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Job Generation and Regional Industrial Policy in Ireland*

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Abstract: Irish industrial policy explicitly encouraged job generation in certain "designated" areas via, amongst other things, preferential grant treatment, job targets and the building of advance factories in the IDA's (Industrial Development Authority) regional industrial plans of 1973-1977 and 1978-1982. To assess the impact of these regional plans, this paper compares the employment performance of the designated and the non-designated areas in Ireland since 1972 by employing the job flow methodology pioneered by Davis and Haltiwanger (1992). We find that the convergence in aggregate industrial employment levels between designated and non-designated areas observed since 1972 has been largely driven by a higher rate of job creation without an accompanying higher rate of job destruction in the designated areas. Our econometric study attributes an annual 27 per cent of the job generation in the designated areas during the relevant period to the explicit regional industrial policy.

I INTRODUCTION

The evolution of current Irish industrial policy has its origins in concern over the paucity of industry, particularly in rural areas, and rural depopulation. It was thus as early as the 1950s that Irish industrial policy

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distinguished between designated areas (DAs) and non-designated areas (NDAs). Those regions classified as "designated" were typically the least wealthy, least populated, least industrialised and most peripheral regions of Ireland, and have intermittently enjoyed preferential grant treatment in an effort to encourage indigenous and foreign new firm location and job creation in these areas. While the emphasis on this regional component in industrial policy has shifted over time, being strongest in the early 1950s and in the 1970s, regional considerations have always remained.[1]

Despite the importance of the regional aspect of Irish industrial policy the number of studies directly or indirectly assessing the "success" of such policy in encouraging job generation in the DAs has been relatively few. Some of the early literature examined the determinants of the likelihood of plant start-up in DAs, see for instance O'Farrell and Crouchley (1984 and 1979), and O'Farrell (1980). Also, for a sub-sample of firms that established between 1980 to 1982, Killen and Ruane (1998) discover that the survival rate is higher in DAs. In contrast, Hart and Gudgin (1994) in a cross-sectional study could not find any significant relationship between a county's gross or net firm formation rate over the period 1980 to 1990 and its classification by designation. Drudy (1991), using a different regional classification that closely approximates the breakdown between DAs and NDAs, finds that over the period 1973 to 1989 peripheral regions experienced a considerable net aggregate gain in manufacturing employment relative to core regions.

In this paper we seek to assess the "success" of Irish regional industrial policy since the early 1970s in terms of job generation by employing the job flow methodology pioneered by Davis and Haltiwanger (1992), a technique that is now widely used in the labour economics literature, to a plant level employment data set that covers virtually the entire Irish industrial sector. Recent studies of the job flows of a number of countries, including Ireland,[2] have shown that firms continuously readjust their employment level, producing what are commonly termed job flows, over their lifetime. This adjustment process consists of both firms creating jobs and firms destroying jobs at the same time even within very refined sectors or regions, so that most of the plant level employment adjustments are "netted out" in aggregate. The extent of this adjustment process has been surprising and in contrast to predictions by traditional representative

1. For instance, more recently concern has again been expressed over the regional distribution of job creation, arising from claims that a disproportionate share of new jobs being attracted into Ireland are going towards the larger urban centres. See *The Irish Times* 06/01/1997 (p. 2), 08/01/1997 (p. 16), and 14/07/1997 (p. 2).

2. See Strobl *et al*. (1998) for a study of job flows in the Irish manufacturing sector.

firm models.[3] The use of job flows to analyse this adjustment process has allowed further characterisation of plants' employment behaviour. Through our comparative study of the job flows in DAs and NDAs we are thus, in this paper, able to unearth additional insight into the underlying factors that are driving the relative aggregate employment trends and can address additional issues such as relative job stability.

The layout of the paper is as follows. In Section II the evolution of regional and industrial policy in Ireland is outlined. A description of our data set and an overview of the aggregate employment trends in DAs and NDAs are provided in Section III. The job flow methodology employed is briefly outlined and the results of the regional job flow analysis are presented in Section IV. We investigate the determinants of the regional job flows in an econometric study in Section V. Section VI concludes.

II THE EVOLUTION OF INDUSTRIAL AND REGIONAL POLICY IN IRELAND[4]

After an initial protectionist stance towards indigenous industry, stagflation and huge emigration in the 1950s made it clear that there was the need for a new approach to industrial and regional policy in Ireland. Consequently, the Undeveloped Areas Act of 1952 was enacted to assist in the provision of an alternative source of employment to replace declining agricultural employment in rural areas by providing for cash grants of up to 50 per cent of the cost of machinery and equipment and up to 100 per cent of the cost of land and buildings and for training of workers in certain undeveloped areas. The initial undeveloped (designated) areas included Sligo, Leitrim, Roscommon, Mayo, Galway, Clare, Donegal, Kerry and West Cork.

