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Creating jobs through public subsidies: An empirical analysis ☆

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Abstract

This paper analyses the impact of government grants on labour demand using plant level data for manufacturing industry in Ireland. Our data consists of a large sample of plants and their complete grant history. We provide evidence that additional employment is created over and above the level that would have prevailed in the absence of grant payments. We also find differences in the employment response to subsidies between domestic and foreign-owned plants, with the former creating more additional jobs per euro of grant payment. Simple cost-benefit analysis reveals that a large part of the costs of grants appears to be recouped in additional wage streams under reasonable assumptions.

JEL classification: H25; J23
Keywords: Grants; labour demand; multinationals

1. Introduction

Creating jobs through subsidies is now a commonly used policy tool in many OECD countries. One approach advocated in the academic literature is to attempt to increase employment directly via employment subsidies. As a matter of fact, Kaldor (1936) originally advocated a general subsidy to be given to all workers. Since expenditure on such jobs, however, represents

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deadweight spending, Layard and Nickell (1980) proposed instead marginal employment subsidies, where financial assistance is only given to additional jobs created.[1] Yet another approach is to subsidise other aspects of firm activity, such as encouraging R&D, innovation, capital investment, entrepreneurship, exporting, training and efficient energy use, and link these with the number of jobs to be created. Such grants also act essentially as marginal employment subsidies; see Wren (2003).

The most commonly appealed to justification for marginal employment subsidies is that the firm's cost of creating the *additional* job(s) may be higher than the shadow or social cost.[2] In practise, however, the efficiency of such financial assistance may be questioned. Specifically, the problem of deadweight spending may arise, where, because of the policy maker's lack of complete information about firms, jobs are subsidised that would have been created independently of receiving financial assistance — a point already noted by Layard and Nickel (1980). One potential route with which to overcome this problem at least partially is by using discretionary subsidies accompanied by employment targets, in which the amount of subsidy to each firm depends on an assessment by a civil officer of the level of additional employment associated with the project.[3] In practise, of course, such an assessment process may be difficult and costly to implement and the policy maker is very unlikely to ever be in possession of perfect information.[4]

Despite the widespread and increasing use of financial assistance to firms encouraging job generation (see Holden and Swales, 1995 and Wren, 2003), rigorous econometric analysis of the actual job additionality of such subsidies is rather limited. Nevertheless, overall the view appears to be that deadweight spending, i.e., spending on non-additional jobs, represents a large part of financial assistance. Using qualitative survey data for selected groups of Irish firms, Lenihan (1999) and Lehinan et al. (2003) find deadweight spending to be between 40 and 80 per cent.[5] Also, Cotta and Mahy (1998) using the results from a firm level questionnaire find that the equivalent figure varies between 46 and 62 per cent for a similar scheme in Belgium. Wren (1994), on the other hand, provides econometric evidence that in certain limited cases grants under the Regional Financial Assistance programme did positively affect the build-up and duration of employment in the UK.

One crucial issue in assessing the amount of additionality due to financial assistance is determining what the employment level of the grant recipient would have been without government

[1] Alternatively, of course, there are supply side subsidisation policies. For instance, Snower (1994) advocates a voucher system for long-term unemployed workers, while Phelps (1994) and Katz (1996) make an argument for targeting subsidies for disadvantaged workers.

[2] Non-competitive labour market models such as models where firm's have monopsony power give additional reasons for a larger gap between social and private costs for labour where subsidies are efficient [see Strobl and Walsh (2006)]. Bulow and Summers (1986) present a dual labour market efficiency wage model where workers in high wage sectors earn rents rationalising industrial policy aimed at capturing high wage jobs.

[3] Examples include the Regional Selective Assistance in the UK and the grant system in the Republic of Ireland studied here. One may want to note that regional assistance was scrapped in England and Wales in 2004, but continues to exist in Scottland.

[4] Picard (2001) shows under asymmetric information that the first best situation can be achieved when the gap between firms optimal level of employment and the optimal level desired by the grant authority is not too large and firms are different enough in terms of their unobserved productivity. Wren (2003) argues that discretionary assistance is more efficient than non-discretionary assistance. The level of assistance is conditional on the investment scale rather than employment targets which he argues have larger information costs.

[5] The actual result varies according to what groups of firms was examined and distinguishing between partial and full deadweight spending.

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support. Clearly, however, this is unobservable, since one only observes a funded firm's actual employment and not the number of workers it would have employed without the subsidy. To deal with this missing 'counterfactual' most studies rely on subjective assessments by either the firm itself or the policymaker; see Van der Linden (1995), Cotta and Mahy (1998), Disney et al. (1992) and Foley (1992), Lenihan (1999) and Lehinan et al. (2003). In contrast, the few econometric studies, such as Wren (1989) and Wren (1994), use as control group those firms that did not receive any assistance.

These approaches are, however, potentially problematic in terms of concluding on the job additionality aspect of financial assistance. For example, the use of non-recipients as a comparison group would only be justified if the provision of grants were a completely random process, otherwise the analysis would suffer from selection bias. In reality, of course, this is unlikely to be the case as authorities will select recipients among the pool of candidates according to some selection criteria in the case of discretionary assistance,[6] or firms may select themselves non-randomly where grants are extended on a non-discretionary basis. In terms of using qualitative survey data, in contrast, the assessment of the 'counterfactual' may be rather subjective. Moreover, there may be incentives for being untruthful. For example, arguably a firm may have an incentive to be 'untruthful' about what employment would have otherwise been, as in the case where the firm fears that its answer may affect its future ability to succeed in obtaining assistance.[7] Similarly policymakers may have little incentive to reveal the true deadweight losses involved in grant provision in order not be seen as having 'wasted' public funds.

The current paper re-examines empirically the issue of the effectiveness of subsidisation in creating job additionality. In doing so we extend the literature in a number of important ways. Firstly, we address the issue of the endogeneity of grant receipt in examining its effect on employment. Secondly, we have access to Irish manufacturing plant level data, which allows us to explicitly estimate a plant's labour demand function. We also have exhaustive information on the complete grant history of the sample of plants included, rather than just information on a specific programme. Studying Ireland is arguably particularly suitable to the task at hand as Irish industrial policy has had a long history of using discretionary grants to encourage job creation and growth.[8] As noted earlier, previous more rudimentary estimates for Ireland seem to indicate little evidence of job additionality. Furthermore, given Ireland's peculiar industrial structure, which relies heavily on foreign multinational firms (e.g., Barry and Bradley, 1997; Görg and Strobl, 2002), we are able to analyse the different effects of grants on domestic and foreign plants separately. As we show below, this unearths some important differences across these two groups.

The paper is organised as follows. In the following section we describe briefly the financial grant system in Ireland. Our data set and summary statistics are provided in Section III. The econometric analysis is contained in Section IV. Using our econometric estimates of job additionality we undertake some simple cost-benefit calculation in Section V. The final section concludes.

