

*The Economic and Social Review, Vol. 39, No. 3, Winter, 2008, pp. 235–256*

## Job Turnover in Irish Manufacturing 1972–2006

MARTINA LAWLESS AND ALAN P. MURPHY\*

*Central Bank and Financial Services Authority of Ireland*

---

*Abstract:* With the recent slowdown in global economic growth, there has been considerable focus in Ireland on some high-profile job losses, particularly in the manufacturing sector. This paper places such developments into a broader context and shows that aggregate changes in the net number of jobs arise from large numbers of firms both increasing and decreasing employment simultaneously at all points in time. Even at the height of the Celtic Tiger boom when employment grew by 8 per cent, this was the result of 15 per cent growth in jobs by expanding firms offset by 7 per cent of positions being eliminated in contracting firms.

One important feature of job flows is that they may contribute to productivity growth by allowing movements from low to high productivity firms. To a degree, this reflects the re-allocation of jobs from declining sectors to expanding sectors, but this is not a comprehensive explanation. A significant factor underlying job flows is the reallocation within sectors from under-performing firms to expanding firms. This study also shows that productivity growth is, on balance, positive for employment growth. On the other hand, these calculations also show how hard it is for policymakers to identify firms that will be employment and productivity growth winners.

### I INTRODUCTION

Net changes in employment are the result of many individual firm-level decisions to expand or contract in response to a wide variety of changes in the market environment. These include the emergence and spread of new

\* The authors would like to thank Forfás, and in particular Deborah Quinn, for providing the anonymised survey data. We would also like to thank Maurice McGuire, Karl Whelan and two anonymous referees for useful comments and suggestions. The views expressed in this paper are the personal responsibility of the authors and are not necessarily held by the CBFSAI or the ESCB. E-mail: [Martina.Lawless@centralbank.ie](mailto:Martina.Lawless@centralbank.ie) or [Alan.Murphy@centralbank.ie](mailto:Alan.Murphy@centralbank.ie)

products and technologies, marketing campaigns by the individual firm, learning by doing by both managers and workers, the costs of hiring, training and firing workers, and other changes. As a consequence, figures on aggregate changes in employment conceal a significant amount of turnover as jobs are created and destroyed, with many of these additions and subtractions of jobs cancelling one another out in the statistics for total employment growth.

To give an illustration of how job flows may give a deeper perspective on what is happening in the labour market, consider a net employment growth rate of 4 per cent. This aggregate figure could be arrived at from a job creation rate of 12 per cent and job destruction rate of 8 per cent, giving gross reallocation of 20 per cent. Alternatively, the same net employment change could result from job creation of 5 per cent and job destruction of 1 per cent, giving a gross reallocation figure of 6 per cent. The first example indicates a much more dynamic labour market than the second, a fact which could be overlooked if only net employment growth is considered.

In some respects the first part of this paper updates Barry *et al.* (1998) by adding an additional 12 years of data, a period which covers the Celtic Tiger era, the 2001 “dot-com” collapse and the start of current economic slowdown. It provides a comprehensive picture of job flows in the Irish economy using a detailed firm-level data set. This data set allows us to follow individual firms over time, and to decompose aggregate job changes into that part due to some firms adding jobs and another part due to some firms shedding jobs. The second part of this paper makes two further contributions to the study of job flows in Ireland. The first issue we test is whether it is possible to spot patterns in the data that can help to differentiate between those firms that will have a tendency to grow and create jobs from those that will be liable to contract. In addition a further analysis is conducted on how job gains and losses are linked with changes in the pattern of firm level labour productivity.

The main finding from this detailed data set is that underlying the aggregate figures for changes in the number of jobs, there are very large numbers of firms both increasing and decreasing employment. These increases and decreases in employment at individual firms occur simultaneously at all points in time. For example, even at the height of the Celtic Tiger boom when employment in our sample of firms was growing by 8 per cent, the decomposition of data shows that this was the result of 15 per cent growth in jobs by expanding firms offset by 7 per cent of positions being eliminated in contracting firms. The calculations also show how difficult it is for policymakers to select those firms that are most likely to be successful in increasing job growth. In the final part of this analysis our data shows that the relationship between employment and productivity is a complex one.

That jobs are being created and destroyed at the same time, even in years of very high growth, partly reflects the re-allocation of employment from contracting sectors such as textiles to expanding sectors such as financial services. This is not a complete explanation, however, as even within any individual sector we also observe jobs being created and destroyed at all points in time. Therefore, a substantial factor underlying job flows is the reallocation within sectors from under-performing firms to expanding firms.

The contents of the paper are as follows: Section II discusses the source and coverage of the data. Section III presents calculations of job creation and destruction rates for the whole economy and compares the Irish experience to that of other countries. Section IV discusses sectoral reallocation as an explanation for the observation of simultaneous job creation and destruction. Section V looks at the paths of expanding and contracting firms, presenting estimates of how long-lived newly created jobs are and how likely destroyed jobs are to be reinstated, while Section VI looks at some of the links between employment growth and labour productivity. Section VII concludes.

## II DATA

Forfás are the providers of the two data sets used in this paper. The primary results on job gains and losses, presented in Sections III to V, are calculated using the Forfás Employment Survey. This survey tracks employment levels and has been carried out on an annual basis since 1972, covering agency-supported firms engaged in manufacturing and internationally traded services. Each establishment is allocated a unique identifying number that allows researchers to follow individual units over time while preserving the anonymity of the data. The information contained in the survey is limited to numbers of permanent full-time employees, along with some descriptive information on the sector the firm operates in, ownership and location. The primary benefit of this data source is that it has been carried out on a consistent basis for a considerable period of time, allowing us to track the evolution of employment at the establishment level for 34 years.