In the late 1950s, increasing concern with the overall national economic situation led to erosion of the regional emphasis in favour of a more nationally oriented approach based on export-led growth. In 1956 the IDA (Industrial Development Authority) was empowered to give grants of up to two-thirds of the costs of buildings and land outside the undeveloped areas; the grants in developed (non-designated) areas were later extended to cover up to one-third of machinery and equipment costs. However, while the preferential treatment

3. Strobl *et al.* (1998), for instance, find in the case of the Irish manufacturing sector that over the period 1973 to 1994 the average job reallocation rate was 17.3 per cent; of this job reallocation 71.9 per cent was in excess of net aggregate changes.

4. This section draws extensively from Shannon Development (1996). For a discussion of early regional industrial policy in Ireland, see also NESC (1985 and 1980).

of the undeveloped areas was rolled back somewhat, undeveloped areas still received more favourable treatment than other areas.

In response to the Buchanan Report (Buchanan and Partners, 1969) proposing the identification of a small number of regional development centres (nine), and considerable general debate advocating regional growth centres during the 1960s there was a significant shift in the regional emphasis of industrial policy in the early 1970s. Regional policy in the 1970s essentially focused on two primary issues: (1) avoidance of rural-urban drift whereby workers migrate from rural areas to urban areas in search of higher paid employment, as modelled by Harris and Todaro (1970)[5] and, (2) avoidance of the over-concentration of foreign firms in the core areas.[6] The approach adopted to achieve this end was to set specific job targets for town groups but at a much more diverse level than the nine growth centres advocated in the Buchanan Report. The IDA's (1972) "Regional Industrial Plans for 1973-1977" focused on a large number of town clusters (forty-seven) encompassing 177 towns, to ensure the maximum geographical dispersion of new industrial employment.

An important element of this strategy was the purchase of sites for industrial undertakings and the building of advance factories. The setting of specific job targets combined with a programme of advance factory building facilitated the regional spread of job creation in a number of ways. First, the existence of advance factories accelerated the start-up process and encouraged foreign firms to move to areas where these advance factories existed. Second, at an organisational level, there was strong pressure on IDA personnel to fill vacant factories. Thus, once an advance factory was located within an area, there was increased pressure to secure a client for the factory. Third, the IDA often influenced the location of inward investment by deliberately bringing potential investors along predetermined "itinerary" routes (Breathnach, 1982). Finally, the existence of very specific job targets by town group also created additional organisational pressure to ensure that these targets were met. This "target town" approach was continued after the 1973-1977 plans for a further period up to 1982 (IDA, 1979). While there was some emphasis on a more strategic industry approach in the later plans, the main orientation continued to be of an explicit regional nature. However, after 1982, following the Telesis Report (NESC, 1982) the emphasis again shifted from an explicit regional emphasis to an explicit strategic industry approach.[7]

5. See Killen and Ruane (1998) for a discussion of this issue.
6. See Drudy (1991).
7. While regional issues were still given some consideration in the project evaluation process, their importance was secondary to that of strategic industry considerations.

III DATA DESCRIPTION AND AGGREGATE TRENDS

Our data source used to analyse Irish regional industrial policy in terms of job generation is the annual employment panel survey carried out by Forfás since 1972, covering all known active manufacturing and internationally-traded service companies. The overall response rate to this survey has, on average, been extremely high, generally over 99 per cent of the plant population. 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 identified by a unique plant number, a 4 to 5 digit NACE sector code, by planning region, a county and town location code, and by its nationality of ownership.[8,9]

For the purposes of this paper we define designated areas as those that have been designated over the entire period 1972 to 1996. These are counties Donegal, Sligo, Leitrim, Roscommon, Mayo, Galway, Kerry, Cavan, Monaghan, Longford and West Cork.[10] A number of other areas have been designated for temporary periods of time but are not included as designated areas for the purposes of this paper.

The start of our data set, 1972, coincides not only with the year prior to Ireland's first explicit regional plan but also with its preparation for entry into the European Economic Community. As can be seen from Table 1, in 1972 Irish industry was still strongly dominated by the natural resource based and traditional sectors[11] and was heavily reliant on indigenous and UK industry. Irish industry also was underrepresented in DAs; DAs accounted for 18 per cent of industrial employment compared to a population share of 31 per cent.

Since 1972, Irish industry has changed considerably with significant shifts in the overall level as well as in the pattern of employment trends. Between

8. For a more complete description of the data set see Strobl *et al*. (1998).

9. One particular structural break in the collection of data is worthy of mention. Plants covered by the regional agency Údarás na Gaeltachta (hereafter Údarás) were not included in the employment data set until 1984. The employment level of all of these plants, regardless of whether they may have existed prior to 1984, appears as zero in the data set up until 1984. Given information on the start-up date we are, however, able to distinguish between incumbent Údarás plants and actual Údarás plant births taking place in that year and we thus only consider jobs created by Údarás plant births for that year as job creation under Údarás coverage. This will tend to understate the true job creation rate for 1984. The effect on job creation and destruction prior to 1984 is uncertain a priori.

10. This classification corresponds broadly, although not exactly, with the Border, Midlands and Western (BMW) region recently adopted by Eurostat for statistical purposes. The main differences between the designated areas and the BMW region are that Kerry and West Cork are excluded from the BMW region, while Louth, Laoighis, Offaly and Westmeath are included.

