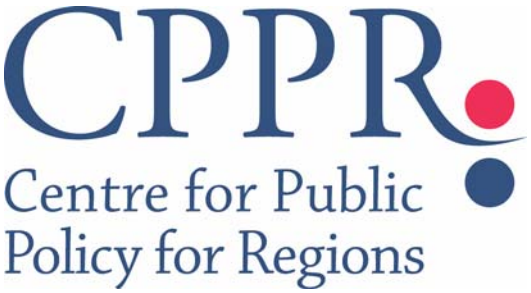


**Discussion Paper No.7**

**October 2005**

# The Impact of Government Intervention on Employment Change and Plant Closure in Northern Ireland, 1983-1997

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**ABSTRACT**

Financial assistance to manufacturing industry is an important element of the industrial development policy in Northern Ireland. This paper uses the individual plant level records of the ARD for the Northern Ireland manufacturing sector (1983-1997) matched to the plant level details of financial support provided by the Industrial Development Board to examine the effect of selective financial assistance (SFA) on employment change and plant closure. We find that SFA concentrated on protecting existing, rather than new, enterprises in terms of employment change. Using a hazard model, we find that the receipt of SFA significantly reduced the probability of plant closure by, on average, between 15 and 24 per cent.

Key words: Northern Ireland Regional Policy, Selective Financial Assistance Employment change, Plant closure

## 1. INTRODUCTION

Since 1945 industrial policy in Northern Ireland has been driven by the twin aims of increasing (and at times stabilising) employment and raising investment levels. Motivated by the need to improve Northern Ireland's economic performance (until 1995 GDP per head in Northern Ireland was less than 80 per cent of the UK average) and reduce the continual imbalances between the supply of and demand for labour, which have led to high levels of unemployment and outward migration, substantial public resources have been devoted to promoting new firm formation by both externally-owned and local companies; and supporting existing businesses. To achieve these aims, government employed a set of policy instruments, collectively termed Selective Financial Assistance (SFA). These instruments would provide the financial aid to increase investment levels and thus raise industrial capacity through the replacement of obsolete equipment, the introduction of new technologies and new products. In terms of employment growth, SFA would support the creation of jobs in both new and expanding businesses in the manufacturing sector. However, government also acknowledged that there was a need to strengthen existing businesses and make available, to potentially viable companies, the support necessary to safeguard employment when redundancies and closure were threatened.

Manufacturing firms in Northern Ireland have received financial assistance to a higher average level than firms in the assisted regions of Great Britain and in most of the eligible regions of EU countries. Yuill *et al.*, 1995, showed that between 1986 and 1992 the annual average net grant equivalent expenditure per head of population in Northern Ireland was twice as high as that in recipient regions of Great Britain and the third highest compared to eligible regions of the EU after Italy and Luxembourg. Between 1983 and 1997 (the study period) SFA accounted for, on average, 1.2 per cent of total public expenditure in Northern Ireland and 29 per cent of the total spending on discretionary assistance to manufacturing industry in the UK. In terms of direct cost per forecast job supported, the average cost over the study period in Northern Ireland was around £8,800 compared to £3,300 in GB. In nominal prices this represented a sizeable total spending of some £1.1 billion in the province.[1]

Given such high levels of investment the outcome in terms of employment appears to have had a substantial impact. During the study period, official figures from the agency responsible for SFA (the NI Industrial Development Board) show that about 124.4 thousand jobs were promoted and/or maintained, which compares to total employment in manufacturing throughout the period of around 110 thousand. [2] The latter refers to the stock of employment and disguises the large amount of 'churning' that takes place (i.e., jobs created through new plants opening, jobs lost through closures and *in situ* employment change). Since new firm formation was a policy aim, it is useful to examine if SFA encouraging the creation of jobs in new firms or concentrated on protecting employment in existing firms.

There have been many studies that have assessed the effectiveness of SFA on the Northern Ireland economy. These have been based on data from the annual reports of the organisation that administered the scheme (Industrial Development Board[3] (IDB)), specialist surveys and case studies. However, to be able to fully determine the dynamics of employment change it is necessary to compare the change in plants that received assistance with the change in non-assisted plants i.e. the counterfactual. This paper uses a unique dataset that links or matches a range of data extracted from IDB company records with the ONS's Annual Respondents Database (ARD), which contains financial information on *all* plants and establishments operating in Northern Ireland.

The paper examines the effect that SFA had on manufacturing employment change between 1983 and 1997, considers whether such assistance concentrated on protecting existing plants as regards employment change, rather that supporting job creation in new firms, and estimates if the receipt of SFA affected the probability of plants exiting the manufacturing sector. The paper is set out as follows: the next section provides a brief overview of industrial policy in Northern Ireland, policy instruments and previous assessment studies. The third section describes the dataset and the characteristics of the supported plants. Section four presents employment change using a standard labour market accounts approach; section five gives the results from estimating a hazard model to determine the probability of plant closure. The final section provides some concluding remarks.

## 2. GOVERNMENT ASSISTANCE TO INDUSTRY

Since 1945 the provision of financial assistance to manufacturing industry has played an important part in the development of industrial policy in Northern Ireland.[4] The rationale for intervention was based on the need to create the economic conditions that would bring about an increase in employment in the most socially and economically deprived region of the UK. By dealing with the underlying causes of economic disadvantage such as: industrial composition, the lack of technical innovation and low levels of productivity; the outcome would be a competitive and restructured industrial base that would provide the opportunities for new employment (Harris, 1991).

Over time the policy instruments employed, the nature of assistance available and the associated policy objectives have evolved and/or changed. Initially expenditure was focused on advance factory building but progressively the package of aid grew to incorporate selective financial assistance (capital, employment, rent and interest relief grants) to attract inward investment; the provision of automatic capital grants and, in some cases, employment grants to enhance the efficiency and competitiveness of the indigenous sector[5]; and financial assistance to the labour market in the form of training and employment services. Hence, by the early 1980s, Northern Ireland had the most generous and wide-ranging package of assistance anywhere in the UK, a situation that has remained ever since.