Section VI makes use of a second Forfás data set, called the Annual Business Survey of Economic Impact (ABSEI). This also surveys firms (at establishment level) that are engaged in manufacturing and internationally traded services. Compared to the Employment Survey, ABSEI has a shorter time dimension having been carried out on an annual basis since 1983 – the ABSEI is only around in its current form since 2000, before that it

was called the Annual Survey of Irish Economy Expenditures, and is currently available to the end of 2005. One shortcoming of the survey is that it is biased towards larger firms, as it only covers firms with 20 or more employees. The main advantage of ABSEI is that it contains a more comprehensive set of firm characteristics (including information on employment, value added, wages and material costs) allowing one to examine the relationship between employment growth, labour productivity and other firm characteristics.

Using data on manufacturing firms from the Central Statistics Office that covered the same period as this study, shows that the firms in the Employment Survey accounted on average for 73 per cent of manufacturing jobs in Ireland. Given the nature of activity in international traded services sectors it is more problematic to relate job coverage to the general services sector in Ireland. However, taking the Central Statistics Office broader category of "Financial and Other Business Services", on average our data accounts for 26 per cent of these jobs.

Looking at the manufacturing sector data series for the entire period of the sample the correlation co-efficient is 67 per cent, which is broadly similar to total employment. When the sample is split the correlation co-efficient for the first two decades of the sample is somewhat lower, while from the mid-1990s this correlation raises to approximately 90 per cent. As expected given the differences in definition, the correlations between aggregate data for "Financial and Other Business Services" and the number of jobs in our data for international traded services is lower.

### III EMPLOYMENT FLOWS

The examination of data on gross job flows can be used to obtain additional information on employment dynamics, and give a better indication of the amount of structural change the economy is undergoing, which cannot be determined from aggregate employment and unemployment figures. The same net employment change may reflect very different rates of creation and destruction thereby masking an important element of the flexibility or volatility of the labour market (Konings, 1995). In addition higher simultaneous creation and destruction may imply higher adjustment costs for the economy despite resulting in the same net employment change.

The job flow measures we use are defined following Davis and Haltiwanger, (1999):

(Gross) job creation at time  $t$  is the employment gain summed over all business units that expand or set-up between  $t - 1$  and  $t$ .

(Gross) job destruction at time  $t$  is the employment loss summed over all business units that contract or shut down between  $t - 1$  and  $t$ .

Net employment change is job creation minus job destruction.

(Gross) job turnover (or reallocation) is the sum of job creation and destruction.

Comparisons of job flows can be made more convenient by converting these measures into rates. In order to do this, the job flows literature uses a variant on the ordinary growth rate by defining the growth rate of the firm (or sector etc.) as the change in employment between  $t - 1$  and  $t$  divided by the average of employment in  $t - 1$  and  $t$  (unlike the more traditional definition of a growth rate which would divide by employment in  $t - 1$ ). The reason for this adjustment is that it gives a growth rate which is symmetric around zero and which lies within a closed interval  $[-2, 2]$ , thereby allowing an integrated analysis of entry and exit.

The job creation rate is calculated as the sum of the size-weighted positive growth rates, while the job destruction rate is the sum of the size-weighted negative growth rates. Net employment growth is given by the difference between the two rates. Adding together the job creation and destruction rates gives a rate for gross job reallocation (turnover measure). An alternative measure is to use the total turnover adjusted to remove business cycle effects by subtracting the absolute value of net employment change from the gross reallocation rate (i.e. job creation rate + job destruction rate – absolute value of net employment change).

It should be emphasised that our calculations focus on *job flows* and not on *worker flows* (for a discussion of this distinction see Burda and Wyplosz (1994) or Davis and Haltiwanger (1999)). To explain what we mean by this, consider a firm that in one year has 20 employees and in the next year reports 21 employees. Our method regards this as the creation of one job. In practice, this could have involved four individuals leaving the company and five being hired. The contrary is also true and job reallocation may be treated as a lower bound to worker reallocation as it is obviously possible for workers to change jobs or move in and out of the labour market without any actual creation or destruction of jobs taking place.

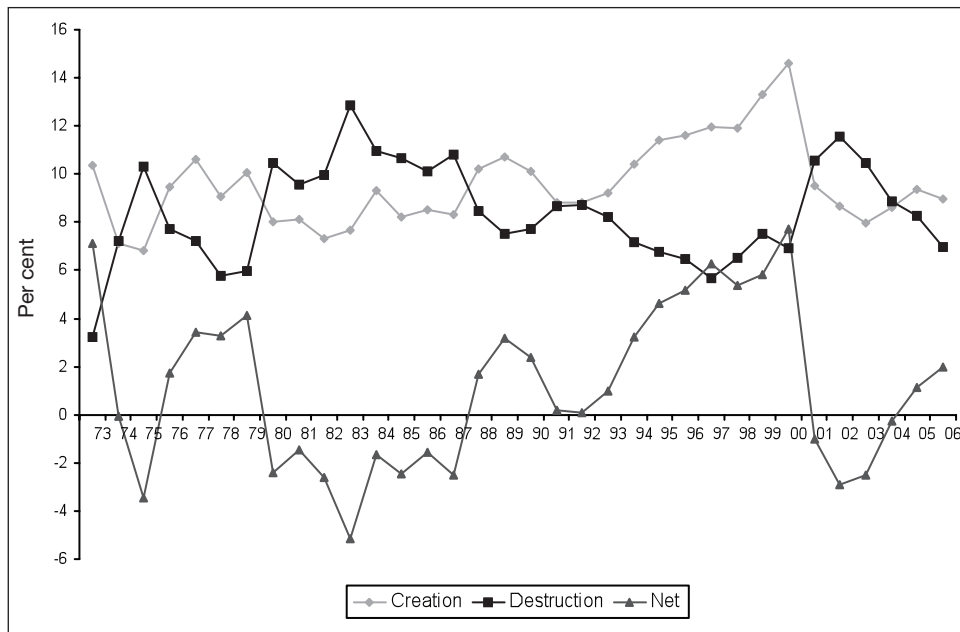
Figure 1 shows the rates of job creation, job destruction and net employment growth for the firms covered by the Forfás Employment Survey from 1973 to 2006; summary statistics over a range of business cycle episodes are provided in Table 1. Employment growth is positive whenever job creation is greater than job destruction, and aggregate employment declines when job destruction is higher than job creation.