11. For the purpose of this paper the modern sector encompasses chemicals, man-made fibres, mechanical engineering, data processing, electrical engineering, instrument engineering, and non-manufacturing grant aided industries.

Table 1: *Structure and Ownership of Irish Industry (Percentage of Total Employment), 1972 and 1996*

	Designated		*Non-Designated*		*Overall*	
	1972	*1996*	*1972*	*1996*	*1972*	*1996*
	%	%	%	%	%	%
(STRUCTURE)						
Modern	7.8	26.9	9.1	32.8	8.9	31.1
Non-Modern	92.2	83.1	90.9	77.2	91.1	78.9
(OWNERSHIP)						
Irish	66.5	55.0	68.0	52.5	67.7	53.2
UK	9.3	3.3	15.5	6.4	14.4	5.5
Other EU-15	8.9	9.4	8.8	10.0	8.8	9.9
US	11.6	26.4	5.7	26.3	6.8	26.4
Rest of World	3.8	5.8	2.0	4.7	2.3	5.0

1972 and 1979 overall employment rose by 14.0 per cent from 217,685 to 248,194. The deep recession in the 1980s took its toll on employment, which decreased by 18.1 per cent to 203,150 over the period 1979-1987. Since 1987 there has been a recovery in overall employment; an increase of 22.9 per cent, to reach 249,619 in 1996, thus standing slightly above its previous peak of 1979.

While there has been a considerable shift in the structure of Irish manufacturing industry, there has been remarkably little divergence between DAs and NDAs in their overall composition in terms of nationality or sector. Table 1 illustrates the significant structural shifts in Irish industry and changes in ownership, as well as the notable degree of similarity in current composition across areas of designation.[12]

To gauge whether the objectives of the regional policy adopted since 1970s, namely avoidance of a rural-urban drift of workers and the over-concentration of foreign firms in the core areas, have been achieved we also chart the relative employment performance of DAs and NDAs since 1972 in Figure 1. Over the period 1972 to 1979, when the IDA adopted the target town strategy most

12. The composition of employment was also examined at a more detailed sectoral level (20 sub-sectors). The degree of correlation in the sectoral employment structure between designated and non-designated remains remarkably strong (falling only marginally from 0.89 in 1972 to 0.81 in 1996). There have been significant changes in three sub-sectors only — chemicals (the share of employment increased more rapidly in designated areas than in non-designated areas), data processing equipment (the employment share in non-designated regions rose more rapidly than in designated regions) and motor vehicles (the employment share fell in non-designated regions but rose in designated regions).

Figure 1: *Industrial Employment Trends in DAs and NDAs (1972 = 100)*

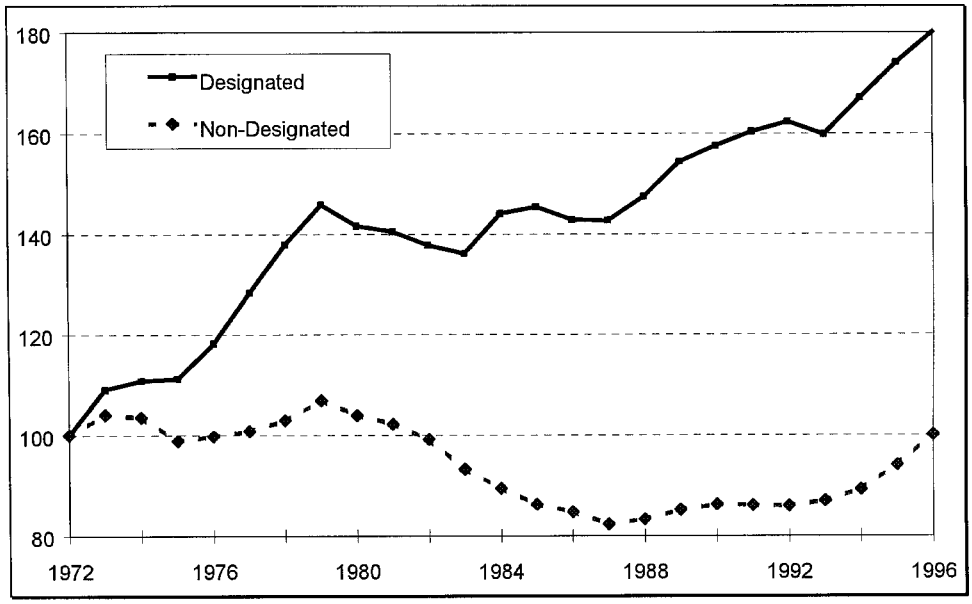
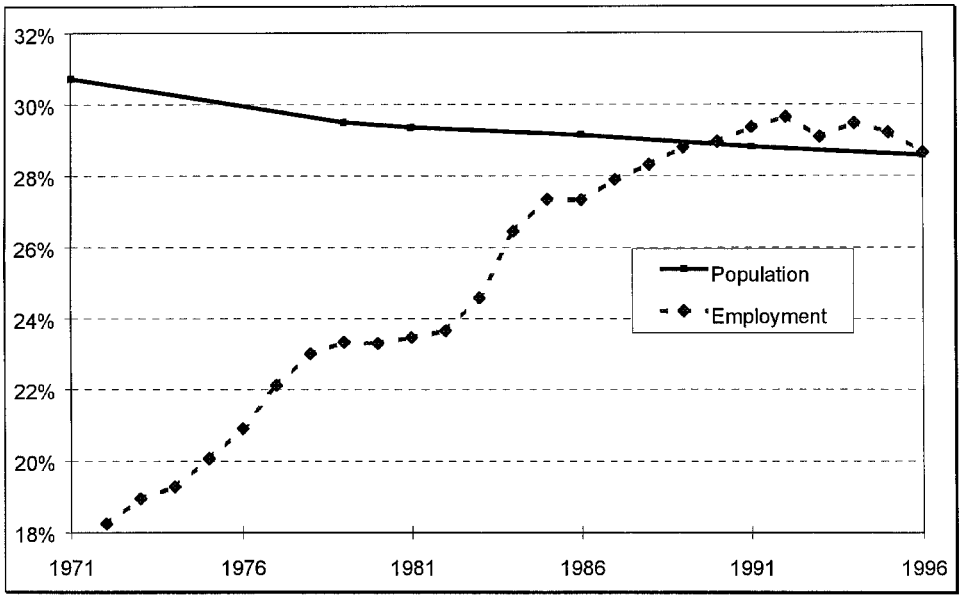