In 1988 there was a major review of the role of regional policy in national economic development (HM Government, 1988). The outcome was a change from the traditional view, that regional policy was a way of reducing regional economic disparities (particularly with regard to unemployment), to one that attributed regional problems to economic inefficiency and a lack of entrepreneurial activity in the regions. From this followed new policy objectives that were designed to help the disadvantaged regions increase their competitiveness and productivity which, in turn, would improve their efficiency and stimulate growth in indigenous industry. Policy instruments to achieve these new objectives were devised and included a move from automatic to selective investment grants, along with schemes targeted on skills training, advice, and innovation.

In Northern Ireland this reorientation of policy was central to the strategy document *Competing in the 1990s* (DED, 1990), which acknowledged that although Northern Ireland had benefited from the growth of the national economy, the levels of growth achieved were inadequate to reduce income inequalities (i.e. relative GDP per head *vis-à-vis* the level in Great Britain). The new strategy marked a fundamental change in the type of support that government would provide to the indigenous sector. SFA would be available to the firm to enable it to deal with the constraints to competitiveness and growth that could not be addressed through the market, rather than as a means of stabilising employment in existing firms. Hence, support would be focused on activities such as training, R&D, design and marketing rather than on the direct provision of finance for capital investment (and thus direct employment creation or increasingly in the 1970's and 1980's the protection of existing employment). Nevertheless, this did not signify the end of capital grants to the indigenous sector, rather such assistance would be considered on the basis that it did not displace private sector financial funding and that it was targeted on improving firm competitiveness. No longer would the promotion (or maintenance) of employment through best endeavours be the primary criterion in the decision to grant-aid indigenous firms; instead companies had to demonstrate that efficiency gains would be realized and from this, additional long-term employment would follow.

The inward investment strategy remained unchanged with the recognition that the involvement of externally-owned firms in the local economy brought benefits in terms of technological progress, improved efficiency, managerial skills and the opportunities for the development of linkages with local firms. However, a more fundamental reason for retaining the inward investment strategy was that these new firms bring additional employment opportunities and thus job targets would continue to be a key consideration in the decision to fund mobile projects.

The mechanism for the delivery of government assistance to firms that applied for support for a project (to say, expand production or modernise) was based on the criteria of additionality, viability and efficiency (HM Treasury, 1991). The proposed project had to be "additional", that is, the investment would not have occurred in the way that it did without government support (hence, there would be no deadweight loss). The supported project would be expected to be commercially viable within three years and

should only have been assisted if the resulting costs and benefits represented an efficient use of national resources. As such there was to be no displacement within Northern Ireland i.e. by supporting a project the government was not causing rival firms to close or reduce employment. In the decision to finance a project the IDB also considered the importance of the project to the industrial sector, the sub-region and the cost-per-job.

*Table 1. Policy Instruments and Policy Objectives*

| SFA scheme | Description | Objective supported |
|---|---|---|
| Capital grant | Up to 50% of the eligible cost of new buildings, machinery and equipment | • Attract inward investment, maximum available for locating in TSN areas<br>• Create (and maintain) employment through allowing for greater capital expenditure<br>• Modernize equipment in indigenous firms, introduce new technology; provide funding to supplement private sector finance<br>• Encourage business start-ups |
| Employment Grant | Negotiable on a per capita basis normally paid over a period of 3-5 years according to the build-up of employment | • Attract inward investment<br>• Lower wage (and thus overall) costs to provide a cost-advantage to NI firms<br>• Safeguard employment where appropriate |
| Interest Relief Grant | Payable towards interest costs on loans obtained from the private sector | • Facilitate borrowing from the private sector which would otherwise be too expensive given adverse selection problems and thus (financial) market failure |
| Rent Grant | Payable towards rental costs of factories (up to 100% of rental costs for up to five years) | • Attract inward investment<br>• Encourage growth in locally owned expansions |

| | | |
|---|---|---|
| Loan<br>Share Capital Investment | Discretionary Government loan against approved security; investment in the share capital of the company | • Access to capital to plug gaps in private sector capital markets (cf. also Interest Relief Grant) |
| Marketing[1] | Payable towards the development of a marketing plan. | • Increase competitiveness; encourage a greater emphasis on quality rather than cost through opening-up more (niche) markets |
| Product Development | Payable towards the development of a new product range | • Increase competitiveness through innovative activities; lower the barrier to such developments (hence market failure) |
| Research & Development[2] | Payable towards activities that are R&D in nature but are not expenditure related. | • Cf. product development, but also underwriting the risks involved through higher percentage levels of grant aid |
| Miscellaneous[3] | Payable towards a range of miscellaneous activities. | • Cf. product development; lowering the barriers to local NI firms accessing business services. |

*Notes*: 1. Independent of the Marketing Development Grant Scheme which is not included in SFA.

2. Expenditure related R&D activities were provided for under a separate scheme until 1992 when they were included in the remit of IRTU.

3. Includes grants towards activities such as, consultancy costs, survey reports, recruitment of specialised staff. It also includes payments when predefined targets are achieved, e.g. increase in sales, improvement in profit margins.