Table 1: *Job Creation and Destruction Rates*

	<i>Creation</i>	<i>Destruction</i>	<i>Net</i>	<i>Gross Reallocation</i>	<i>Reallocation Less Net</i>
1973-78	9	7	2	16	14
1979-87	8	10	-2	19	17
1988-92	10	8	2	18	16
1993-01	12	7	4	19	15
2002-06	9	9	-1	18	17

Source: Authors' calculations from Forfás Employment Survey.

Figure 1: *Job Creation, Job Destruction and Net Employment Change 1973–2006*



The first noteworthy finding is that jobs are created and destroyed simultaneously in every year. Averaging over the entire period, we find that one in ten jobs are newly created every year and one in twelve were destroyed. The “Celtic Tiger” era of strong employment growth is reflected in our data, with net growth increasing from 1993 and peaking in 2000. Even during this period of overall expansion, where job creation reached rates of 12 to 15 per cent of total employment each year, the rate at which jobs were destroyed did not fall below 6 per cent.

In contrast, even in the economic stagnation of the early 1980s some firms expanded and job creation rates never fell below 7 per cent. Table 1 also includes figures for the total reallocation of jobs (sum of creation and destruction) and reallocation net of the business cycle (subtracting net change in employment). These show the extent of the churning of jobs in the Irish labour market, particularly in the high growth period of the late 1990s.

Comparing these results to the earlier analysis of Barry *et al.* (1998), we find a number of differences arising from the improved economic performance of the period after their data ended in 1994. They found an average job creation rate of 8.4 per cent, which increased to 11 per cent over 1994–2006. At the same time the job destruction rate fell from 8.9 to 8 per cent. Over the entire period covered in this paper, net employment grew by 1 per cent per annum – mainly due to the 3.5 per cent annual growth post-1994. In addition to these changes in job creation and destruction rates, we also observe changes in their volatility in the periods before and after 1994. The volatility of job creation (standard deviation) increased from 1.7 in 1974–1994 to 2.0 in 1994–2006, while that of job destruction decreased from 2.1 to 1.8.

To put these figures in context, they are strikingly similar to the US, where previous research by Davis and Haltiwanger (1992) found that manufacturing job creation averaged 9.2 per cent and job destruction 11.3 per cent. Gomez-Salvador *et al.* (2004) conducted an EU cross-country study based on large firms and looked at the evolution of jobs in the 1990s. They showed that net job creation averaged 1.9 per cent, arising from average job creation and destruction rates of 5.6 and 3.7 per cent, respectively. Given the type of data used, the EU figures are not directly comparable with the results reported in this paper because of their restricted focus on large firms. However, even within that study, Ireland was one of the countries that exhibited large job creation and destruction rates at 8.5 and 3.1 per cent respectively, and had the highest net job growth rate at 5.4 per cent.

#### IV SECTORAL EVIDENCE

The sectoral composition of Irish employment has changed considerably over the past three decades. To some extent, this is an explanation for the observation of jobs being both created and destroyed at the same time, as certain sectors contract and others grow. Table 2 shows how job creation and destruction rates have varied across sectors and over broad time periods.

Table 2: *Average Job Creation and Destruction Rates by Sector*

	1973-78		1979-87		1988-92		1993-01		2002-06	
	Crea- tion	Destruc- tion	Crea- tion	Destruc- tion	Crea- tion	Destruc- tion	Crea- tion	Destruc- tion	Crea- tion	Destruc- tion
Chemicals	10	6	7	8	8	4	8	3	7	6
Clothing	8	10	10	14	10	15	6	18	5	23
Drink & Tobacco	4	4	2	5	3	8	8	6	4	9
Financial Services	6	21	17	6	48	6	27	6	17	6
Food	7	5	6	9	8	9	8	7	8	8
Furniture	9	9	11	12	10	9	9	7	7	9
Intern. Traded Services	21	8	17	9	20	9	25	8	13	12
Metals & Engineering	12	8	11	11	11	7	12	7	7	9
Mining & Quarrying	7	4	10	8	14	13	15	10	14	10
Misc. Manufacturing Non-Metallic	14	11	13	11	12	11	11	11	8	10
Minerals	8	4	5	10	6	7	7	6	6	8
Paper and Printing	6	4	5	7	6	5	6	6	5	11
Plastics & Rubber	9	7	11	12	11	8	9	7	7	10
Textiles	8	11	8	13	9	9	6	12	5	20
Wood	12	9	11	13	11	11	10	6	7	6

Source: Authors' calculations from Forfás Employment Survey.

In the more traditional manufacturing sectors, such as textiles and clothing, we find the job destruction rate is consistently higher than the job creation rate as these sectors decline over time. These sectors show job destruction rates consistently higher than creation rates even during the 1993-2001 period of high overall economic growth. Other sectors, such as financial services, have experienced considerable employment growth as the rate at which jobs are created has outstripped that of job destruction. The gradual restructuring of the economy away from lower technology sectors to higher technology manufacturing and services is evident from these calculations. At the same time, jobs continued to be both simultaneously created and destroyed in all sectors, regardless of whether the overall trend in the sector was of growth or decline. Therefore, it is apparent that *within each sector* the net change in employment is made up of sizeable flows of jobs from contracting to expanding firms.

Over the period of our sample, job reallocation across sectors accounted for 56 per cent of all establishment-level job changes, while re-allocation within sectors accounted for the remaining 44 per cent. The 56 per cent figure was calculated by dividing the sum of all sectoral-level changes in employment



(both positive and negative) by the total number of establishment-level job changes (again both positive and negative). If re-allocation of jobs between sectors were the only factor underlying job flows then this calculation would produce a value of 100 per cent. The contribution of within-sector reallocation is higher than the 0.30 found on average for the UK by Konings (1995). He found that within-sector reallocation tended to be higher in times of economic growth, which would accord with our finding of an increase in within-sector reallocation in the 1990s. Table 3 presents the reallocation breakdown between and within sectors for sub-periods, showing that there has been a slight increase in the contribution of within sector reallocation over time.