[6] Moreover, awareness of these criteria may mean that plants will self select themselves into the application process.

[7] As noted by Lehinan (2004) other recipients may behave in the completely opposite manner and totally play down the impact of assistance attributing success to their own personal characteristics.

[8] Honohan (1998) in his review of the cost-benefit model used by Irish industrial development agencies uses the analogy of the agency as a discriminating monopolists who offers a grants package on a firm by firm basis to maximise society's surplus.

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2. Grant Provision in Ireland[9]

Grants for industrial development were first offered in Ireland under the Underdeveloped Areas Act of 1952. This was enacted to assist the provision of an alternative source of employment to replace declining agricultural employment in rural sectors, specfically by providing 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 the training of workers in certain underdeveloped areas.[10] In the late 1950s, however, there was an erosion of the regional emphasis in favour of a more nationally oriented approach based on export-led growth. Subsequently the Anglo–Irish Free Trade Agreement was signed in 1965, which paved way for Ireland's eventual membership of the EEC in 1973. This, in conjunction with the already existent export tax relief, made Ireland an attractive location for multinationals. At the same time the industrial grant system was expanded, increasingly trying to develop the virtually non-existent technology intensive sectors.[11] The range of grants that have been available to firms included capital grants, training grants, rent subsidies, employment maintenance grants, feasibility study grants, technology acquisition grants, loan guarantees and interest subsidies, and research and development grants. The essence of this industrial strategy has remained an integral part of Irish industrial policy until today.

The agency primarily responsible for the provision of grant assistance in manufacturing in the modern era was the Industrial Development Agency (IDA) until 1994[12], after which it was split into IDA Ireland and Forbairt. The former is now responsible for the grant provision to foreign owned firms while the latter presides over assisting indigenous plants.[13] While there have been some changes in the provision of grants over time, provision within the time period examined in our empirical analysis can be safely summarised as follows (see KPMG, 2003). Projects suitable for assistance had to either involve the production of goods primarily for export, be of an advanced technological nature for supply to international trading or skilled self supply firms within Ireland, and/or be in sectors of the Irish market that are subject to international competition. In order to be eligible the applicant has to generally show that the project required financial assistance, is viable, and has an adequate equity capital base. More importantly with regard to the current paper, projects had to be able to generate new employment or maintain existing employment in Ireland. The actual grant level is generally very project specific and subjected to a rudimentary cost-benefit analysis. Additionally, total grant levels can generally not exceed certain capital cost thresholds, usually between 45 and 60 per cent. Payment was usually made in pre-specified instalments such that further payment was often subject to periodic reviews.[14]

[9] This summary of the grant provision in Ireland is based on information in Cassidy (2002), Kennedy et al. (and Meyler and Strobl (2000).

[10] See Meyler and Strobl (2000) for details.

[11] While regional concerns still dominated in the 1970s, by the early 1980s a strategic industry approach, encouraging the attraction of multinationals and the development of an indigenous sector in technology intensive sectors became the primary concern. Nevertheless regions always remained of at least some concern.

[12] IDA Ireland is also the principal organisation for promoting industrial development in Ireland. In the very early years, grant provision was under the authority of the Underdeveloped Areas Board before this responsibility was taken over by the IDA.

[13] After 1998 Forbairt become Enterprise Ireland as a consequence of a merger with the Irish Trade board.

[14] One should note that the Irish sources provided the primary source of grant payments for plants located in Ireland. For example, information from the 1997 R&D expenditure survey showed that less 10 per cent of total subsidies received by R&D spenders came from European sources.

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Finally, one should emphasise that an important aspect of financial assistance in Ireland has been and continues to be employment generation. In the earlier days of financial assistance, i.e., until about the mid-1980s, this resulted in some cases in setting explicit job creation targets for certain regions and sectors, and putting pressure on policymakers to fill these. Additionally, until today large proposed job gains due to projects are generally widely publicised in the Irish media. Moreover, at the project level in practise grant levels were often determined at least in part with a view to how many jobs the proposed project would create. As a matter of fact, in many cases specific job creation targets were attached to a specific project, agreed upon by both the grant provider and the applicant. However, even when employment creation targets were not explicitly stated as a condition for grant receipt, they are likely to have been a consideration in the formulation of the grants package. For example, Honohan (1998) notes that "…even when the statutory ceiling on grants is expressed in terms of a fraction of fixed capital investment, it is clear that this ceiling tends to be reached only for job rich projects". Given that grant packages were negotiated on a case by case basis one would thus expect potential employers to commit at least informally to additional job creation in such negotiations. Thus, arguably, in general subsidies in Ireland acted in part as marginal employment subsidies.

3. Data

In order to analyse the employment effects of government grants we utilise information from three data sources collected by Forfás, the Irish policy and advisory board with responsibility for enterprise, trade, science, and technology. The first is the Forfás Employment Survey which is an annual plant level survey, conducted since 1972, with information on the nationality of ownership, sector of production, the start-up year and the level of employment each year. The coverage rate of this survey of Irish manufacturing is argued by Forfás to be essentially 100 per cent so that the data can be seen to be exhaustive. One should also note that Forfás defines foreign plants as plants that are majority-owned by foreign shareholders, i.e., where there is at least 50 per cent foreign ownership. While, arguably, plants with lower foreign ownership should still possibly considered to be foreign owned, this is not necessarily a problem for the case of Ireland since almost all inward foreign direct investment has been greenfield investment rather than acquisition of local firms (see Barry and Bradley, 1997). One should also note that we are not able to identify takeovers (which would appear as new entrants) and changes in the main sector of production.[15]

The second source of information is the Irish Economy Expenditure (IEE) Survey, collected from 1983 until 1998. This is an annual survey of larger plants in Irish manufacturing with at least 20 employees, although a plant, once it is included, is generally still surveyed even if its employment level falls below the 20 employee cut-off point.[16] Its response rate to this survey has varied between 60 and 80 per cent of the targeted population of plants. The information available from this source that is relevant to the current paper are the level of output, the level of employment, and total wages. It also includes time invariant information on the nationality of ownership and sector of production.

[15] There are unlikely to have been many takeovers of domestic by foreign plants, however, in part because foreign entrants tended to operate in new sectors and in part because such takeovers were generally discouraged by the Irish industrial development authorities.

[16] As discussed below, a unique plant identifier allows us to link data across information sources and hence we are able to distinguish non-responses from actual plant exits from the market.

Table 1
Sample selection statistics

	All	Plants 20+Emp.	Our Sample
Plants	13047	2842	2110
Observations	106945	22835	12410
% Foreign	12.9	30.1	34.4
Avg. Employment	31	121	132
% Obs. Grant>0	22.3	33.0	41.0
Avg. Grant	211738	603496	618000

Notes: (1) Amounts are in Euros (1998 prices); (2) Observations refer to plant-year observations.