Table 1 details the schemes that were in operation during the period of this study. The two main policy tools employed were capital grants of up to 50 per cent of the eligible costs of buildings, plant and machinery which accounted for about 70 per cent of the value of total offers; and employment grants that were negotiable on a per capita basis and accounted for about 19 per cent of total offer value. Employment grants were particularly important in the 1980s but were then to some extent replaced by Revenue Grants in much of the 1990s. These revenue grants supported the policy of increasing firm competitiveness and funded activities such as marketing, product development and non-expenditure related research and development[6]. Other SFA expenditure such as interest relief grants that were payable towards interest costs on loans obtained from the private sector, loans and share capital investment were generally on a very small scale. Despite this wealth of schemes there were few offers of assistance that did not include capital funding as part of the SFA package.[7]

A number of studies have assessed the role of SFA in the Northern Ireland economy. Harris, 1991, examined the period from 1945 to 1988 and concluded that in general the policy tools employed had made some difference to the regional economy in that they did provide more jobs and investment than would have otherwise not been achieved. Harrison, 1990, concluded that, by the end of the 1980s, the policy of diversification through inward investment, supported by SFA for capital investment in employment generating projects had not led to self-sustaining regional economic growth. The Northern Ireland Economic Council (NIEC) published several reports in the 1990s criticising industrial policy as not having delivered the development of profitable and productive companies capable of maintaining and expanding employment; of encouraging the development of a dependency culture and that inward investment had failed to create sufficient linkages and integration with the rest of the economy (NIEC, 1990, 1991, 1994). An assessment of the extent to which the administration of industrial policy altered during the first half of the 1990s following the change in government policy concluded that despite the increased focus on 'softer' aspects of improving competitiveness the straight subsidisation of capital investment by grants continued to be the main characteristic of IDB policy (NIEC, 1997).

While all of these studies have provided useful and timely insights into the effect of regional policy none have specifically addressed the issue of whether SFA impacted on

the performance of assisted plants in terms of employment change and survival prospects compared with plants that did not receive assistance.

## 3. DESCRIPTION OF THE DATA

The data used in this study come from two primary sources: the records of the IDB and the ARD. The ARD has been discussed at length in Griffith, 1999, and Harris, 2002, and essentially comprises mainly financial information[8] collected from some 14-19,000 UK establishments (or reporting units), based on a stratified sampling frame that is heavily biased towards the largest establishments (see Oulton, 1997, Table 1 for details). Establishments (and the plants comprising such establishments) can be linked through time to form a panel, and information on the population of establishments (or plants) can be used to weight the data to obtain population estimates.

The dataset constructed from the IDB records was for all manufacturing plants that had received offers and payments of SFA in the financial years 1983/84 to 1996/97 (1,337 offers).[9] For each plant assisted, information was collected on a range of variables covering industrial classification, postcode, ownership, the value of SFA offered by grant type (e.g. capital grant, employment grant, loans etc.), the total capital investment supported, employment at date of offer and associated job promotion and/or maintenance, payments made each year by grant type, the year that the company first received ID assistance, year of closure (if appropriate) and the employment profile of the plant. Sources comprised the letters of offer, payment account records, company records and annual employment returns.

Using a database of company names linked to the ARD[10] we were able to tie 1,161 of the offers into the ARD at the plant level, the latter comprising the known population of local units operating in Northern Ireland,[11] to give 436 plants in the matched dataset. Hence, there were 176 offers that could not be matched and we have calculated that in terms of new employment from SFA, safeguarded employment and total SFA grants offered, the matched data excluded 12.2, 5.2 and 10.5 per cent of the totals, respectively. Careful checking of the SFA data that was matched into the ARD revealed no bias in terms of factors such as the years in which these offers were made, the

industries covered, the country of ownership, etc. (although the offers made did tend to be smaller than for those offers that were matched into the ARD).[12]

The data showed that a significant number of plants were in receipt of more than one offer. Only 139 (or 12 per cent of) offers were one-off payments to an individual plant and accounted for 17.2 per cent of the total assistance paid out during the period. Overall, 14 per cent of the 436 matched plants received five or more offers which represented 26.5 per cent of total assistance. This highlights the issues of whether multi-aided plants had become dependent on financial assistance to support their operation and the extent of probable deadweight that was involved in these repeat offers.[13]

The previous section detailed the policy instruments that were in place during the period and highlighted the importance of capital grants and, to a lesser extent, employment grants, in supporting industrial development. Table 2 shows that the median level of capital assistance was 45 per cent until 1987, i.e., most offers were close to the maximum limit of 50 per cent of capital expenditure that could be grant-aided. Since then there has been a marked decline in such support so that by the late 1990s capital grants contributed some 20-25 per cent of the fixed investment being undertaken by the assisted plant.

*Table 2. Expenditure on capital and employment creation, 1983-97*

| | Median Capital Expenditure (%) | Median Cost-per-job[1] (£, current prices) | | |
|---|---|---|---|---|
| | | New Jobs | Maintained Jobs | Both New and Maintained Jobs |
| 1983 | 45 | 7,704 | 1,945 | 2,243 |
| 1984 | 45 | 7,427 | 2,150 | 6,038 |
| 1985 | 45 | 9,196 | 3,825 | 6,354 |
| 1986 | 45 | 8,825 | 2,500 | 4,573 |
| 1987 | 45 | 12,022 | 3,300 | 5,769 |
| 1988 | 40 | 8,850 | 3,135 | 8,950 |
| 1989 | 38 | 8,994 | 3,013 | 7,111 |
| 1990 | 33 | 10,832 | 3,932 | 8,259 |
| 1991 | 25 | 11,906 | 5,625 | 7,284 |
| 1992 | 25 | 16,806 | 5,671 | 7,809 |
| 1993 | 25 | 12,916 | 7,150 | 4,754 |
| 1994 | 26 | 14,813 | 4,178 | 4,409 |
| 1995 | 25 | 10,082 | 4,288 | 14,397 |
| 1996 | 25 | 18,169 | 5,000 | 6,659 |
| 1997 | 20 | 13,459 | 5,560 | 5,013 |

*Note*:1. The categories of new, maintained and both new and maintained are mutually exclusive.

*Source*: Own calculations based on IDB company accounts.