Table 3: *Reallocation Between and Within Sectors (per cent)*

	<i>Between</i>	<i>Within</i>
1973-78	0.64	0.36
1979-87	0.56	0.44
1988-92	0.56	0.44
1993-01	0.51	0.49
2002-06	0.52	0.48
Average	0.56	0.44

There is a broad consensus that job destruction serves to increase aggregate productivity by removing or reducing the bottom end of the micro-level productivity distribution, [for a detailed discussion see Caballero and Hammour (1994) and Den Hann *et al.* (2000)]. This gives an indication of how job flows within an industry may contribute to productivity improvements within a sector by allowing movements of jobs away from low to high productivity firms. These potential productivity gains are in addition to the gains that are recognised for sectoral job reallocation with jobs moving from declining to expanding sectors.

Table 4 shows the percentage rates of job gains and losses, when the sample is split by nationality of ownership. Splitting the sample by ownership shows that Irish owned firms had a nearly zero net employment change, while UK owned firms had a negative net employment change over the entire sample. On the other hand, US owned firms exhibited the highest percentage gross job creation and net employment change figures. This was particularly the case in the 1988-92 and 1993-01 periods, with a slight decrease towards the mean creation rate for all firms in the 2002-06 period. A cross-country comparison by Faggio and Konings (1999) found that foreign-owned firms have higher job creation and excess reallocation rates and typically lower job destruction rates. Walsh and Whelan (2000) link plant growth and

performance with trade orientation and show how this can explain a significant proportion of the permanent job reallocation process in Ireland between 1972 and 2000.

Table 4: *Job Reallocation Rates and Ownership*

		<i>Creation</i>	<i>Destruction</i>	<i>Net</i>
Ireland	1973-78	0.08	0.07	0.01
	1979-87	0.08	0.11	-0.03
	1988-92	0.10	0.10	0.00
	1993-01	0.11	0.08	0.03
	2002-06	0.10	0.10	0.00
UK	1973-78	0.05	0.08	-0.03
	1979-87	0.05	0.09	-0.04
	1988-92	0.06	0.10	-0.04
	1993-01	0.10	0.07	0.03
	2002-06	0.06	0.12	-0.05
EU-15 (ex-UK)	1973-78	0.10	0.06	0.04
	1979-87	0.08	0.09	0.00
	1988-92	0.08	0.07	0.02
	1993-01	0.08	0.07	0.01
	2002-06	0.07	0.08	-0.02
USA	1973-78	0.16	0.06	0.10
	1979-87	0.11	0.09	0.02
	1988-92	0.11	0.05	0.06
	1993-01	0.15	0.06	0.09
	2002-06	0.08	0.08	0.00

*Source:* Authors' calculations from Forfás Employment Survey.

Over the sub-periods identified, all firms with the exception of those owned by EU-15 (excluding the UK) multinationals, show a similar business cycle effect with lower creation and higher destruction rates in the low growth years of 1979-87. The higher growth 1993-01 period shows higher creation and lower destruction rates, even for UK owned firms, which were experiencing net decline over most of the survey span.

It is important to note that this may be due to certain nationalities being concentrated in high job growth sectors, (with over half of these firms in the chemical, financial services or international traded services sectors) and is not attributable to any direct nationality effect. We examine if this is the case by regressing creation, destruction and net growth on ownership dummies (with Irish-owned as the base category) in Table 5. Even with controls for firm size, sector and year included, we find that a strong ownership nationality effect remains. In particular, US-owned firms have significantly higher job creation than Irish firms. This is also true of the "Rest of World" category, although it

Table 5: *Ownership Effects Controlling for Sector*

	<i>Creation</i>	<i>Destruction</i>	<i>Net</i>
EU-15	0.05*** (0.01)	0.03*** (0.01)	0.05*** (0.01)
Other Europe	-0.02 (0.03)	-0.01 (0.01)	-0.05 (0.04)
Rest of World	0.13*** (0.02)	0.03*** (0.01)	0.18*** (0.03)
UK	0.03** (0.01)	0.02*** (0.01)	-0.02 (0.02)
USA	0.10*** (0.01)	0.04*** (0.01)	0.13*** (0.01)
Firm Size Control	Yes	Yes	Yes
Sector Controls	Yes	Yes	Yes
Year Controls	Yes	Yes	Yes
No. Obs.	88,444	57,299	224,669
R <sup>2</sup>	0.28	0.27	0.01

*Notes:* Ownership effect relative to domestic ownership.

Standard errors in parentheses. \*\*\* denotes significance at 1 per cent, \*\* at 5 per cent.

should be noted that this is a particularly small group. There is a significant but considerably smaller difference in job creation rates between Irish firms and those owned by the UK or EU-15. There is no statistically significant difference between Irish and Other Europe firms.

## V PATTERNS OF FIRM-LEVEL EXPANSION AND CONTRACTION

In spite of underlying firm level heterogeneity, there are some systematic differences across sectors and firm characteristics that are worth noting. Our analysis has highlighted the co-existence of job expanding and contracting firms in all sectors and at all points in time, and discussed how relatively small changes in total job growth are made up of much larger inflows and outflows of jobs at the firm level.

A study by Davis *et al.* (1996) found that excess reallocation rates are declining in capital and energy intensity and are increasing in plant-level product specialisation and industry-level total factor productivity growth. This section considers whether it is possible to identify patterns that can help to distinguish those firms that will tend to grow and create jobs from those that will tend to contract. Four aspects of this question will be looked at:

- Is there a relationship between job creation and the current size of the firm?
- How important is the entry of new firms and the closing down of firms to rates of job creation and destruction respectively?
- How much volatility is there in the growth of firms? In other words, is there a tendency that today's growing firm will continue to grow in the next period?
- How permanent are a firm's decisions to create or destroy jobs, or are many of these decisions short-lived responses to market fluctuations?

