1979	0.60	0.49	0.81	0.80	0.75	0.93
1980	0.62	0.50	0.80	0.70	0.66	0.94
1981	0.62	0.49	0.78	0.81	0.77	0.95
1982	0.64	0.52	0.81	0.80	0.74	0.93
1983	0.64	0.54	0.85	0.83	0.78	0.95
1984	0.63	0.50	0.80	0.85	0.80	0.94
1985	0.62	0.47	0.76	0.78	0.75	0.96
1986	0.59	0.47	0.80	0.82	0.76	0.94
1987	0.72	0.63	0.88	0.81	0.70	0.87
1988	0.70	0.58	0.84	0.79	0.72	0.91
1989	0.70	0.54	0.78	0.73	0.67	0.92
1990	0.64	0.50	0.78	0.83	0.79	0.96
1991	0.61	0.44	0.73	0.80	0.75	0.94
1992	0.63	0.54	0.85	0.76	0.68	0.89
1993	0.72	*	*	0.66	*	*
Ave.	0.65	0.53	0.81	0.75	0.70	0.92

Table 5: *International Comparison of Job Persistence Indicators*

	FPOS	*FPOS2*	*FNEG*	*FNEG2*
IE	0.65	0.53	0.76	0.71
UK	0.62	0.31	0.81	0.61
US	0.67	0.50	0.81	0.73
N[23]	0.68	0.58	0.66	0.63
DK	0.71	0.58	0.71	0.58

Table 6: *Sectoral Decomposition of Job Reallocation (%)*

		2 to 3 digit NACE Sectors			*4 to 5 digit NACE Sectors*	
	Agg	*Inter*	*Intra*	*Agg*	*Inter*	*Intra*
Average	11.6	17.7	70.8	11.6	31.6	56.8
Maxi	24.8	33.3	85.5	24.8	42.6	69.3
Min	1.8	0.5	50.9	1.8	13.7	41.7
Correl	0.25	–0.93	0.72	0.25	–0.93	0.80

23. Results are taken from Salvanes (1996) for the sample period 1977-82.

Table 7: *Plant Turnover, Birth and Death Rates*

	Firm Turnover	*Birth*	*Death*
Average	12.4	7.0	5.3
Correlation	–0.41	–0.12	–0.37

Table 8: *Sectoral Decomposition of Plant Turnover (%)*

		2 to 3 digit NACE Sectors[24]			*4 to 5 digit NACE Sectors*	
	Agg	*Inter*	*Intra*	*Agg*	*Inter*	*Intra*
Average	20.9	7.4	**71.7**	**20.9**	24.4	54.7
Max	52.7	22.3	**89.1**	**52.7**	58.0	67.8
Min	0.2	0.0	**47.3**	**0.2**	4.3	40.6
Correl	0.27	0.07	–0.43	0.27	0.03	–0.68

Table 9: *Decomposition of Aggregate Job Flow Rates by Plant Turnover (PT) and Continuing Plants (CP)*

Year	*EXP*	*CON*	*EN*	*EN (%)*	*EX*	*EX(%)*	*SUM-CP*	*SUM-PT*	*SUM-PT(%)*
1974	5.7	5.4	1.7	23.4	1.7	23.5	11.1	3.4	23.4
1975	5.0	8.5	1.7	24.9	1.7	16.7	13.5	3.3	19.9
1976	7.0	5.6	2.6	27.4	2.0	26.5	12.6	4.7	27.0
1977	7.1	4.9	2.7	27.4	2.8	36.7	12.0	5.5	31.5
1978	6.9	3.4	2.2	24.0	2.5	42.3	10.4	4.7	31.2
1979	7.6	4.3	2.5	24.7	1.8	30.0	11.9	4.3	26.7
1980	5.6	7.9	2.2	28.5	2.7	25.5	13.5	5.0	26.8
1981	6.2	6.1	2.0	24.5	3.6	36.8	12.3	5.6	31.2
1982	5.3	7.2	1.7	24.3	2.7	27.5	12.5	4.4	26.1
1983	5.9	8.1	1.9	24.8	4.5	35.7	14.0	6.4	31.5
1984	5.4	6.4	2.0	27.0	4.7	42.2	11.9	6.7	36.1
1985	5.5	6.0	2.2	28.5	4.7	44.1	11.5	6.9	37.6
1986	5.8	6.1	2.0	25.0	3.8	38.4	12.0	5.8	32.5
1987	5.6	6.9	1.9	25.0	4.2	37.7	12.5	6.0	32.6
1988	7.1	4.9	1.9	20.8	3.0	37.9	12.0	4.9	28.9
1989	8.0	4.7	2.0	20.0	2.7	36.2	12.7	4.7	26.9
1990	7.4	4.4	1.5	17.2	3.7	45.5	11.8	5.2	30.7
1991	6.2	5.6	1.7	21.9	2.6	31.9	11.8	4.4	27.0
1992	5.9	5.6	1.9	24.0	2.5	30.7	11.4	4.3	27.4
1993	6.5	7.2	2.0	23.2	2.6	26.9	13.7	4.6	25.2
1994	8.8	5.0	1.5	14.8	1.4	22.2	13.8	3.0	17.6
AVE	6.4	6.0	2.0	24.2	2.9	32.5	12.4	4.9	24.8
Correl	0.87	–0.86	0.30	–0.48	–0.66	–0.09	–0.29	–0.51	–0.36

24. The sectoral classification is the same as that in Table 6.

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