The cost of promoting new jobs rose in nominal terms from about £8,000 per job in the early 1980's to around £15,000 by the late 1990's.[14] The cost of maintaining existing jobs was lower (typically a third of the cost of new jobs), and also increased over time, partly reflecting the impact of inflation. These increases over time imply that the decision to support a project was not strongly influenced by the cost-per-job measure. In terms of employment, there were 40,138 new jobs promoted over the period; 50,421 jobs were safeguarded and plants with a mix of new and safeguarded employment

accounted for 33,791 SFA jobs.[15] The total number of jobs promoted and/or safeguarded was 124,350, which represents a significant amount of employment since the total stock of employment in manufacturing throughout the period was around 110,000 and are a reflection not just of the level of assistance but also of the considerable level of 'churning' that exists in the Northern Ireland manufacturing sector. Job promotion and/or maintenance tended to be concentrated on the traditional (and also 'older') industries of food, drink and tobacco; textiles; clothing and footwear between 1983 and 1991. From 1992, there was not only a decline in the level of employment supported but also a shift away from these traditional industries towards electronics and electrical engineering.

*Table 3. Variable Definitions (means and standard deviations)*[1]

| Variable | Definitions | Mean | Standard deviation | Which model Variable entered in[4] |
|---|---|---|---|---|
| $US_{it}$ | Dummy coded 1 if plant *i* is US-owned at time *t*=1983, …1997 | 0.027 | 0.179 | 1 & 2 |
| $EU_{it}$ | Dummy coded 1 if plant *i* is EU-owned at time *t*=1983, …1997 | 0.078 | 0.230 | 1 & 2 |
| $O\_FO_{it}$ | Dummy coded 1 if plant *i* is other foreign-owned at time *t*=1984, …1997 | 0.013 | 0.111 | 1 & 2 |
| $GB_{it}$ | Dummy coded 1 if plant *i* is GB-owned at time *t*=1983, …1997 | 0.222 | 0.415 | 1 & 2 |
| $\Delta OWN_{it}^{83-89}$ | Dummy coded 1 when plant *i* changes ownership in *t*=1983-1989 (remains 1 thereafter) | 0.146 | 0.376 | 2 |
| $\Delta OWN_{it}^{90-98}$ | Dummy coded 1 when plant *i* changes ownership in *t*=1990-1998 (remains 1 thereafter) | 0.071 | 0.286 | 2 |
| $SINGLE_{it}$ | Dummy coded 1 when plant *i* is a single plant in year *t* | 0.274 | 0.493 | 1 & 2 |
| *ln* $REL\_P\_SZE_{it}^{2}$ | Employment of plant *i* relative to enterprise *k* to which plant belongs in *t* | -1.672 | 1.476 | 2 |
| *ln* $REL\_E\_SZE_{kt}^{2}$ | Employment of enterprise *k* relative to industry employment in *t* | -1.537 | 1.433 | 2 |
| $SFA_{it}$ | Value of SFA for plant *i* in *t* (£m 1990 prices) | 0.086 | 1.181 | 2 |

| | | | | |
|---|---|---|---|---|
| *ln* $EMP_{it}$ | Current employment in plant *i* in year *t* | 2.589 | 1.447 | 1 & 2 |
| $AGE_{it}$ | Age of plant (*t* minus year opened +1) in years | 9.421 | 8.100 | 1 & 2 |
| *ln* $CAP\_LAB_{it}$ | Capital-to-labour ratio for plant *i* in time *t* (source: Harris and Drinkwater, 2000, updated) | -5.290 | 1.924 | 1 & 2 |
| *ln* $GROWTH_t$[3] | Growth in industry real gross output, *t*-1 to *t*. | 0.015 | 0.279 | 2 |
| *ln* $Y/L_{it}$ | Real gross-value added per employee in plant *i* and time *t* | 9.578 | 0.789 | 2 |
| North | Dummy coded 1 if plant located in Coleraine or Ballymena TTWA | 0.108 | 0.311 | 1 & 2 |
| South | Dummy coded 1 if plant located in Newry or Craigavon TTWA | 0.156 | 0.363 | 1 & 2 |
| West | Dummy coded 1 if plant located in Londonderry, Strabane, Enniskillen or Omagh TTWA | 0.128 | 0.334 | 1 & 2 |
| Mid-Ulster | Dummy coded 1 if plant located in Dungannon or Mid-Ulster TTWA | 0.117 | 0.321 | 1 & 2 |

*Notes*: 1. In addition the variables entering the models included 21 industry dummies at the 2-digit level and individual year time dummies. All data are weighted by population weights.

2. Single-plant enterprises coded as zero.
3. Calculated separately for each 4-digit industrial sector.
4. Model 1 refers to Tobit (Table 4) and model 2 refers to hazard (Table 6)

*Table 4. Parameter estimates of the weighted Tobit model for SFA offers for Plant i in year t (all NI manufacturing industry, 1983-98; plants belonging to enterprises employing 50 or more workers)*

| Variable | $\hat{\beta}$ | *t*-values |
|---|---|---|
| $US_{it}$ | 0.468 | 3.29 |
| $EU_{it}$ | 0.575 | 4.85 |
| $GB_{it}$ | -0.298 | -4.44 |
| *ln* $AGE_{it}$ | 0.241 | 4.43 |
| *ln* $EMP_{it}$ | 0.943 | 32.78 |
| *ln* $CAP\_LAB_{it}$ | 0.419 | 18.19 |
| $North_{it}$ | 0.195 | 2.36 |

| | | |
|---|---|---|
| $South_{it}$ | 0.176 | 2.43 |
| $West_{it}$ | 0.217 | 2.76 |
| $Mid\text{-}Ulster_{it}$ | 0.672 | 8.37 |
| Constant | -5.693 | -15.03 |
| Pseudo-$R^2$ = 0.16 | | |

*Note*: See Table 3 for definitions of the variables.