Concerning the first question, the data show a negative relationship between establishment size and the rate at which it creates jobs and destroys jobs. Table 6 shows that smaller units both create and destroy jobs at higher rates than larger ones. On average, over the sample period, establishments in every size group added more jobs than they eliminated, as would be expected given the considerable economic expansion of recent years. Very small establishments (with ten employees or fewer) experience by far the greatest volatility in their employment flows, with new jobs accounting for 16 per cent of their employment on average each year and 14 per cent of jobs in this group being lost. In contrast, the largest units in the sample (employment over 500) had average job creation rates of 7 per cent and job destruction rates of 4 per cent.

The negative relationship between firm size and job creation and destruction rates remains even if sector and year controls are added. The last two columns in Table 6 show the coefficients for the size groups from regressions of creation and destruction rates on size, sector and year dummies. There is a progressively larger negative effect on both creation and destruction as firm size increases, and this is statistically significant for each size group.

These findings may reflect the fact that small firms are learning about their market and their competitiveness and are, therefore, more vulnerable to surprises than larger, more established firms. In this context, it should be pointed out that although small establishments account for a very large proportion of the total population of firms, their contribution to total employment is much smaller. Firms of fewer than 10 employees make up 54 per cent of firms but account for just 6 per cent of the total jobs in the dataset we use. On the other hand, firms with over 500 employees are relatively rare in our sample just 1 per cent of all firms are this large but they account for 18 per cent of the jobs. Looking at the number of jobs created annually the data shows that on average firms with more than 500 employees created 2,400 jobs, while firms with 10 employees or fewer created 950 jobs.

The second question relates to the contributions of entry and exit of

Table 6: Average Job Creation and Destruction Rates by Firm Size

<i>Employees</i>	<i>Creation</i>	<i>Destruction</i>	<i>Net</i>	<i>Per Cent Firms</i>	<i>Per Cent Emp.</i>	<i>Creation Coefficient*</i>	<i>Destruction Coefficient*</i>
1-10	16	14	2	54	6	–	–
11-20	14	9	5	15	7	–0.56 (0.01)	–0.24 (0.003)
21-30	12	7	5	8	6	–0.65 (0.01)	–0.29 (0.004)
31-50	11	6	5	8	9	–0.72 (0.01)	–0.32 (0.004)
51-75	11	6	5	5	8	–0.76 (0.01)	–0.33 (0.005)
76-100	10	6	4	3	7	–0.77 (0.01)	–0.34 (0.006)
101-150	9	5	4	3	10	–0.82 (0.01)	–0.36 (0.01)
151-200	9	5	4	1	7	–0.85 (0.02)	–0.36 (0.01)
201-250	9	5	4	1	5	–0.84 (0.02)	–0.37 (0.01)
251-400	8	4	3	1	11	–0.88 (0.02)	–0.38 (0.01)
401-500	7	4	3	0	5	–0.87 (0.02)	–0.39 (0.01)
500+	7	4	3	1	18	–0.92 (0.02)	–0.39 (0.01)
No. Obs.	–	–	–	–	–	88,547	57,411
R <sup>2</sup>	–	–	–	–	–	0.28	0.27

*Source:* Authors' calculations from Forfás Employment Survey.

\* Regression of creation and destruction rates respectively on firm size category dummies (1-10 as base category), sector and year. Standard errors are in parentheses; all coefficients are significant at the 1 per cent level.

establishments to overall job creation and destruction rates. These calculations are described in Table 7. In each year, establishments are separated into four groups: entrants, exitors, units increasing employment and units decreasing employment. The average job creation rate over the sample period was 9.6 per cent. This was made up of 2.2 per cent job creation by newly formed units and the remaining 7.4 per cent from existing establishments increasing their employment. The average job destruction rate of 8.4 per cent can likewise be decomposed into the contribution of exitors, who had a destruction rate of 2.7 per cent, and a job destruction rate of 5.7 per cent from continuing but declining units.

An alternative way to express this is that just one-fifth of job creation came from new establishments, whereas one-third of job destruction came from firms shutting down. The contribution of entry and exit is surprisingly high given that, on average, in any year just 8 per cent of firms are new entrants and 6 per cent have exited. Table 8 looks at how these relative contributions from entry, exit and continuing firms vary across sectors. It is interesting to note that, as with the simultaneous creation and destruction of jobs, firm entry and exit also occurs across all sectors. Even sectors with an overall decline in employment can have new entrants creating jobs at a rate of 2.7 per cent annually (Clothing). Across all sectors, existing increasing or decreasing firms are the dominant source of job creation and destruction.

Table 7: *Contributions of Entry, Exit and Continuing Firms to Net Employment, Per Cent*

	<i>Entrants</i>	<i>Exits</i>	<i>Increases</i>	<i>Decreases</i>	<i>Net</i>
1972-74	3	-1	6	-4	4
1975-77	3	-2	6	-6	1
1978-80	2	-2	7	-5	2
1981-83	2	-4	6	-7	-3
1984-86	3	-4	6	-6	-2
1987-89	2	-4	7	-5	1
1990-92	2	-3	7	-5	1
1993-95	2	-2	8	-5	3
1996-98	2	-2	10	-4	6
1999-01	2	-2	10	-6	4
2002-04	2	-3	7	-7	-2
2005-06	1	-2	8	-5	2
1973-2006	2.2	-2.7	7.4	-5.7	1

*Source:* Authors' calculations from Forfás Employment Survey.