Figure 2: *Share of Population and Industrial Employment in DAs*



vigorously, employment in the DAs rose by 45.9 per cent compared to an increase of 6.9 per cent in NDAs. During the period 1979 to 1987, employment remained reasonably steady in DAs despite a strong recession, but declined by over 20 per cent in NDAs. Since 1987, employment in the DAs has increased by 26.2 per cent, compared to an increase in NDAs of 21.6 per cent. These developments resulted in a cumulative increase of 80.1 per cent in DA employment and a marginal increase of 0.1 per cent in NDA employment over the entire period.

From Figure 2, which charts the relative share of DAs in overall manufacturing employment and population, one discovers that to a large extent the phenomenon of periphery-core drift has been avoided; there was only a slight decline in the overall population share in DAs from 30.7 per cent in 1971 to 28.6 per cent in 1996.[13] There has also not been a drift of manufacturing employment to core areas. The share of manufacturing employment in designated areas has risen from 18.2 per cent in 1972 to 28.7 per cent in 1996. Thus the manufacturing employment share of DAs is now approximately equal to its population share. Employment levels have been maintained in NDAs, whilst employment increased substantially and population share has remained relatively constant in DAs.

IV REGIONAL JOB FLOW ANALYSIS

The net aggregate positive job generation of DAs outlined in the previous section could have been produced by a number of different underlying employment dynamics. For instance, there may have simply been just more jobs created in DAs while job losses were negligible in both areas. However, the net aggregate employment gains in DAs could also be consistent with large amounts of job creation that were at the same time accompanied by (not quite as) large amounts of jobs being destroyed. This latter scenario could of course imply greater employment instability in DAs, a factor that would clearly be of concern to policymakers. As a matter of fact, recent studies of job flows for Ireland and numerous other countries have shown that there is a large amount of job turnover at the plant level driving aggregate trends and that studying this turnover can lead to additional insight into the underlying adjustment processes. To determine and compare the nature of these plant level employment adjustments in the DAs and NDAs we thus undertake a job flow analysis of our data set.

The first step in the derivation of aggregate job flow rates involves the calculation of net growth rates of individual plants in each year over the sample

13. This does not, however, preclude the large amounts of emigration, which have taken place especially during the 1980s. Furthermore, it does not cover the age profile of regions. It may be possible that young people from rural areas have either emigrated to destinations outside of Ireland or migrated to urban areas.

period.[14,15] These net growth rates are then grouped as either positive or negative, and within each category under consideration size-weighted (by the size of the plant relative to the total size of the aggregation category being examined), resulting in what are known as the aggregate job creation and job destruction rate, respectively. The job creation rate (POS) constitutes a measure of the total number of jobs created relative to total aggregate employment, while, conversely, the job destruction rate (NEG) is an index of the total number of jobs lost relative to aggregate employment. One should note that because one derives these rates from the plant level, one captures simultaneous positive and negative employment changes (at the plant level) that would be "netted out" if one were to simply use aggregate employment figures. For instance, large amounts of simultaneous job creation and destruction by different plants, could result in a low net growth rate, which is simply the difference of these, and hence disguise underlying employment adjustments and possibly valuable information. These changes, however, are captured in the job creation and job destruction rates. Of course, the level and nature of aggregation for these job flow measures can be chosen as desired according to the purpose of the analysis; in our case this is done at the regional level (DAs vs. NDAs) and other identifying categories within these.