With the IDB and ARD data linked, it is possible to look at the characteristics of the plants that received government support and compare them with plants that although eligible for support (i.e. enterprise employment was 50 or more workers) did not receive such assistance. To do this, we estimate a Tobit model where the dependent variable is total SFA received. A sub-set of the variables available in the IDB-ARD merged dataset are used to determine which plants were in receipt of assistance and how much they received. These are defined in Table 3, and the results from estimating the Tobit model are presented in Table 4. Note a Tobit model is used as the dependent variable ($SFA_{it}$) is truncated at zero for those plants that do not receive assistance, and only a sub-set of variables are chosen for the Tobit model in line with previous work in this area (see for example Harris and Trainor, 2005).[16] As Table 4 shows, SFA plants were larger in employment terms, were more capital intensive and older than non-assisted plants. In terms of ownership, there was evidence that US- and EU-owned plants were more likely to receive assistance, while GB-owned plants were less likely to receive SFA, vis-à-vis the benchmark group (NI-owned plants). There is also evidence that plants located outside of the Belfast area were more likely to receive (higher levels of) aid (especially those located in the Dungannon or mid-Ulster travel-to-work area).

The creation of this matched dataset allows us to examine employment change in plants that received SFA and compare this to what happened in eligible but non-assisted plants i.e. the counterfactual.

## 4. EMPLOYMENT CHANGE

Using a standard labour market accounts approach, Table 5 shows the overall employment change between 1984 and 1998, differentiated into plants that were in operation throughout the period, plants that opened after 1984 and those that closed before 1998. The data relates to plants that received SFA, plants that were eligible and did not receive SFA (counterfactual) and plants that were not eligible for assistance because they were too small (i.e. they belonged to enterprises employing fewer than 50 workers).

*Table 5. Employment in Northern Ireland Manufacturing, 1984-98*

| | Employment | | |
|---|---|---|---|
| | 1984 | 1998 | Change |
| *Open throughout 1984-98* | | | |
| Eligible and SFA | 15,996 | 36,219 | 20,223 |
| Eligible but not SFA | 32,498 (28,178) | 6,147 (5,355) | -26,351 (-22,823) |
| Non-Eligible plants | 1,365 (5,685) | 1,436 (2,228) | 71 (-3,457) |
| Total | 49,859 | 43,802 | -6,057 |
| *Opened after 1984* | | | |
| Eligible and SFA | 0 | 5,497 | 5,497 |
| Eligible but not SFA | 0 | 29,969 (16,603) | 29,969 (16,603) |
| Non-Eligible plants | 0 | 25,768 (39,134) | 25,768 (39,134) |
| Total | 0 | 61,234 | 61,234 |
| *Closed before 1998* | | | |
| Eligible and SFA | 6,106 | 0 | -6,106 |
| Eligible but not SFA | 36,817 (21,425) | 0 | -36,817 (-21,425) |
| Non-Eligible plants | 17,979 (33,371) | 0 | -17,979 (-33,371) |
| Total | 60,902 | 0 | -60,902 |
| *All plants* | | | |
| Eligible and SFA | 22,102 | 41,716 | 19,614 |
| Eligible but not SFA | 69,315 (49,603) | 36,116 (21,958) | -33,199 (-27,645) |
| Non-Eligible plants | 19,344 (39,056) | 27,204 (41,362) | 7,860 (2,306) |

| | | | |
|---|---|---|---|
| Total | 110,761 | 105,036 | -5,725 |

*Note*: Figures in parenthesis show an alternative method of measuring employment change in plants that did not receive SFA in that, for the eligible but not SFA, they refer to plants that belonged to enterprises with at least 50 workers *throughout* the 1984-98 period.

*Source*: ARD/IDB matched dataset.

The first point worth noting is the substantial amount of 'churning' (i.e. employment loss and creation due to the opening and closure of plants) in Northern Ireland manufacturing. Some 61 thousand jobs were created in new plants while nearly the same number were destroyed through plant closures. For plants that were in operation throughout the period (accounting for some 41-45 per cent of all employment), small non-eligible plants had very little impact on overall employment change. Such small plants have high rates of closure (Storey, 1994) and many would not have survived the 14-year period under consideration. For plants that were eligible for SFA and remained open throughout the period, non-assisted plants experienced a considerable loss of employment (26,351 jobs) *vis-à-vis* a significant gain for SFA plants (20,223 jobs). These changes do *not* reflect a shift of plants from the non-assisted to the SFA sector during the 1984-98 period, as all SFA plants are included in the 'eligible and SFA' sub-group if assistance was given between 1983/84 and 1996/97. Since eligibility depends on the size of the enterprise, the figures in parenthesis in Table 5 give an alternative version of these data with the eligible non-SFA sub-group being restricted to plants that belonged to enterprises that had at least 50 workers *throughout* the time period. This shows that some of the eligible non-SFA plants belonged to enterprises that were below the employment threshold at some point during the period.

In terms of the impact on employment for plants that opened after 1984, smaller non-eligible and eligible but non-assisted plants accounted for the vast majority of the 61 thousand jobs created in new plants. In contrast, only around 5,500 jobs were created in plants that had received SFA and were new to manufacturing. This indicates that much of the impact of SFA was concentrated on existing (larger) plants and companies, and was poor at fostering new firm formation. While SFA had a relatively poor record at creating new plants and firms, the data also shows that in relative terms it protected plants from higher levels of closure. Out of a total of almost 61,000 jobs that were lost

through plant closures, just over 6,000 of these jobs were in plants that had received SFA.