Table 8: *Contributions of Entry and Exit, by Sector*

	<i>Entrants</i>	<i>Exits</i>	<i>Increases</i>	<i>Decreases</i>	<i>Net</i>
Chemicals	1.2	-1.4	6.6	-3.9	2.6
Clothing, Footwear and Leather	2.7	-6.1	5.4	-7.1	-5.1
Drink and Tobacco	0.5	-0.8	3.6	-4.8	-1.5
Financial Services	4.2	-2.0	16.8	-4.6	14.4
Food	1.6	-2.0	5.6	-5.3	-0.1
Furniture	2.4	-3.0	7.0	-6.1	0.4
Internationally Traded Services	5.1	-2.7	13.8	-6.9	9.3
Metals and Engineering	1.9	-2.7	8.7	-5.8	2.0
Mining, Quarrying and Indigenous Services	4.6	-2.5	8.0	-6.4	3.6
Miscellaneous Manufacturing	3.9	-4.2	7.4	-6.8	0.4
Non-Metallic Minerals	1.4	-1.6	4.8	-5.3	-0.7
Paper and Printing	1.3	-2.1	4.2	-4.3	-0.9
Plastics and Rubber	2.0	-2.8	7.4	-5.8	0.9
Textiles	2.0	-4.0	5.4	-7.6	-4.1
Wood and Wood Products	2.4	-2.4	7.6	-6.2	1.4

*Source:* Authors' calculations from Forfás Employment Survey.

The third question relates to patterns of job growth and decline seen over time. Specifically, we can characterise firms according to their past record of employment changes and then record their subsequent performance. This

relates to the question of whether, in practice, firms can be identified as persistent “winners” or persistent “losers”. Using time intervals of three years, we divided establishments into four groups: those that grew in one period and declined in the next; those that declined in both periods; those that declined in the first period but grew in the next; and finally, those that grew in both periods.

On average, 31 per cent of establishments grew in two consecutive three-year periods and 22 per cent continued to contract their employment. This leaves 47 per cent that reversed their performance of the previous period. This is made up of 34 per cent who had increased employment in one period then reducing it in the next and another 13 per cent of firms who switched from declining in the first period to growing in the next. This shows the considerable difficulty involved in predicting which firms will be successful in increasing employment over even relatively short time horizons. These calculations are described in Table 9.

Table 9: *Growing, Declining and Performance Switching, Per Cent of Employment*

	<i>Grow in t – 1 Decline in t</i>	<i>Decline in t – 1 Decline in t</i>	<i>Decline in t – 1 Grow in t</i>	<i>Grow in t – 1 Grow in t</i>
<i>Percentage of Firms in Each Group</i>				
1975-77	30	24	15	31
1978-80	30	21	14	35
1981-83	40	22	9	29
1984-86	35	27	12	26
1987-89	36	23	11	30
1990-92	38	20	12	30
1993-95	32	21	15	32
1996-98	30	17	15	39
1999-01	36	16	11	37
2002-04	41	24	10	26
2005-06	25	24	20	30
Average	34	22	13	31

*Source:* Authors’ calculations from Forfás Employment Survey.

The surprisingly large degree of switching from being a growing firm to declining, or from declining to growing, relates to our final question of how persistent are newly created jobs or destroyed jobs. This is a particularly relevant issue for policymakers who will want to support establishments that are creating stable long-term employment.

Table 10: *Average Persistence Rates: All Firms and by Nationality of Ownership*

	<i>1-year</i>	<i>2-year</i>
<i>Job Creation</i>		
All Firms	81	59
Irish Owned	78	55
Foreign Owned	84	64
<i>Job Destruction</i>		
All Firms	88	74
Irish Owned	87	74
Foreign Owned	88	75

*Source:* Authors' calculations from Forfás Employment Survey.

Because the data used in this paper allows us to track firms over time, we can calculate how many of the jobs created in any one year are still in existence in the following year. Looking at Table 10, we see that for every 100-jobs created, 81 are still in existence a year later, while 59 still exist after two years. Likewise we can calculate if destroyed jobs are likely to be replaced a period later. For every 100-job reductions observed, 88 remain one year later, and 74 two years later. The higher rate of persistence for job reductions compared to creation suggests that firms tend to reduce employment only if they expect the reduction to be permanent.

Comparing these persistence rates to those found by Barry *et al.* (1998), it appears that newly created jobs have become more likely to survive over one and two year horizons – they find a one-year persistence of 65 per cent and a two-year rate of 53 compared to our figures of 81 and 59 respectively for the longer time period. We also note an increase in the persistence of job destruction, with the Barry *et al.* one-year rate 75 compared to our finding of 88 per cent.

Splitting the sample by ownership shows that foreign owned firms tend to retain more created jobs compared to Irish owned firms and the difference in retention rates increases from year one to year two. One potential explanation for this is firm size. In that foreign owned firms entering the Irish market locate here to serve the European market and even though they are typically “Greenfield” operations, given their function they are necessarily larger than the average domestic firm. Job loss rates are broadly similar for both Irish and foreign firms, with little change in the relative differences between the two groups in year one and year two.



Table 11: *Sector Job Persistence Rates*

	<i>1-year</i>		<i>2-years</i>	
	<i>Creation</i>	<i>Destruction</i>	<i>Creation</i>	<i>Destruction</i>
Chemicals	0.88	0.83	0.73	0.66
Clothing, Footwear and Leather	0.74	0.92	0.50	0.81
Drink and Tobacco	0.86	0.89	0.53	0.71
Financial Services	0.91	0.82	0.78	0.60
Food	0.79	0.84	0.57	0.65
Furniture	0.78	0.85	0.57	0.70
Internationally Traded Services	0.85	0.82	0.66	0.61
Metals and Engineering	0.82	0.85	0.61	0.70
Mining, Quarrying and Indigenous Services	0.80	0.81	0.55	0.64
Miscellaneous Manufacturing	0.78	0.88	0.55	0.75
Non-Metallic Minerals	0.81	0.87	0.56	0.68
Paper and Printing	0.80	0.88	0.56	0.73
Plastics and Rubber	0.79	0.83	0.57	0.68
Textiles	0.79	0.91	0.56	0.81
Wood and Wood Products	0.79	0.82	0.58	0.66

*Source:* Authors' calculations from Forfás Employment Survey.

In Table 11, the persistence rate appears to be strongly related to the sector's net growth or decline. New jobs created in the Clothing, Footwear and Leather sector have the lowest probability of surviving into the next year (0.74 of jobs still exist after one year), whereas destroyed jobs in the same sector are the most likely to remain destroyed (0.92). New jobs created in growing sectors such as Chemicals and Financial Services are the most likely to persist after one and two years. This is in addition to these sectors having higher rates of jobs being created in the first instance.