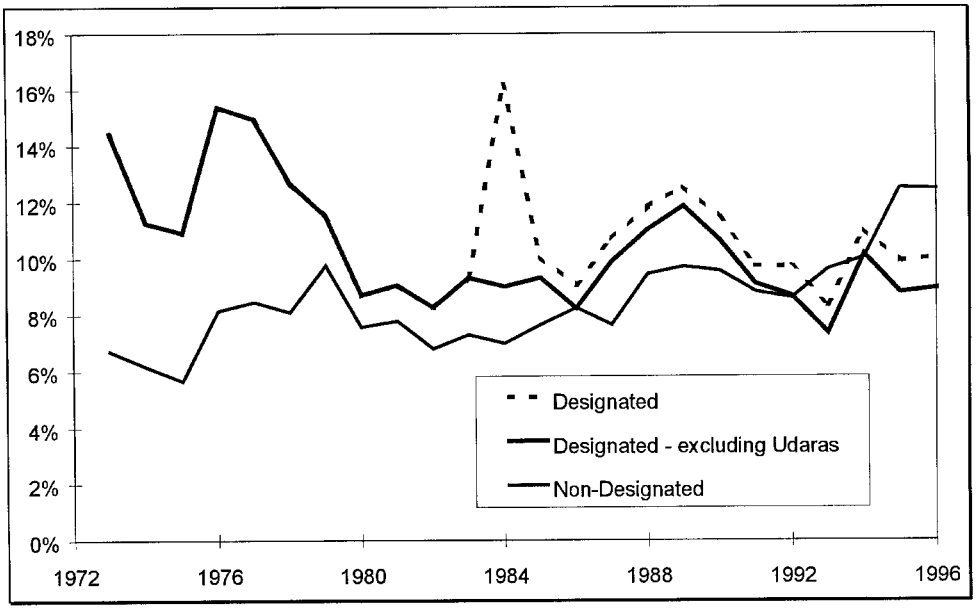
We depict the job creation rates of DAs and NDAs in Figure 3. Accordingly, POS is clearly higher for the DAs, on average 11.1 versus 8.4 per cent. This difference is particularly pronounced in the 1970s, but holds true for most of the rest of our sample period as well. Excluding Údarás plants altogether, as depicted by the revised series in Figure 3, indicates that the true job creation rate in the DAs may have been even higher prior to 1984 than calculated by our measure. The lines corresponding to the data series of both areas show, however, a convergence in job creation across areas; job creation in the DAs is on a declining trend while that in the NDAs is on a rising trend. The percentage of plants involved in creating jobs is on average slightly higher in DAs than NDAs, standing at 38 per cent for the former and 36 per cent for the latter. Further investigation reveals that the greater figure for the DAs is due to a particularly high participation in the job creation process in the 1970s, nearly 41 per cent,

14. Given that the calculations and formulae involved are now fairly standard and common in the economics literature, we only outline them discursively. For more details see, for example, Strobl *et al*. (1998).

15. The net growth rates used differ somewhat from standard net growth rates in that the denominator is not the level of employment in the previous period but an average of employment of the previous and the current period. This restricts growth rates to be bounded between 2 and –2, but allows one to take account of births and deaths, which simple calculation will show constitute the two boundaries 2 and –2, respectively.

that has since fallen substantially. In contrast, the percentage of plants involved in job creation has marginally risen for NDAs over our sample period.

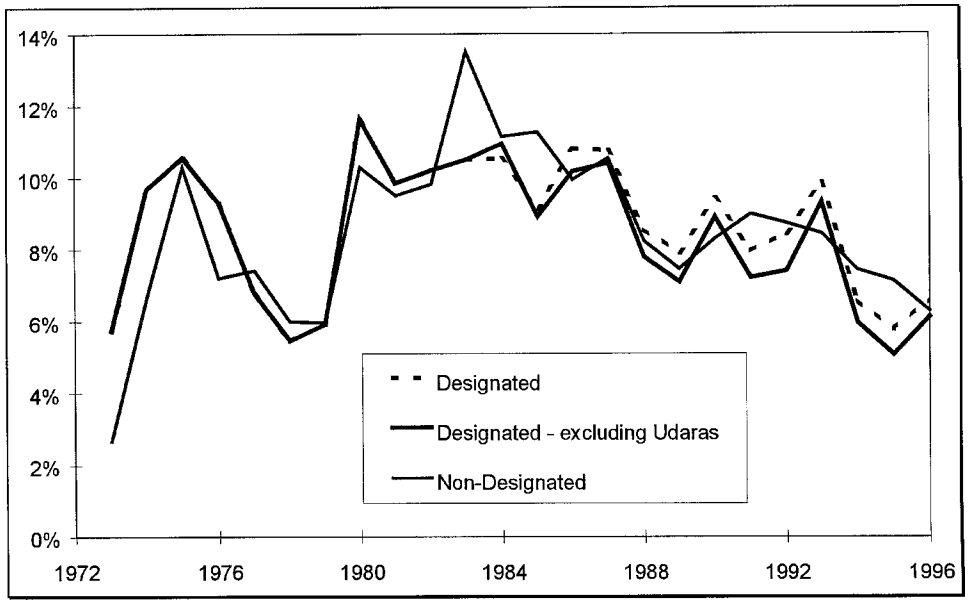
Figure 3: *Job Creation Rates in DAs and NDAs*