The final data source used is Forfás' exhaustive annual database on all grant payments that have been made to plants in Irish manufacturing since 1972.[17] Specifically, there is information on the total amount of grant approved, year of approval, level of payment(s), the year of payment (s) and the explicit scheme under which it was paid, covering all types of grants provided by the Irish authorities.[18] In some cases information was also recorded on the job target associated with each project. One should note, however, that no record of such does not necessarily mean that there was no explicit job target associated with a project, as it may simply not have been recorded. Moreover, as noted earlier, most projects are likely to have at least informally been associated with creating additional employment.

In terms of using these three data sources in conjunction with each other one should note that Forfás provides each plant with a unique numerical identifier, which allows one to link information across plants and years.[19] For our econometric analysis we use the grant data for classifying plants as grant recipients and the IEE for all other plant level variables used in the analysis. Thus, our sample consists of plants of a sub-sample of the Irish manufacturing plant population that is generally of at least 20 employees and for the period 1983–1998, as restricted by the IEE data. Thus any econometric results should be used to infer behaviour in terms of larger plants rather than the entire Irish manufacturing sector. One should also note that because these are larger plants there is little entry (less than 4 per cent of plants) and exit (less than five per cent of plants) in the linked sample.[20] For our more general summary statistics on financial assistance development we can, however, resort to using the grant and employment data for the entire sample period (1972–2000) and for the entire population.

In order to gain some insight into how representative our final sample is of the Irish manufacturing plant population we provide some summary statistics in Table 1. As can be seen, our sample consists of 16.2 per cent of all plants and 11.6 of total observations in Irish manufacturing. Unsurprisingly our sample of large plants consists of substantially more foreign plants (which tend to be larger than domestic ones) and is characterised by an average size slightly over four times than the average employment in the population. Moreover, the incident of grant payment as well as the size of each payment is noticeably larger. Since our sample is only a survey of large plants it is fruitful to compare it to the total population of large plants. To do this we

[17] One should note that our data only covers grants from the Irish authorities and not from the European Commission.
[18] One should note that this data refers to subsidy payment only, and not other forms of policy tools such as tax relief.
[19] One should note that we are unable to link plants that belong to a common multi-plant operation, thus leaving us to ignore the possibility that plants may transfer grants across plants. However, since in Ireland there tend to be few multi-plant firms and in generally projects are plant specific, this is unlikely to be a severe problem for our empirical analysis.
[20] In our analysis we also experimented with reducing our sample to just those plants that were present for the entire sample period. This had no significant qualitative or quantitative impact on our results.

Fig. 1. Total Grant Provision and Employment. Notes: (1) Grants in 1998 prices. (2) Employment is full-time employment only.

simply dropped all plants whose size never reached 20 employees from our total sample. As can be seen, our sample constitutes 74 per cent of these. One may want to note that the loss of 26 per cent is mainly due to plants not having been included in our sample at all, rather than non-response by covered plants.[21] In terms of the other features given in Table 1, our sample has only slightly more foreign plants, a somewhat greater average size, marginally higher grant payment incidence, and a somewhat smaller average grant amount. Thus, in general, one may conclude that our sample is representative of the population of large plants.

As a means of gauging general trends and a potential link between growth performance and grant provision in Irish manufacturing we graph total manufacturing employment and total grant payments, appropriately rescaled, in Fig. 1. Accordingly, total grant provision rose from the beginning of from which data for these two variables are available (1972), peaked in the early 1980s, upon which total (real) amount of grant payments declined until 1990, rose for the early 1990s somewhat, but has been on a general decline since then. At the same time employment in Irish manufacturing similarly rose in the 1970s, fell substantially during the recessionary period of the 1980s, but has recovered substantially since the late 1980s.[22]

In Fig. 2 we plot the number of plants in Irish manufacturing and their proportion receiving grants. Accordingly, while the number of plants in Irish manufacturing has increased, in any year about 10 – 20 per cent of plants are supported by a grant payment. Fig. 3 reveals that on average the amount received per recipient was much higher in the 1970s and the first half of the 1980s, but has fallen since. However, one should note that at the same time the average size of plants has fallen, so that the amount paid per recipient has remained relatively constant; see Cassidy and Strobl (2004).

We also used the information on the job approval amount associated with projects for the small sub-sample of projects for which this was available and graph the average over the years in Fig. 4.

[21] Non-response only constitutes 2 percentage points of the 26 per cent difference.

[22] One may note that there appears to a change in the pattern of correlation between employment grant payments in the graph. However, further investigation at the two digit sector level suggests that this is simply a visual consequence of aggregation bias, since there are no similar patterns at this more disaggregated level.

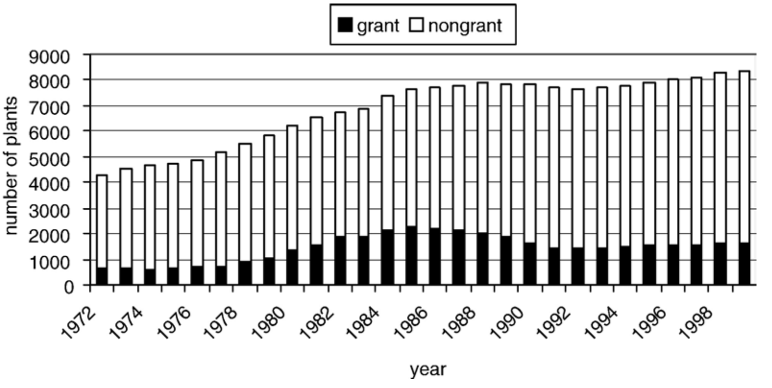

Fig. 2. Number of Plants — Grant versus non-Grant Recipients.

As can be seen, the average amount of money per agreed additional employment has from the 1970s until early 1990s generally been on a decline, but appears to have stabilised. More precisely, until the 1980s, normally more than 20,000 Euros (1995 prices) were spent on each additional job. By the 1990s, the fall in this per job expenditure has stabilised on average to about 15,000 Euros per job. One may want to note that the two spikes in the data are driven by particularly large payments (relative to jobs agreed to be created) to a few multinationals in these years.