## VI LABOUR PRODUCTIVITY AND EMPLOYMENT CHANGES

The earlier part of this analysis looked at whether firms can be identified as persistent "winners" or persistent "losers" judging the firms on the single dimension of employment size. Up to this point, the analysis has explicitly assumed that job turnover contributes to productivity improvements, either through sectoral reallocation with jobs moving from declining to expanding sectors or by allowing jobs to move from low to high productivity firms in the same sector. This section uses the additional information on productivity available in the ABSEI dataset to examine this idea in more detail and to identify any patterns of co-movement between productivity and employment

that are present in the data. This section, therefore, covers a smaller sample of firms than the earlier analysis, in particular excluding most very small firms.

It is worth noting that based on previous research the impact of job creation on productivity is somewhat less clear-cut. During a recession greater numbers of low-wage jobs than high-wage jobs are shed and in expansionary periods many more low-wage than high-wage jobs are created. This cycle may either decrease or increase aggregate productivity by either adding to or reducing the bottom end of the micro-level productivity distribution. One potential problem with these models is the assumption that low-wage jobs are always low productivity jobs, thus additional job creation has a negative impact on the micro-level productivity distribution [for a detailed discussion see: Merz (1999) and Solon *et al.* (1994)].

The first aspect of this issue to be tested relates to identifying patterns of employment and labour productivity growth during the period of this study. The results of the calculations are shown in Table 12, with the evolution of the groups over time plotted in Figure 2.

Table 12: *Employment and Labour Productivity*

<i>“Successful Upsizers”</i>	<i>“Successful Downsizers”</i>
Increased Employment Increased Productivity 27 per cent of Firms	Decreased Employment Increased Productivity 20 per cent of Firms
<i>“Unsuccessful Upsizers”</i>	<i>“Unsuccessful Downsizers”</i>
Increased Employment Decreased Productivity 34 per cent of Firms	Decreased Employment Decreased Productivity 19 per cent of Firms

*Note:* This categorisation of firms into quadrants does not give any indication of the size of either employment or productivity changes, only their direction.

*Source:* Authors’ calculations from Forfás ABSEI.

Firms are divided into four groups according to their employment and productivity performance from one year to the next: the first group “successful upsizers” contains those firms that grew both employment and productivity; the second group contains “successful downsizers” these are the firms that reduced employment and grew their productivity; the third group “unsuccessful upsizers” are those firms that increased employment and experienced productivity declines; the final group contains “unsuccessful

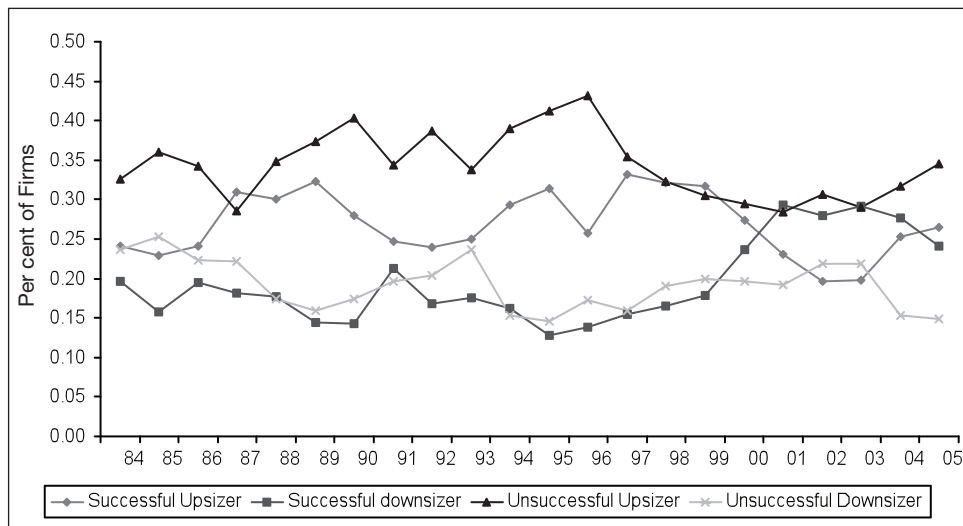
downsizers” these are the firms that reduced employment and experienced a decline in their productivity.

On average, 27 per cent of establishments in the sample grew both their employment and productivity in each two-year period. Firms can find themselves within “successful upsizers” group for various reasons; one possibility is that through technological innovation they have moved closer to optimal efficiency. Alternatively, employment and productivity can grow if the firm experiences increased demand for its products combined with growing returns for technology.

The group containing “successful downsizers” shows that 20 per cent of Irish based establishments increased their productivity at the expense of employment in each two-year period. One explanation for this pattern is falling or static demand combined with technological innovation or investment in capital as a substitute for labour. Based on this analysis it does not appear that the conventional wisdom about a productivity boost arising simply from downsizing is correct or that such a simple model accurately characterises firm behaviour. If this were the case then there should be a significantly larger number than 1 in 5 enterprises contained in this group.

At 34 per cent, the “unsuccessful upsizers” group with increasing employment and falling productivity forms the largest segment of firms in the data. Previous research suggests the behaviour of these enterprises is consistent with a negative productivity shock and static product demand. Another possibility is that these firms have changed their employment

Figure 2: *Employment and Productivity Quadrants, 1984–2005*



conditions and are attracting lower (in terms of productivity) quality employees. Alternatively demand may be expanding but new workers take time to train and the productivity fall is temporary. Approximately 1 in every 5 firms may be classified as “unsuccessful downsizers”. The performance of establishments that fall within the “unsuccessful downsizers” group may be explained by falling or static demand for their products combined with increasing returns for large-scale producers. It might also be the case that these firms have not successfully completed (in terms of employee skill composition) their employment adjustment phase, as new employees take time to train.