Overall, Table 5 suggests that in terms of employment change SFA concentrated on protecting existing (rather than new) enterprises. This was the case with respect to maintaining and expanding employment in plants that remained open throughout the period, but also in terms of significantly reducing the probability of closure of the plants belonging to these enterprises. In the next section we examine this issue of plant closure in more detail, as it may be the case that SFA plants experienced lower closure rates because of certain characteristics (such as size) rather than because SFA itself lowered the probability of exiting. It is also important to note, that the results in Table 5 do not necessarily imply that SFA resulted in improvements in the plants concerned (such as increases in total factor productivity) such that this accounted for their apparently better employment performance. For evidence on this, see Harris and Trainor, 2005.

## 5. PLANT CLOSURE

The above analysis suggests that SFA plants are less likely to close *vis-à-vis* non-assisted plants and in keeping with the empirical literature on firm survival (e.g. Disney *et al*., 2003; Harris and Hassaszadeh, 2002; Audretsch and Mahmood, 1995) we use a Cox proportional hazard model (COX, 1975, 1975) to model the likelihood of plant exit. In order to model the determinants of plant exit, the time-varying covariates hazard function model was applied to population weighted plant-level panel data from the Northern Ireland ARD for 1983-1998 with the SFA data matched into the ARD. Defining the hazard rate of plant *i* as the probability that it exits in time *t* having survived until *t*, the hazard function h( ) is given by:

$$h(t; \mathbf{X}(t)) = P[\text{exit at } t \mid \text{survival to } t; \mathbf{X}(t)] = P[T = t \mid T \geq t, \mathbf{X}(t)] \quad (1)$$

where $\mathbf{X}(t)$ is the covariate path of $\boldsymbol{x}$ up to $t$.

We estimated a Cox proportional hazard model:

$$h(t) = h_0(t) \exp(\mathbf{x}(t)\boldsymbol{\beta}) \quad (2)$$

that comprises a non-parametric base-line hazard, $h_0(t)$ and a parameterised function of plant characteristics, $\exp(\mathbf{x}(t)\boldsymbol{\beta})$. The plant characteristics (i.e. covariates) included in $\mathbf{X}(t)$ are listed in Table 3 and include ownership (and changes in ownership), size (and

relative size within the enterprise, and the size of the enterprise within the industry), age, capital intensity, labour productivity, location within Northern Ireland, value of SFA received, and whether the plant operated in a high growth industry.

The choice of variables reflects the extensive theoretical and empirical literature that has identified determinants of plant exit and is fully discussed in Harris and Hassaszadeh, 2001. In brief, the literature considers the impact of ownership in terms of single/multi-plant enterprises and country (e.g. Reynolds, 1988; Baden-Fuller, 1989; Dunne *et al.*, 1989; Ghemawat and Nalebuff, 1990; Audretsch, 1994, Mata *et. al*., 1995; McCloughan and Stone, 1998; Disney *et al.*, 1999; Colombo and Delmastro, 2000 and 2001); ownership changes (e.g. Ravenscraft and Scherer, 1989; McGuckin and Nguyen, 1995 and 2001); size and relative size (e.g. Lieberman, 1990; Caves, 1998; Colombo and Delmastro, 2000); age (e.g. Dunne *et al*., 1989; Mata and Portugal, 1994; Disney *et al*., 1999); capital intensity (e.g Dixit, 1989; Doms *et al.*, 1995; Kleijweg and Lever, 1996); productivity (e.g. Siegfried and Evans, 1994; Kleijweg and Lever, 1996) and high growth industries (Mata *et. al*., 1995).

The results from estimating equation (2) are presented in Table 6 while Table 7 reports the parameters of the hazard function for only those variables with significant values when age effects were important. The second column of data in Table 6 shows that being assisted by government grants (*ceteris paribus*) lowered the hazard rate of closure by 24.1 per cent on average. [17] This is consistent with the finding by Girma *et al*., 2003, that, in general, grant payments have helped plants to survive longer in the Republic of Ireland. In terms of ownership, externally-owned plants were significantly more likely to close. Plants that were US, GB, and Other-foreign owned were 76.2, 30.5 and 103.5 per cent respectively, more likely to exit while EU-owned plants were (*cet. par*.) 15 per cent less likely to close (although statistically there is little evidence to support this given the z-value). As expected, plant size was significant in that larger plants were 14.4 per cent less likely to close, although the largest plants belonging to an enterprise were 5.9 per cent more likely to close. There was no indication that belonging to a large enterprise in the industry had a statistically significant impact on the probability of closure. Plants that experienced a change of ownership in the 1980's were 54.7 per cent more likely to close whilst a change of ownership in the 1990s did not have a significant effect on closure. Location within Northern Ireland had some impact on closure: being

situated in the South of the province lowered the probability by some 12 per cent while plants located in Mid-Ulster were over 15 per cent more likely to close (*cet. par.*).

*Table 6. Parameter estimates of the weighted hazard model for NI manufacturing industry, 1983-98 (plants belonging to enterprises employing 50 or more workers)*