4. Econometric Analysis

In order to investigate whether financial assistance has resulted in additional employment in Irish manufacturing plants we specify, in the spirit of Nickell (1987), the following dynamic labour demand function for plant i in year t,

$$l_{it} = \alpha + \beta_1 l_{i,t-1} + \beta_2 w_{i,t} + \beta_3 y_{i,t} + \beta_4 g_{i,t} + \tau_t + \eta_i + \varepsilon_{i,t} \tag{1}$$

where l, w, and y are logged values of employment, wages per head, and output, respectively. g is the log of the total amount of grant received by the plant covering payments under all types of

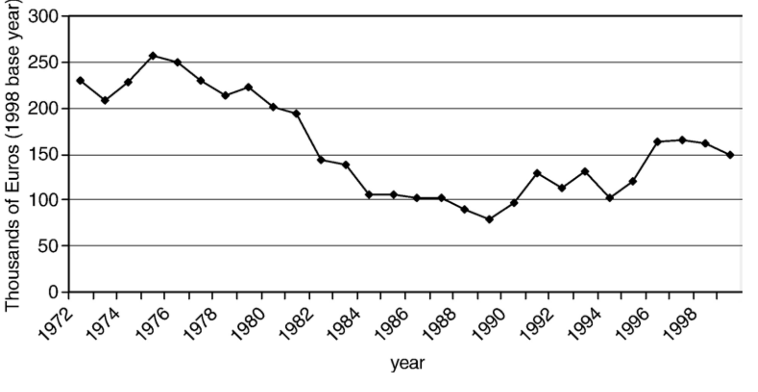

Fig. 3. Average Grant Amount per Recipient.

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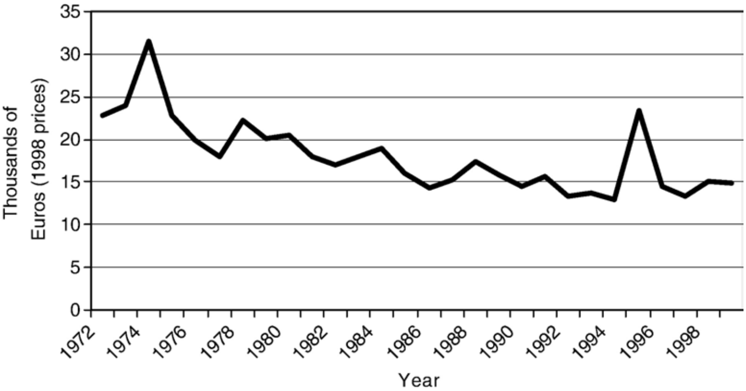

Fig. 4. Grant Amount per Jobs Agreed to be Created.

available schemes.[23] Moreover, τ_t, η_i and ε_{it} are time specific effects, plant specific time invariant effects, and an i.i.d. error term, respectively all unobservable (to the econometrician). We have also included a lagged value of the dependent variable in (1). This is standard as arguably labour demand may be dynamic in nature because of a non-smooth adjustment process in plants' employment policy (see, for example, Hamermesh, 1993).

One should note that simply using OLS to estimate (1) is likely to prove problematic. Specifically, employment is likely to be simultaneously determined with output and may also affect plant level wages if the plant is not a price taker in the local labour market. More importantly, as argued earlier, financial assistance is likely to be endogenous to the employment decision. First, certain firms may be more likely to apply for grants or ask for a greater grant amount. For example, if governments are more likely to 'pick winners', i.e., firms that are already doing well, then these may also be more likely to apply.[24] On the other hand, firms in financial trouble may find greater benefits from applying for grants relative to its costs. Secondly, without perfect information on potential job additionality policymakers may use other criteria to select recipients. In other words, there may be other plant specific characteristics important in the grant selection and amount determination process that are unobservable to the econometrician (i.e., given the information in our data set on each plant) but correlated with grant receipt. If such sample selection biases were time invariant then simply first differencing the data would provide a possible solution.[25] However, given the length of the panel of individual plants (up to 15 years) this is unlikely to be the case.

In order to take account of such potential endogeneity while also controlling for plant specific fixed effects, we thus resort to using the now popular GMM systems estimator developed by Blundell and Bond (1998). Accordingly, one simultaneously estimates first differenced and level versions of Eq. (1), where for the former appropriately lagged values and for the latter appropriately lagged differences of the endogenous variables can serve as valid instruments. The validity of these instruments can be tested using Arellano and Bond's (1991) Sargan test. Also, in our dynamic specification the consistency of the GMM systems estimator depends on the validity of the assumption of no serial correlation of the error terms. We investigate this using the test by

[23] In order to avoid dropping zero values we arbitrarily added 0.0001 to these.

[24] Given a limited budget, accountability may create incentives for policy makers to pick 'winners'.

[25] The inclusion of the lagged dependent variable would render a simple fixed estimator inappropriate in this context.

Table 2
Summary statistics for total sample

	GRANT		*Non-GRANT*	
	Mean	*St. Dev.*	Mean	*St. Dev.*
L	132	*208*	101	*148*
W	21	*22*	28	*48*
Y	23624	*77674*	22003	*81159*
G	618	*3877*	—	—
$\mathbf{L^A}$	47	69	—	—
$\mathbf{G/L^A}$	13	56	—	—
$\mathbf{\Delta L/ L^A}$	0.94	4.36	—	—

Notes: (1) Amounts are in thousands of Euros (1998 prices).

Arellano and Bond (1991), which was specifically developed for dynamic panel models under GMM and tests the presence of second-order serial correlation in the first differenced error term.

As noted earlier, using all information necessary to estimate the plant level labour demand equation required linking all three of the data sources and hence resulted in only a sample of the total plant population. Specifically, the use of information on wages and output from the IEE left us with a sub-sample of larger (at least 20 employees at the first time of inclusion) plants covering the period 1983–1998.[26] In total we were left with 12,410 plant-year observations, of which 41 per cent were observations where grant payments were made to the plant. This covers in total 2,110 plants, of which 1,464 received at least one grant over their lifetime observed over our sample period. Moreover, 726 of these plants are foreign and 1,384 domestic owned. We provide sample statistics of this subsample by whether grant payment was received or not in Table 2. One should note in this regard that most plants received at least one grant payment, if not several, over their lifetime, although not necessarily within the window of our sample period. As can be seen from our summary statistics in Table 2, plants that received financial assistance within our sample period received on average a payment of around 618,000 Euros. These plants employed around 130 employees, each of which earned around 21,000 Euros per year. Additionally, they produced output worth about 23 million Euros. In contrast, plants that did not receive financial assistance were somewhat smaller both in terms of employment and output. However, their employees received on average about 28,000 Euros per year in compensation.

We also provide summary statistics regarding plants for which job targets were recorded. Accordingly the mean number of agreed jobs (L^A) was close to 50 on average, which resulted in grant payments of about 13,000 Euros per agreed additional employment (G/L^A). For these plants we also calculated the change in employment from the first year of payment relative to the last year of payment and then compared this to the total job target associated with the project. One finds that this ratio ($\Delta L/L^A$) is about 0.94, indicating that most plants that received financial assistance came close to reaching their employment target. Of course, whether these jobs were additional, i.e., would have been created without assistance, is a priori not clear and a matter to be disentangled by our econometric analysis.