In contrast to the job creation rate, the job destruction rate was, on average, very similar in magnitude for both the DAs and the NDAs, 8.7 versus 8.4 per cent. This job destruction can be, on average, attributed to 29 per cent of the plant population in both DAs and NDAs. Assuming stationarity and a stable distribution of job creation and job destruction, our results imply an average job life of 11.7 years for NDAs and 11.5 years for DAs.[16] Depicting the job destruction rates graphically in Figure 4, one discovers that these differ little in magnitude or pattern over our sample period. Also shown is the job destruction rate for the DAs excluding those plants under Údarás, to investigate whether their exclusion in the data set prior to 1984, as discussed in Section III, may indicate distortions in our measurement of the true job destruction rate for the DAs for the earlier part of our sample period. We find little evidence of this.

16. The average job life is the inverse of the job destruction rate.

Figure 4: *Job Destruction Rates in DAs and NDAs*



We also investigated whether the differences, or lack thereof, in the job flow rates across regions were due to different size, age or nationality of ownership compositions within our two regional areas. First, we calculated the job creation and job destruction rates for two categories, plants with less than, and plants with at least, 50 employees within the regional categories. We similarly calculated job creation and job destruction rates within the DAs and NDAs for indigenous, UK, other EU, US, and other Non-EU plants separately. For all of these, the results found in aggregate generally also prevailed at the sub-category level. That is, job creation was substantially higher in DAs with no apparent differences in terms of job destruction (for details of these results see Meyler and Strobl, 1997).

Our aggregate job flow rates by area of designation show that a substantially higher job creation rate in the DAs was not coupled with a higher job destruction rate. These results hold even if we further decompose our rates into plant size and nationality of ownership categories. However, it is possible that the jobs created in the DAs, if they were linked to preferential grant treatment, would not persist as long as those created in the NDAs. In other words, in the face of smaller job creation costs, firms are more likely to create jobs that have a smaller chance of survival. Moreover, despite a similar job destruction rate, are those

jobs destroyed in the DAs a more temporary or permanent phenomena than job losses in NDAs? To investigate these issues we calculate the fraction of jobs created (FPOS) and jobs destroyed (FNEG) in the DAs and NDAs that persist one to five years later and depict these in Table 2.[17]

Table 2: *Average Job Flow Persistence (Percentage of Jobs Created / Destroyed)*

	FPOS		*FNEG*	
Years	*DAs*	*NDAs*	*DAs*	*NDAs*
1	79.6	80.0	85.9	88.4
2	68.2	68.1	80.5	83.7
3	61.0	60.0	77.7	81.4
4	55.7	53.0	75.7	80.0
5	50.4	47.6	73.4	79.0

Accordingly, the average persistence of jobs created is less than the equivalent persistence measures of jobs destroyed across both areas over our sample period. Thus job creation appears to be a relatively more temporary phenomenon. After one year on average 79.6 and 80.0 per cent of those jobs created persist in the DAs and NDAs, respectively. However, from the third year onwards the percentage of jobs created that still exist becomes increasingly higher in the DAs, resulting in a 2.8 per cent difference in the fifth year after their creation. The probability of a job created surviving five years conditional on having survived the first is thus, on average, 63.3 and 59.5 per cent for the DAs and NDAs, respectively. Job destruction persistence, in contrast, always remains higher in the NDAs, implying that a greater fraction of jobs lost are recovered in DAs.

The further decomposition of the job creation and job destruction persistence rates into our two plant sizes categories (0-49, 50+), although not reported here,[18] showed that smaller firms experience greater job creation persistence for the first two years in NDAs. Thereafter, however, the likelihood of jobs surviving is consistently greater in DAs. Jobs created by large firms, in contrast, are, on average, always likelier to still exist in both the short and medium term in DAs. In terms of nationality of ownership we found little difference in the average job creation persistence by nationality group across areas of designation. Jobs created by US plants are more likely to survive than those created by any other nationality group over the following five years. Jobs created by UK plants, in contrast, are, except for the first year in NDAs, the least likely to exist over a similar time span, regardless of the area of designation. Jobs created in Irish

17. For details on the calculation of persistence measures see Meyler and Strobl (1997).
18. See Meyler and Strobl (1997) for details.

plants generally rank third, those created in Other Non-EU plants second, and those created in Other EU plants fourth in terms of persistence.