| Variable | Standard Model | | | Instrumented model[1] | | |
|---|---|---|---|---|---|---|
| | $\hat{\beta}$ | $e^{\hat{\beta}}$ | z-values | $\hat{\beta}$ | $e^{\hat{\beta}}$ | z-values |
| $US_{it}$ | 0.566 | 1.762 | 2.34 | 0.676 | 1.965 | 2.69 |
| $EU_{it}$ | -0.163 | 0.850 | -1.26 | -0.061 | 0.941 | -0.45 |
| $O\_FO_{it}$ | 0.711 | 2.035 | 4.37 | 0.616 | 1.852 | 3.58 |
| $GB_{it}$ | 0.267 | 1.305 | 2.43 | 0.226 | 1.253 | 2.07 |
| $\Delta OWN_{it}^{83-89}$ | 0.437 | 1.547 | 3.76 | 0.418 | 1.519 | 3.56 |
| $\Delta OWN_{it}^{90-98}$ | 0.026 | 1.027 | 0.26 | 0.022 | 1.022 | 0.21 |
| $SINGLE_{it}$ | -0.194 | 0.823 | -1.44 | -0.186 | 0.830 | -0.98 |
| $SINGLE_{it} \times AGE_{it}$ | 0.029 | 1.029 | 2.93 | 0.030 | 1.030 | 3.04 |
| *ln* $REL\_P\_SZE_{it}$ | 0.057 | 1.059 | 1.88 | 0.067 | 1.069 | 1.93 |
| *ln* $REL\_E\_SZE_{kt}$ | 0.018 | 1.018 | 0.53 | 0.022 | 1.022 | 0.63 |
| $SFA_{it}$ | -0.275 | 0.759 | -2.70 | -0.162 | 0.851 | -2.84 |
| *ln* $EMP_{it}$ | -0.156 | 0.856 | -3.89 | -0.183 | 0.982 | -3.27 |
| *ln* $CAP\_LAB_{it}$ | 0.032 | 1.033 | 1.21 | 0.084 | 1.087 | 2.79 |
| *ln* $GROWTH_t$ | 0.201 | 1.222 | 2.13 | 0.203 | 1.225 | 2.12 |
| *ln* $GROWTH_t \times$ $AGE_{it}$ | -0.046 | 0.955 | -6.25 | -0.045 | 0.956 | -6.07 |
| *ln* $Y/L_{it}$ | -0.034 | 0.967 | -2.50 | -0.030 | 0.971 | -2.45 |
| *ln* $Y/L_{it} \times AGE_{it}$ | 0.011 | 1.011 | 2.15 | 0.009 | 1.009 | 1.83 |
| $North_{it}$ | 0.063 | 1.064 | 0.55 | 0.075 | 1.078 | 0.65 |
| $South_{it}$ | -0.128 | 0.880 | -1.79 | -0.108 | 0.898 | -1.09 |
| $West_{it}$ | -0.045 | 0.952 | -0.41 | -0.015 | 0.985 | -0.14 |
| $Mid\text{-}Ulster_{it}$ | 0.141 | 1.151 | 1.64 | 0.212 | 1.236 | 1.68 |

*Note*: See Table 3 for definitions of the variables.

[1] Predicted value for SFA (obtained from estimates in Table 4) included instead of actual value of SFA.

*Table 7. Median parameter estimates $e^{\beta-1}$ by age sub-group in years (based on Table 6)*

| | AGE <= 1 | 1 < AGE <= 5 | 5 < AGE <= 10 | AGE > 10 |
|---|---|---|---|---|
| $SINGLE_{it}$ | -0.165 | -0.107 | 0.038 | 0.329 |
| *ln* $GROWTH_t$ | 0.155 | 0.063 | -0.168 | -0.629 |
| *ln* $Y/L_{it}$ | -0.023 | -0.002 | 0.052 | 0.159 |

Table 7 shows that new single-plant enterprises were over 16 per cent less likely to close (*cet. par.*) but the probability decreases with age such that single plants aged over 10 years were some 33 per cent more likely to close. Very young plants operating in high growth industries were 15.5 per cent more likely to close, but the oldest plants had a 62.9 per cent lower probability of closure. Lastly, very young plants with high labour productivity levels were 2.3 per cent less likely to exit an industry, but plants with high labour productivity that were over 10 years old were (*cet. par.*) some 16 per cent more likely to close.[18]

There is potential sample selection bias in our estimated model of closure, as Table 4 indicated that those plants that received assistance are not a random sample of population of all plants.[19] In other words, there is likely to be a correlation between the characteristics of a plant relating to the probability of receiving assistance and the relationship between having received assistance or not and the probability of plant closure. Ideally, what we want to know is what would have happened to those receiving SFA (with their set of characteristics that distinguishes them from non-SFA plants), in terms of the probability of closure, if they had not received SFA, so we can directly estimate the impact of SFA on closure (known in the literature as 'treatment on the treated'). Harris (2005) discusses this issue of sample selection and the remedies that are available. The most appropriate way to try to take account of sample selection here is to obtain an 'instrument' for the SFA variable in the hazard model. We do this by using the earlier Tobit model (see Table 4) to obtain a predicted value of SFA, which we substitute for actual SFA, this gives the second set of results reported in Table 6. The major impact of instrumenting SFA is to reduce the impact of this variable; instead of those in receipt of SFA having a 24.1 per cent lower probability of closure, the impact is

reduced to a 15 per cent lower probability, still confirming that those that received SFA were significantly less likely to close.

## 6. CONCLUSIONS

This study has focused on two questions relating to the impact of government financial assistance on employment in manufacturing firms in Northern Ireland. Firstly, did such assistance concentrate on protecting employment in existing firms as opposed to encouraging new firm foundation; and secondly, did support influence the probability of firm closure? The various studies cited in section 2 have all attempted to answer these questions but their methodology was constrained by the availability of only aggregate data sources. This study is unique, in that it used a dataset that combines plant-level information from the ARD and the IDB. Hence, we are able to compare employment change in those manufacturing plants that received assistance against the counterfactual position.

The results show that the overall net effect on employment change was an increase of around 19,600 jobs in plants that had received SFA compared with a loss of 33,200 jobs in eligible but non-assisted plants. Disaggregating employment change into openings, closures and *in situ* change showed that fewer than 5,500 jobs were created in new firm formation by plants that had received SFA. Hence, in answer to the first question, the main effect of financial assistance was to stabilise employment by sustaining existing plants rather than through the generation of new plants. This does not seem to fit well with the need for government to produce the right setting to aid the churning of plants, which it is acknowledged has an important role in boosting aggregate productivity growth in (regional and) national economies (see for example, Hoekman and Javorcik, 2004). To answer the second question, we estimated a plant closure model. The results show that IDB-assisted plants had on average somewhere between a 15 and 24.1 per cent lower probability of closure due solely to the impact of a plant receiving SFA.