Before proceeding to our GMM system results it is important to discuss certain aspects with respect to the number of instruments used to generate these. First of all, the number of available instruments will depend on the length of observations available for each plant and on the

[26] Additionally, the dynamic specification and use of the lagged variables as instruments necessitated a minimum of three subsequent observations for a plant to be included in the econometric analysis.

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Table 3
GMM regression results for all plants

	(1)	(2)	(3)	(4)
L(t-1)	0.8185**	0.8185**	0.8154**	0.7736**
	(0.0290)	(0.0286)	(0.0229)	(0.0322)
W	−0.2173**	−0.2029**	−0.1800**	−0.0890**
	(0.0253)	(0.0264)	(0.0224)	(0.0283)
y	0.1619**	0.1560**	0.1559**	0.1511**
	(0.0194)	(0.0193)	(0.0167)	(0.0191)
g		0.0015	0.0026**	0.0059**
		(0.0012)	(0.0008)	(0.0019)
g(t-1)				0.0013
				(0.0018)
g(t-2)				0.0054*
				(0.0021)
g(t-3)				−0.0003
				(0.0018)
g(t-4)				0.0030
				(0.0019)
g(t-5)				−0.0031
				(0.0019)
Constant	0.0009	0.0084	−0.0500	−0.0989
	(0.0966)	(0.0948)	(0.0809)	(0.1183)
Obs.	12410	12410	12410	4973
Number of bisid	2110	2110	2110	969
# of Instruments	193	193	257	97
Sargan Test	153.24	153.27	215.99	87.75
Sargan p-value	0.30	0.28	0.18	0.19
AR(2) Test	0.33	0.34	0.39	1.88

(1) standard errors are in parentheses; (2) ** and * indicate 1 and 5 per cent significance levels. (3) time dummies are included in all specifications. (4) Variables instrumented: l(t-1), w, y, g, g(t-1), g(t-2), g(t-3), g(t-4), g(t-5).

exogeneity of the explanatory variables. For instance, if one has included a one period lagged dependent variable and contemporaneous, but endogenous, other controls as explanatory variables, then lags from t-2 to the maximum available of all of these may serve as valid instruments as long as there is no second order serial correlation. In our case, where we can have up to 15 observations for plants this would leave us with a large number of instruments at hand.[27] However, as noted by Roodman (2007), while increasing the number of instruments used may increase efficiency, using many instruments can distance the estimates from the asymptotic ideal, and overfit endogenous variables. Moreover, it may weaken the Sargan test up to the point where it generates implausibly high p-values.

Unfortunately, there appears to be no clear guidance available as to what constitutes a 'good' number of instruments; see Roodman (2007). We thus first experimented with using a variety of number of lags as instruments. While the results were generally qualitatively similar in terms of the significance of the explanatory variables and the Sargan test generally supported the validity of the instruments, clearly the p-value of the Sargan test rose noticeably as instruments were added.[28] As a compromise we thus chose to use the minimum number of instruments above

[27] Under the GMM systems estimator the valid instrument count increases quadratically in the number of periods.
[28] Roodman (2007) notes that unusually high p-values may be interpreted as a sign of too many instruments.

Table 4
Summary statistics by nationality of ownership

	Foreign		Domestic	
	Grant	*Non-Grant*	Grant	*Non-Grant*
L	201	*144*	81	*73*
W	24	*31*	19	*25*
Y	38739	*34085*	12722	*14206*
Y/L	192	*236*	157	*194*
G	1187	—	203	—
$\mathbf{L^A}$	99	—	28	—
$\mathbf{G/L^A}$	12	—	7.25	—
$\mathbf{\Delta L/ L^A}$	1.78	—	0.65	—

(1) Amounts are in thousands of Euros in 1998 prices.

which the coefficient estimate was generally stable across all our specifications, which turned out to be up to four lags.[29,30]

Our GMM estimates of (1) for all plants are provided in Table 3. One may want note that, in addition to support for instruments as indicated by the Sargan statistic, in all our specifications there is no evidence of second order autocorrelation, which would render our results inconsistent. In the first column we estimated plant level labour demand in our sample, controlling for lagged employment, wages, and output and for their endogeneity by the method briefly outlined above. One can see that the coefficients of our standard labour demand explanatory variables are as would be expected — higher wages decrease, while greater output increases the demand for labour. Additionally, the estimates of the labour elasticities with respect to wages and output are in line with the literature using firm level data; see Hamermesh (1993). Moreover, the significance of the lagged dependent variable validates the use of a dynamic labour demand equation.[31]

In the second column we include the logged grants variable without taking account of its potential endogeneity. Although the coefficient on this variable is positive, it is statistically insignificant. This would suggest that financial assistance within our sample has not been successful in creating additional employment on average. As argued in the introduction, however, grants are unlikely to be an exogenous variable, and we thus need to instrument this variable as well. The result of doing so is shown in the third column. There are two notable changes compared to the previous estimation. Firstly, the coefficient on the grants variable has increased substantially in size. More importantly, it is now statistically significant, suggesting that financial assistance has increased employment in plants in Irish manufacturing. In other words, this estimation provides some evidence of job additionality of financial assistance once the endogeneity of the grants variable is properly taken into account. One should note that the change in statistical significance after controlling for endogeneity possibly suggests that larger firms receive larger grants.

Feasibly the effect of grant payments may not be instantaneous, i.e., plants may make their employment adjustment over several years. Moreover, some of the jobs created may be

[29] While using less instruments almost always produced qualitatively similar results, often the size of the coefficient changed substantially.

[30] For example, when we included t to t-5 of the grant variable we used as instruments for these lags t-7, t-8, t-9, and t-10.

[31] We also experimented with higher lags of the dependent variable, adjusting the instruments implemented accordingly, but these always proved to be insignificant.