V ECONOMETRIC STUDY

Our results thus far provide some evidence that regional industrial policy may have played an important role in the net aggregate employment gain of the DAs by generating relatively stable jobs without incurring parallel job losses. Of course, there may be other factors that cause these results, such as different economic conditions or sectoral composition across regions. To properly disentangle the role of policy in the differences in the job creation rates we now proceed to model econometrically the determinants of job creation in the DAs and NDAs over our sample period. Our econometric specification is as follows:[19,20]

$$\text{POS}_{it} = \text{CON}_i + \text{FOREIGN}_{it} + \text{MODERN}_{it} + \text{SMALL}_{it} + \text{URATE}_{it-1} + \text{GRANT}_{it-1} + \text{POLICY}_i$$

$$i = \text{designated, non-designated; } t = 1973\text{-}1996;$$

where POS is the job creation rate and CON is a constant term. FOREIGN is the percentage of foreign employment in total employment and is intended to control for the degree of multinational presence in each of the regions. As a proxy for direct and indirect effects of more industry specific policies in generating employment we also include the percentage of modern sector in total employment, MODERN. Hart and Gudgin (1994) show in their study that the proportion of small establishments in the plant population positively influences county level rates of new firm formation. We thus, similarly, include SMALL, the proportion of plant population due to plants of 50 or less employees as an explanatory variable. To control for economic and labour market conditions we also calculated the unemployment rate, URATE, for each region using the Labour Force Survey.[21]

19. While one may have ideally liked to include other potentially relevant explanatory variables, such as demographic indicators, these were only available for a limited number of years. For example, consideration was also given to including a variable proxying the relative education levels in designated and non-designated regions. However, Census data on education levels are only available for the years 1971, 1981, 1986 and 1991. In "periphery" regions (using Drudy's (1991) core/periphery breakdown) the number of persons having completed third-level education per 1,000 of the working age population, rose from 8.1 in 1971 to 100.7 in 1991. In "core" regions the number rose from 13.0 in 1971 to 133.4 in 1991. As the trend across both areas was relatively similar and data are only available for four years the variable was not included in the econometric analysis.

20. Ideally one would have liked to investigate the influence of regional policy on employment growth at the plant level. However, grants and other information were only available in aggregate.

21. Unfortunately, the regional breakdown in the Labour Force Survey was not detailed enough to allow us to construct series corresponding to the two regions exactly. However, using Drudy's (1991) periphery/core classification we were able to construct close approximates. For those years in which the Labour Force Survey was not available, namely 1972-74, 1976, 1978, 1980 and 1982, we interpolated our series using Live Register data.

GRANT is the grant level (approved) weighted by the size (in employment) per region.[22,23] However, as discussed earlier, grants are only one part of Irish industrial regional policy and a substantial proportion of these grants are for purposes other than job generation, such as re-equipment. We have thus included POLICY, a zero-one type dummy variable taking on the value of one for the designated region until 1982 and zero otherwise, to explicitly control for regional industrial policy when it was strongest and most explicit, i.e. during the 1973-1982 period.[24] Constructing variables for both designated and non-designated areas leaves us with a panel of the two regions over 23 years.[25]

To investigate whether we can pool our data across regions we employed an F-test on the null hypothesis of common slope coefficients and intercepts and our F-statistic, $F(7, 32) = 2.796$, led us to initially reject this. We further conducted an F-test on the null hypothesis of common slope coefficients and were not able to reject the null hypothesis given the F-statistic $F(6, 32) = 1.676$. Also, the hypothesis of common intercepts given the equality of slope coefficients, similarly using an F-test,[26] could not be rejected. We thus decided to pool the data and run an OLS regression on our specification.[27,28]

Examining the OLS regression results for our job creation model, found in Table 3, we find that the R^2-statistic shows that our model is able to explain nearly 50 per cent of total variation in the job creation rate over our sample period. POLICY, our regional policy proxy, is significant at the 5 per cent level.[29] Using the means over the relevant period, the coefficient may be interpreted to imply that the strong preferential policy treatment until 1982 increased the job creation rate in DAs annually by 27.3 per cent. It should not be too surprising

22. The level of grants approved was deflated using the CPI.

23. During the period of the regional industrial plans, the level of grant approved per existing job was on average 24,300 and 16,700 Irish pounds for DAs and NDAs, respectively, compared to 12,200 and 14,800 Irish pounds, on average, for DAs and NDAs, respectively since 1982 in constant price terms.

24. Unfortunately, consistent series for other factors, such as job targets or advance factory construction are not available over our entire sample period.

25. A dummy variable to account for the break in the data due to the inclusion of Údarás firms in 1984 was included but found not to be significant.

26. $F(1, 38)=1.290$.

27. To investigate this matter further, we also employed the Lagrange multiplier test due to Breusch and Pagan (1980) for random effects and were able to find additional support for an OLS estimation.