In terms of the overall aim of SFA, (i.e. a restructuring of the industrial base that would encourage the development of a competitive and export-orientated manufacturing sector that would provide the opportunities for new employment), the evidence (particularly

prior to 1991) suggests that assistance was mostly responding to the existing concentrations of employment rather than furthering firm formation in new industries. This implies that policy, during this period, was demand driven, with companies that were seeking to expand or struggling to survive receiving assistance. Harris, 2001, provided evidence that manufacturing plants in Northern Ireland operated at a lower level of technical efficiency when compared to their counterparts in other regions of the UK and pointed to the presence of "a long tail of weaker plants that tend to drag down average efficiency". By supporting these relatively inefficient plants policy may have been exacerbating, although not intentionally, problems in the manufacturing sector. It is important to note that for the early years of the period policy was operating in a climate of political conflict and instability and hence the task of building a more efficient indigenous base and also attracting inward investment was particularly difficult.

Since 1991 there has been a policy shift away from maintaining employment, particularly in indigenous companies operating in the traditional sectors, towards an approach focused on improving competitiveness and more recently innovation and entrepreneurship. Whether this policy shift has been significant (away from providing mostly capital grants that stabilise exiting manufacturing employment in the Province) and to what extent it will be sustained is beyond the scope of this study (and requires more recent data to evaluate fully). Thus, future studies will determine if this is the 'right' direction for sustaining manufacturing employment.

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**NOTES**

[1] Shorts, and Harland and Wolff were excluded from the analysis because we did not have access to their files. In addition, under the arrangements for privatisation (in 1989) they collectively received around £400 million between 1990 and 1997 in respect of retained liabilities and guarantee support schemes rather than through SFA. Inclusion of these payments in our analysis would have distorted the results.

[2] Clearly, many of these jobs did not survive and/or were based in companies that returned to the IDB more than once for assistance.

[3] In April 2002 a new economic development agency, Invest Northern Ireland, was established. Invest NI is responsible for the functions previously carried out by a number of separate agencies – Industrial Development Board, Local Enterprise Development Unit, Industrial Research and Technology Unit, and Business Support Programmes administered by the Department of Enterprise, Trade and Investment and the Northern Ireland Tourist Board.

[4] Although industrial development policy in Northern Ireland dates back to the 1932 New Industries Development (NI) Act, it was not until the introduction of the Industries Development Act (NI) in 1945 that the basis for the provision of selective financial assistance for job creation was established.

[5] Although the extent to which early policy was based on *directly* enhancing efficiency and competitiveness, and the extent to which SFA was used as a means to create and maintain employment, is a matter of debate. Clearly, capital grants are intended to increase productive capacity (and thus generate employment, although indirectly and at

the risk that capital may be substituted for labour if capital grants make the price of capital cheap relative to that of labour).

[6] Expenditure related R&D activities were provided for under a separate scheme until 1992 when they were transferred to the remit of Industrial Research and Technology Unit.

[7] Indeed there were very few projects funded involving employment grants that did not also receive capital grants. We are aware that since the late 1990s there have been changes in the proportion of SFA accounted for by capital grants and the 2001/02 Annual Report from the IDB shows that in 2001-02 capital grants accounted for 36.4% of all SFA grants paid.

[8] Such as sales, purchases of inputs, as well as certain key characteristics of respondents such as ownership, location, employment and industrial classification.

[9] Under SFA legislation only enterprises employing 50 or more workers are eligible for assistance. A separate organisation, the Local Enterprise Development Unit (LEDU), provided assistance to small firms.

[10] This database did not provide full coverage of company names; hence key characteristics such as postcode, industry classification, and employment size were also used to identify plants.

[11] Note, financial information contained in the reporting unit data in the ARD was 'spread back' to each plant (or local unit) using information on plant employment. The arguments for doing this (rather than working at the reporting unit level) have been extensively discussed in Harris (2002, 2005), and relate to various problems with using reporting unit information (not least that when a plant closes the reporting unit often does not).

[12] It should also be noted that payments lag behind offers made and in aggregate they might not sum to the total value of offers if SFA is suspended or the offer withdrawn for any reason (e.g., the plant does not reach the agreed employment targets, business plans change, the plant ceases production, etc.). Payments on employment grants, loans and rent relief were more likely not to match the initial value of the offers made, than were other categories.

[13] In theory, grant-aid is not given if deadweight is likely to occur. In practice, there seems to have been minimal monitoring of repeat offers and thus whether previous SFA had achieved its aim.

[14] Cost is defined as all grants offered under SFA (and excludes rent relief and loans); jobs refer to the number of jobs to be promoted or maintained as agreed with the IDB at the time that the grant was offered. Thus, the figures in Table 2 are simply the direct cost per supported job; they are not the exchequer cost per job based on a full evaluation of the SFA programme,

[15] The number of jobs promoted or maintained declined from an annual equivalent of some 12.5 thousand in 1983-91 to some 7.8 thousand p.a. in 1992-97. Much of this decline was the reduction in providing grants for maintaining existing jobs rather a decline in the number of new jobs promoted through SFA.

[16] Note, 'other foreign-owned', the employment size of the enterprise and whether the plants was a single-plant enterprise or not were also entered into the model, but were jointly insignificant on the basis of a *F*-test (and were thus omitted from the final model). We also have tried including a variable representing labour productivity, but this also

proved insignificant (probably explained by a high correlation between plant size and productivity, leading to collinearity problems).

[17] This result is obtained by subtracting value 1 from the log-odds ratio of closure $e^{\hat{\beta}}$.

[18] This result may reflect the fact that older, high labour productivity plants have higher fixed costs (associated with the use of vintage capital stocks) and therefore become prone to closure when organisations are looking to cut capacity.

[19] We are grateful to a referee for pointing this out to us, and suggesting a solution to this problem.