Table 5
GMM regression results by nationality of ownership

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	*Domestic*	*Domestic*	*Domestic*	*Foreign*	*Foreign*	*Foreign*
l(t-1)	0.8031**	0.6858**	0.8074**	0.7691***	0.7978***	0.8230***
	(0.0240)	(0.0181)	(0.0243)	(0.0198)	(0.0278)	(0.0144)
w	−0.1568**	−0.2387**	−0.1546**	−0.2432***	−0.1745***	−0.2426***
	(0.0208)	(0.0120)	(0.0207)	(0.0219)	(0.0410)	(0.0158)
y	0.1315**	0.2018**	0.1310**	0.1821***	0.1632***	0.1488***
	(0.0173)	(0.0104)	(0.0174)	(0.0131)	(0.0190)	(0.0099)
g	0.0021*	0.0024**	0.0021*	0.0019*	0.0035*	0.0017**
	(0.0008)	(0.0004)	(0.0008)	(0.0008)	(0.0015)	(0.0005)
g(t-1)		0.0012**			0.0034*	
		(0.0004)			(0.0016)	
g(t-2)		0.0019**			0.0030	
		(0.0004)			(0.0018)	
g(t-3)		0.0014**			0.0027	
		(0.0004)			(0.0015)	
g(t-4)		−0.0009*			−0.0012	
		(0.0004)			(0.0017)	
g(t-5)		−0.0002			−0.0013	
		(0.0003)			(0.0020)	
START*g			−0.0179			0.0252*
			(0.0176)			(0.0114)
START			0.2144			−0.2332
			(0.1493)			(0.1213)
Constant	0.1479*	0.2785**	0.1283	0.1328	−0.0488	0.1975***
	(0.0752)	(0.0554)	(0.0756)	(0.0865)	(0.1329)	(0.0553)
Obs.	7168	2498	7168	5242	2475	5242
# of plants	1384	549	1384	726	420	726
# of Instruments	257	97		257	97	
Sargan Test	191.91	177.37	190.88	219.36	84.04	267.78
Sargan p-value	0.41	0.64	0.39	0.14	0.27	0.21
AR(2) Test	1.05	0.78	0.95	−0.57	−0.61	−0.62

(1) standard errors are in parentheses; (2) ** and * indicate 1 and 5 per cent significance levels. (3) time dummies are included in all specifications. (4) Variables instrumented: l(t-1), w, y, g, g(t-1), g(t-2), g(t-3), g(t-4), g(t-5), START, START*g.

subsequently destroyed once the funds are spent or if found impractical to maintain. To investigate this further we included up to 5 lags of logged grant payments in our specification in (1), the results of which are shown in the last column of Table 3.[32] As can be seen, the inclusion of the lags more than doubles the coefficient on the current logged grant payments, indicating that the labour adjustment to grant payments may be more complex than a simple instantaneous hiring. One may want to note that this increase is only partially due to the smaller sub-sample — when we estimated the same sample without lags the coefficient turned out to be 0.0035. Of the lagged values, however, only the t-2 lag is statistically significant, with its coefficient being somewhat smaller than the current value. Thus plants on average make the largest adjustment in the same year as the payment, and then further increase employment around another two years later.

[32] One should note that this necessarily meant reducing our sample size by 60 per cent.

An important feature of the Irish manufacturing sector is the presence of foreign multinationals; roughly about 50 percent of employment in manufacturing is in affiliates of foreign-owned multinationals (Görg and Strobl, 2002). Arguably, we may expect differencces in the employment response to grants between foreign and domestic plants and, hence, pooling these two groups together may not be appropriate. In particular, foreign multinationals may be expected to be less financially constrained than domestic firms because they tend to be part of a large multi-plant operation. Hence, their choice of employment levels may less likely be depending on government subsidies in their employment creation compared to domestic plants.

To investigate this further, we split our sample into domestic and foreign owned plants and show summary statistics for these in Table 4. Overall, we find that, not surprisingly, foreign plants tend to be larger than domestic plants whether they are in receipt of a grant or not. Additionally, they tend to pay higher wages. In terms of grant vs. non-grant recipients, we find for foreign plants that grant recipients tend to be larger in terms of employment and output, but show lower average wages than non-grant recipients. For domestic plants, however, we find that recipients and non-recipients are much more similar in terms of these characteristics, while grant recipients employ slightly more workers on average, they appear to produce less output and pay lower wages. Using these summary statistics to calculate labour productivity (Y/L) we find that grant recipients for both nationality groups are on average less productive than non-grant recipients.

There are also some stark differences in terms of comparing grant payments and performance. Foreign plants receive on average grant payments that are five times higher than those received by domestic plants. In using the limited job target data available, evidence indicates, however, that the associated number of jobs that are expected to be created is also substantially higher, making the difference in agreed payment per job between the two ownership types not as stark. Comparing the actual level of employment created during payment years relative to the job target, one discovers that in raw numbers foreign plants tend to create more, and domestic plants less jobs than the agreed number.

Estimating Eq. (1) for the samples of domestic and foreign plants separately yields results are reported in Table 5. One should note that in these regressions we continue to treat the grant variable as endogenous to the employment decision, in line with the previous estimations in Table 3. Comparing the results for the other explanatory variables first in our base specification of including current logged grant payments, as shown in columns 1 and 4, one notices some difference across nationality of ownership. In particular, labour demand in foreign firms is more sensitive to changes in the price of labour and output. One reason for this may be that because foreign firms are by definition part of a multinational operation, it is easier for them to adjust their production process to changes in price and product demand (Görg and Strobl, 2003a). In contrast, there is only a marginal difference in the coefficients on grant payments across nationality of ownership.[33]

We also added up to t-5 lags of the logged grant payments in order to investigate whether the adjustment process is sluggish, as shown for domestic and foreign plants in the second and fifth column of Table 5. As can be seen, this produces some interesting dynamics. For foreign plants we find that grant payments cause a decaying positive effect on job creation, lasting up to one

[33] One should note that coefficient for the pooled sample (Table 3) lies outside the range between the domestic and foreign plant estimates. One would expect the pooled estimator to be an unbiased estimator of the average (in this case average of domestic and foreign) in static models only. Peasaran and Smith (1995) show that estimators from pooled dynamic panel data models are biased when there is slope heterogeneity. Therefore one should not necessarily expect the coefficient for the pooled sample to lie between the coefficients for domestic and foreign firms, since it is biased and can lie on either sides of the "boundaries".

year after payment. In contrast, while the subsidies have a significant positive effect on job creation up to three years after receipt for domestic plants, by the fourth year some of these jobs are destroyed, as shown by the negative significant coefficient on the t-4 lag of the logged grant payments variable. Taking the significant coefficients across plants at face value and using mean employment levels for both types of establishments implies that for domestic plants, on average 11,994 Euros must be spent for each additional job. By contrast, 48,625 Euros of subsidisation is required to create an additional job in foreign multinationals.[34] Note that these figures do not relate to subsidies per job (which we calculated in Tables 2 and 4) but to grants per additional job, i.e., disregarding jobs that would have been created even without the plant receiving grants (under the assumption that our counterfactual, established in the regression, is valid).