28. For a discussion of this see Hsiao (1986).

29. The contrast with results by Hart and Gudgin (1994) may be reconciled by the fact that their cross sectional study of county-level net firm formation rates covers the period 1980 to 1990, which only incorporates a small part of the period when regional planning was at its most explicit. We also tried estimating our job creation model with a zero-one type dummy, taking on the value of one for the designated and zero for the non-designated region for the entire period instead of our POLICY variable and found that this significantly lowered the explanatory power and resulted in a smaller coefficient.

that GRANT, the level of grants approved weighted by regional employment size, is not significant given that regional policy was certainly more complex than simple grant levels and that a substantial proportion of the grants approved were for factors other than job creation.[30] Economic conditions, as proxied by URATE, also were a significant determinant; decreasing job creation during bad times and increasing it during good times, as one would expect. Similar to the result by Hart and Gudgin (1994) for the county level new firm formation rate, the proportion of small plants influences the job creation rate positively. Finally, the size of the modern sector and the presence in employment by foreign firms are not significant factors for the rate of job creation.

Table 3: *OLS Estimates of the Determinants of Job Creation and Job Destruction Rates*

Independent Variable:	*POS*	*NEG*
CONSTANT	–15.62*	–1.11
	(8.88)	(6.32)
POLICY	3.30**	0.29
	(1.45)	(1.03)
URATE	–0.37*	0.65**
	(0.13)	(0.10)
GRANT	–0.02	0.04
	(0.06)	(0.04)
FOR	–0.27	0.48*
	(0.36)	(0.26)
MODERN	0.33	–0.50**
	(0.23)	(0.17)
SMALL	0.40**	–0.11
	(0.17)	(0.12)
R^2	0.49	0.65
F statistic	6.30	12.16
	(6, 39)	(6, 39)
N	46	46

(i) Standard errors in parentheses.
(ii) ** and * indicate significance at the 5 and 10 per cent level, respectively.

One of the main results derived from our job flow analysis is that the higher job creation rate in DAs had not been accompanied by a higher job destruction rate. This could be interpreted as indirect evidence of the impact of regional industrial policy. To verify this we postulate a specification similar to the job creation rate for job destruction:

30. We also experimented using various lags of this variable, but our results remained qualitatively the same.

$$\text{NEG}_{it} = \text{CON}_i + \text{FOREIGN}_{it} + \text{MODERN}_{it} + \text{SMALL}_{it} + \text{URATE}_{it-1} + \text{GRANT}_{it-1} + \text{POLICY}_i$$

i = designated, non-designated; t = 1973-1996

where NEG is the job destruction rate and the explanatory variables are defined as above. Our F statistic $F(7, 32) = 0.932$ in this case does not lead us to reject the null hypothesis of common intercepts and slope coefficients and thus we pooled our data and ran OLS on the specification given above.[31]

In the case of job destruction, also set out in Table 3, we get a slightly higher R^2 than for our job creation equation (0.65 vs. 0.49). The fact that our policy proxy is insignificant confirms our interpretation of the earlier result from the job flow analysis that job destruction in DAs did not increase due to the strong preferential policy treatment until 1982. As in the case of job creation, economic conditions, as proxied by URATE, are a significant factor and of the expected sign. We also find a significant positive coefficient for FOR, indicating that the foreign sector is more likely to destroy jobs and, perhaps, more footloose than the indigenous sector after controlling for other factors. In contrast to job creation, the size of the modern sector significantly reduces job destruction. This may provide preliminary support for industrial policy encouraging the growth of the modern sector.

VI CONCLUSION

In this paper we investigated the impact of Irish regional industrial policy since the 1970s using job flow analysis techniques. We first compared aggregate employment trends of those areas classified as designated (DAs), and thus preferentially treated, relative to those classified as non-designated, and found that the former outperformed the latter region, as is in line with the results by Drudy (1991), without experiencing any significant distortions in terms of the sectoral, plant size or nationality of ownership type employment and plant population composition.

To understand the underlying processes driving these aggregate trends we employed the technique of job flow analysis and discovered a number of interesting results. Most importantly, the superior performance of DAs has been driven primarily by a higher job creation rate, particularly in the 1970s. This higher rate of job creation in DAs has, however, not been obtained at the cost of a higher rate of job destruction. Moreover, jobs created in DAs have a higher chance of survival in the long run and jobs destroyed are more likely to be

31. For both the job creation and job destruction OLS regressions, a White test was carried out and the null hypothesis of homoskedasticity could not be rejected.

recovered. Our econometric study of the determinants of the job creation and destruction rates in DAs and NDAs suggests that the explicit regional industrial policy pursued from 1973 to 1982 did in fact increase the job creation rate without playing a significant role in the rate of job destruction in DAs. One should note, however, that a dummy policy variable alone is insufficient to capture the full impact of regional policy measures. Also our study, given the size of the areas under consideration, does not address intra-regional differences in job generation. Moreover, there seems to be some indication that the relative trends in job generation may be experiencing a reversal, possibly due to the reorientation of foreign direct investment towards sectors that are much more likely to locate in large urban centres as highlighted by recent public concern. Both of these issues clearly merit further research.

From a more general perspective, the lessons to be derived from this paper are twofold. First, regional policy explicitly encouraging job generation can have, and has had, in the case of Ireland, considerable impact. Second, studying job flows, a technique already popular in the labour literature, can also serve as a valuable research tool in regional economics; if plant level employment data are available the job flow methodology may significantly increase the understanding of differences in regional employment performance.

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