A study by Bailey *et al.* (1996) looking at co-movement between productivity and employment within US firms reported that 32 per cent of firms could be classed in the “successful upsizers” group, another 26 per cent of firms within the “successful downsizers” group, while 29 per cent of firms were in the “unsuccessful upsizers” group and the remaining 14 per cent of firms fell within “unsuccessful downsizers” group.

Table 13: *Employment Growth and Firm Characteristics*

	<i>Employment Growth</i>	<i>Rate of Job Creation by Expanding Firms</i>	<i>Rate of Job Loss in Contracting Firms</i>
Start-up Employment	−0.10*** (0.04)	−0.09*** (0.02)	−0.05*** (0.02)
Labour Productivity	0.09*** (0.01)	0.02*** (0.004)	−0.02 (0.01)
Firm Age	−0.002* (0.001)	−0.001 (0.001)	0.003*** (0.001)
Sector (2-digit) & Year	Yes	Yes	Yes
No. Obs.	24,204	11,575	8,002
R <sup>2</sup>	0.01	0.05	0.10

Random effects panel regressions. Firm variables are lagged one year. Standard errors are in parentheses.

\*\*\* Indicates significance at 1 per cent, \*\* at 5 per cent and \* at 10 per cent.

Source: Authors' calculations from Forfás ABSEI.

The final part of our analysis looks at the relationships between a number of firm variables and employment growth. Table 13 shows the results for random effects panel regressions with employment growth, job creation rate and job destruction rate as the dependent variables. For the entire sample labour productivity was positively related to employment growth (higher productivity firms are more likely to create more jobs). This result was confirmed when the sample was split into two groups – those increasing employment and those reducing employment (in any one year).

The productivity level per employee was positively related to job gains in expanding firms but was not statistically significantly related to job losses in contracting firms. By focusing on labour productivity instead of total factor productivity, this analysis cannot fully explain the role of capital deepening or biases in technical change within the firm. An obvious example of this is investment in labour saving capital equipment that increases labour productivity, but which may not be successful in providing similar increases to total factor productivity.

A negative relationship was found between original firm size and job growth. As we saw in Section V, larger firms create and destroy jobs at a lower percentage rate compared to smaller firms. Alternative specifications, entering firm size at one, three or five year lags, all found a qualitatively similar result.

## VII CONCLUSIONS

Changes in the net number of jobs arise from large numbers of firms both increasing and decreasing employment simultaneously at all points in time. Jobs are created and lost even in years of very high employment growth. To a degree, this reflects the re-allocation of jobs from declining sectors to expanding sectors, but this is not a comprehensive explanation. Job creation and destruction reallocates employment both within and between sectors. This paper provides a comprehensive description of job creation and destruction and net employment growth in Ireland from 1973 to 2006. This covers a wide range of business cycle episodes from joining the European Community to the recession of the early 1980s to the “Celtic Tiger” era.

Some systematic features of job reallocation emerge. Smaller firms have higher rates both of job creation and destruction, changes in employment are not always associated with productivity improvements, and firm growth is not easily predicted from past performance. These calculations also show that performance varies widely across firms. Many firm-level factors beyond the control of government have a profound influence on job flows. This analysis demonstrates the considerable difficulty involved in predicting which firms will be successful in increasing employment.

## REFERENCES

- BAILY, M., N. BARTELSMAN, E. J., and J. C. HALTIWANGER, 1996. "Downsizing and Productivity Growth: Myth or Reality?", *The Journal of Small Business Economics*, Vol. 8, No. 4.
- BARRY, F., E. A. STROBL and P. P. WALSH, 1998. "Aggregate Job Creation, Job Destruction and Job Turnover in the Irish Manufacturing Sector", *The Economic and Social Review*, Vol.29, No.1.
- BURDA, M. and C. WYPLOSZ, 1994. "Gross Worker and Job Flows in Europe", *European Economic Review*, Vol. 38, pp. 1287-1315.
- CABALLERO, R. and M. HAMMOUR, 1994. "The Cleansing Effect of Recessions", *American Economic Review*, Vol. 87, No1, pp. 115-137.
- DAVIS, S.J. and J. C. HALTIWANGER, 1992. "Gross Job Creation, Gross Job Destruction, and Employment Reallocation", *The Quarterly Journal of Economics*, Vol. 107, No. 3.
- DAVIS, S. J. and J. C. HALTIWANGER, 1999. "Gross Job Flows" in O. Ashenfelter and D. Card (eds.), *Handbook of Labor Economics*, Amsterdam: North Holland/Elsevier Science.
- DAVIS S. J., J. C. HALTIWANGER and S. SCHUH, 1996. *Job Creation and Destruction*, Cambridge, MA and London: MIT Press.
- DEN HANN, W., G. RAMEY and J. WATSON, 2000. "Job Destruction and Propagation of Shocks", *American Economic Review*, Vol. 90, No. 3, pp. 482-498.
- FAGGIO, G. and J. KONINGS, 1999. "Gross Job Flows and Firm Growth in Transition Countries: Evidence Using Firm-level Data on Five Countries", CEPR Discussion Paper No.226111.
- GÓMEZ-SALVADOR, R., J. MESSINA and G. VALLANTI, 2004. "Gross Job Flows and Institutions in Europe", Working Paper No.318, European Central Bank.
- KONINGS, J., 1995. "Job Creation and Job Destruction in the UK Manufacturing Sector", *Oxford Bulletin of Economics and Statistics*, Vol. 57, No.1, pp. 819-863.
- MERZ, M., 1999. "Heterogeneous Job-Matches and the Cyclical Behavior of Labor Turnover", *Journal of Monetary Economics*, Vol. 43, pp. 3-23.
- SOLON, G., R. BARSKY and J. A. PARKER, 1994. "Measuring the Cyclicalities of Real Wages: How Important is Composition Bias", *The Quarterly Journal of Economics*, Vol. 109, No. 1, pp. 1-25.
- WALSH, P. P. and C. WHELAN, 2000. "The Importance of Structural Change in Industry for Growth", *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. XXIX pp. 1-32.