One of the major drawbacks of our estimates thus far is that they neglect the impact of grants on employment in terms of inducing plant start-up. This may be particularly relevant to multinational plants who arguably may have the choice of locating elsewhere outside of Ireland. However, even in terms of domestic plants it is possible that subsidies enable plants to start business, and hence create jobs, that otherwise would note have been able to. Unfortunately our data does not allow us to directly evaluate this since we have neither data on multinationals locating elsewhere nor information on domestic start-up opportunities that were not fulfilled. Nevertheless, one may suspect that if grants played an important part of employment creation via the location/start-up decision in Ireland, then their effect in terms of job creation may have been larger in the first years of start-up relative to subsequent years since it is likely to take time to reach the desired level of employment with imperfect labour and capital markets. To investigate this we created a zero-one type dummy that takes a value of one in the first four years of start-up and zero otherwise, START, and included this variable and its interaction with contemporaneous grant payments in (1).[35] The results of this are given for domestic and foreign plants in columns 3 and 6 of Table 5, respectively. As can be seen from the interaction term, for domestic plants there is no different job creation effect of grants in the first few years after start-up relative to subsequent years of the plant's life cycle. In contrast, the significantly positive coefficient on the interaction term in the foreign plants sample provides evidence that grants have a greater employment creation effect in the first four years after the location of foreign multinational plants in Ireland. This is suggestive of the possibility that our estimates of job creation for multinationals are likely to be lower thresholds of the total job creation induced by subsidies.

5. Cost-Benefit Analysis

It is of course valid to question whether such subsidies as those employed in Ireland can be justified from an economic perspective. In order to do so on a more general scale one would need to conduct a thorough quantitative analysis of all the benefits and costs of the policy. Our analysis above, however, simply provides results concerning any additional employment created and we can thus evaluate the effectiveness of grants only in the sense of acting as marginal employment subsidies. It is important to emphasise therefore that we are using a narrow measure of benefits. Arguably there are many other potential benefits from the grant schemes employed that are not measured because we do not have direct information on them.

[34] The averages taken used for this are for the total domestic and foreign sample rather than just for grant recipients, as calculated in Table 4, since the estimated coefficient is based on both recipients and non-recipients.

[35] One should note that this did not allow the inclusion of lagged variables given the nature of START.

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Firstly, it must be remembered that these subsidies were officially for providing resources for firms' activities other than creating jobs, such as capital formation, R&D, etc., and that job creation was only an additional stipulant. Morever, there may have been spillovers to other firms through the direct effects of financial support. For example, they may have encouraged plant entry. Importantly for the Irish case, they may have also played a role in attracting foreign multinationals to locate in Ireland rather than other host economies as Greenfield investment and/or expanding plant capacity — both of these aspects may have then generated further positive spillovers to the domestic industry. Moreover, if the effect on start-up is more important for foreign than for domestic plants, than this would imply that any effect of grants on employment is more likely to be on the extensive rather than intensive margin for foreign relative to domestic plants. The results with regard to plant start up presented in the last part of the previous section are arguably supportive of this assertion. Additionally, grant payments may have further affected employment by discouraging the departure of foreign multinationals or partial movement of their production capacity to elsewhere and by discouraging outward FDI by domestic plants.

Despite these caveats, it is insightful to evaluate the grants system in terms of its effectiveness as a marginal employment subsidy, particularly because this corresponds closely to the approach taken by Irish industrial policymakers in terms of evaluating potential projects. In essence the rule of thumb implemented by Irish authorities was based on a standard criterion which expressed the discounted present value of the project benefits and compared this to its cost; see Honohan (1998). Specifically, the cost was taken to be the grant outlay and the benefit to be 85 per cent of the wages generated through the new jobs created.[36]

One should note that while under the actual cost benefit rule applied to potential projects Irish policy makers had to rely on 'expected' additional employment, our econometric analysis gives us specific values for the number of Euros of grant support necessary to create an additional job. In outlining how we use this in our cost-benefit analysis it is helpful to initially consider the static equation originally proposed by Kaldor (1936) which shows the condition where the cost of a subsidy will be non-positive in a static framework:

$$s(\lambda A + h) = bh \tag{2}$$

where s is the cost of the subsidy per job adjusted for the shadow price of raising public funds which is possibly greater than unity, A is total employment, h is the number of additional jobs created due to subsidisation, λ is a parameter indicating the number of existent jobs covered by the subsidy, and b is the level of benefits. As noted in the introduction, Kaldor (1936) originally proposed an average subsidy, which in (2) would be where $\lambda = 1$. In the case of marginal subsidies, as are analysed here, $\lambda = 0$. If all jobs are additional to the economy, the subsidy is beneficial as long as $b \geq s$.

We can extend this framework to account for the expected stream of wage benefits generated over the life of the additional jobs created. The estimated coefficients from the regressions of the log of employment on the log of grants [(β_4 in equation (1)] approximates the percentage change in employment from a percentage change in grant payments. The product of this coefficient and average employment (L) divided by the average grant level in thousands of euros (G) gives the

[36] The 85 % derives from assuming a 15 % shadow wage. While this assumes a rather low shadow wage, one should note that, in order to be approved, projects had to achieve a threshold benefit to cost ratio set arbitrarily at 4 to 1. The shadow wage is defined more precisely below.

Table 6
Benefit/Cost of grants

Shadow Wage/Av. Wage	1	0.85	0.5	0.2
Duration 18 years				
Domestic	187%	159%	80%	16%
Foreign	146%	124%	62%	12%
Foreign(significant coefficients)	96%	81%	41%	8%
Duration 10 years				
Domestic	120%	102%	51%	10%
Foreign	94%	80%	40%	8%
Foreign(significant coefficients)	59%	50%	25%	5%

number of jobs created per thousand euros of grants: $\Delta L = \beta_4 \frac{G}{L}$.[37] The present value of each additional job (*PV*) is the present value of the average wage stream generated, net of the shadow wage (the level of the shadow wage is discussed below). PV is calculated in thousands of euros using a discount rate of 3% and assuming that the average job has duration of *D* years (the duration of the job is also discussed below). Multiplying the measure of jobs created per thousand euros of grants by the present value of these jobs gives the benefit/cost ratio of a euro's worth of grants in terms of the wage stream generated:

$$\frac{Benefit}{Cost} = \Delta L^{*}PV \tag{3}$$

One should note that the regressions in Table 5 include up to five lags of the grant variable. We thus as a benchmark modify the terms in equation (3) to account for this, even if some of these are not found to be significant. In particular one may want to note that the coefficients on the fourth and fifth period lags are negative, indicating the possibility that some jobs created by grants may destroyed again within a few years. The average change in employment per thousand euros associated with any of the lagged coefficients is: $\Delta L_j = \beta_j \frac{G}{L}$ where j goes from 0…5 and β_j is the coefficient on the interaction of grants and the jth lag. If the average duration of a job in the economy is *D* we assume that the number of jobs created that will last for D periods are:

$$\Delta L_D = (\Delta L_0 + \Delta L_4 + \Delta L_5) + \delta \Delta L_1 + \delta^2 \Delta L_2 + \delta^3 \Delta L_3 \tag{4}$$

That is we subtract out the number of jobs that will be lost after four or five periods from the initial number of jobs created, then we add on the number of jobs (appropriately discounted) that will be created in the subsequent three years. In addition to this $-\Delta L_4$ of the jobs initially created will last for four years and $-\Delta L_5$of the jobs initially created which will last for five years. If PV_k is the present value of a job of duration k, we can modify (3) to get:

$$\frac{Benefit}{Cost} = \Delta L_D^{*}PV_D - \Delta L_4^{*}PV_4 - \Delta L_5^{*}PV_5 \tag{5}$$

That is the present value of the wage stream of all of the jobs created by a euro of grants gives the benefit/cost ratio.

[37] Average employment is 169, 76 and 114 for foreign, domestic and all plants, respectively. This is the average across grant recipients and non-recipients since both groups are included in the data for the regression which the predicted employment change is based on.

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Following the approach by the Irish authorities we assume the cost of the subsidy to simply be its Euro value. In terms of the remaining parameters in (5), this leaves one to set a value for the shadow wage and the present value of additional employment. We follow Honohan (1998) and assume the shadow wage to be the wage times the fraction of workers in new jobs who would otherwise be unemployed, adjusted for savings in welfare payments and tax receipts from these additional jobs, plus any change in wages for workers in the new job who were previously employed. One issue in doing so is how many of the additional jobs created would be filled by those previously not employed in the economy. Figures from McKeown (1980) suggests that in Ireland at least in the 1970s over half the employees in grant-aided industry had not been employed previously in the Irish economy. Moreover, even if the additional jobs are filled mainly by those already employed, the jobs they left may be taken up by those not previously employed. Certainly, the persistence of high unemployment rates in Ireland over the 1980s would not make this a likely scenario. Moreover, the dramatic reduction in unemployment rates associated with the boom period from the mid 1990's onwards suggests labour demand played an important role in increasing employment; see Walsh (2004). Nevertheless, Honohan's (1998) review of the cost benefit model used by Irish industrial development agencies is critical of the low number they used for the shadow wage (15%) and instead suggests a much higher number around 80%. We could of course argue that since our coefficient estimates are for jobs that are additional to the firm, that we could set a much lower shadow wage than Honohan suggests since his estimate presumably incorporates the fact that some of the jobs created would not be additional to the firm. We thus experiment with a number of different values for the shadow wage.

Finally, in order to determine the present value of additional employment one needs to know the average length of a new job. Our data unfortunately only allows one to determine the number of jobs, but not to follow specific jobs over time. However, as pointed out by Davis and Haltiwanger (1992), if one makes the assumption of a stable distribution of job flows, then the average length of a job is just the inverse of the job destruction rate.[38] Given that the average job destruction rate is about 5.5 per cent for both foreign and indigenous firms in our sample, this implies an average duration of jobs of about 18 years. We did some sensitivity analysis looking at an average duration of 10 years, also as noted above our analysis counts for the fact that some of the jobs initially induced by grants disappear after four or five years. The present value of a job is thus just the present value of the average wage for its duration years discounted by a discount rate, which we assume to be 3%.

Using our estimated coefficients and the assumptions above, we calculate benefit-cost ratios for indigenous and foreign firms for various levels of the shadow wage relative to the average wage, as calculated from our data, in Table 6. We first start off in the first panel by using all coefficients of the grant variable and its lags and an average job duration of 18 years, even if these were not found to be significant. As can be seen, when the shadow wage is greater than 63% and 81% for domestic and foreign firms, respectively, the benefit cost ratio exceeds unity. We then calculated the same using only significant coefficients, but, since this made little difference for the domestic sample where the value on the fifth lag was fairly small, only report that for foreign plants. Accordingly, this reduces the benefit cost ratio over all values of the shadow wage.

Even when we assume that the average job duration is 10 years, as shown in the lower panel of Table 6, a sizeable chunk of the costs of grants are recouped from this fairly narrow measure of

[38] Of course we only observe net changes in employment at firms so that a job may be destroyed and replaced by another job. In this sense net changes in employment will understate true job destruction if some grant aided jobs are replaced by other jobs that would have been created without grants.

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benefits, as long as the shadow wage is reasonably high. As a matter of fact, for domestic plants the benefit cost ratio will be greater than one if the shadow wage is set at 0.85 of the average wage. Again, using only the significant coefficients created essentially the same effect for domestic but a considerably smaller impact for foreign plants.

The analysis suggests fairly large streams of additional wage benefits are generated by grants in both types of firms but particularly in domestic firms. Before concluding that subsidies are more effective in domestic firms though we should sound a note of caution given the discussion earlier on the possibility that grants for foreign firms in particular may induce entry or reduce exit, and the partial evidence supporting this in Table 5.

6. Conclusion

This paper examines the efficacy of government subsidies to create new jobs. While such policies seem to be widespread, a thorough evaluation of the effectiveness is still in its infancy. We contribute to the literature by analysing the impact on labour demand of government grants using plant level data for the manufacturing industry in Ireland and appropriate econometric techniques to take account of the potential endogeneity of the effect of grant receipt on labour demand. Our results provide evidence for job additionality of subsidies, i.e., the subsidies employed in Ireland have been successful in creating employment over and above the level that would have prevailed in the absence of grant payments. We also find that there are differences in the employment response to subsidies between domestic and foreign-owned plants, with the former creating more additional jobs per euro of grant payment. Using a simple cost-benefit rule of thumb shows that in terms of creating jobs a large part of the cost of grants appears to be recouped in additional wage streams under reasonable assumptions about the parameters.

There are, however, a number of reservations to consider in terms of using the results unearthed in this paper as an answer to the question as to whether the grant system in Ireland has been effective. Firstly, it should be kept in mind that grants in Ireland were officially provided to finance other types of firms' activities, such as capital acquisition and R&D amongst others, and their role as marginal subsidy only an additional stipulation for receipt. As a matter of fact, other empirical evidence seems to suggest that grant support in Ireland has played a positive role in other aspects of firm performance, such as survival, productivity, and the expenditure on R&D and employee training.[39] Moreover, it is important to note that grants may have also played some part in terms of attracting multinationals to and influencing their scale and nature of operation within Ireland. This may have led to further positive spillovers to domestic industry. In this respect, Ruane and Ugur (2005) and Görg and Strobl (2002, 2003b) provide empirical evidence that domestic industry in Ireland has indeed benefited from the presence of foreign-owned multinationals in the Irish economy in terms of increased entry, survival, and productivity. Finally, one should note that our analysis is, due to data limitations, restricted to larger firms. Particularly the indigenous sectors has a large number of very small firms, some of which have received grant support. Job additionality effects for these may be very different than for larger firms, particularly since small firms tend to be more financially constrained; see Cabral and Mata (2003). As a matter fact, Lehinan (2004) shows from an analysis of a selective questionnaire that support of smaller Irish firms is less likely to cause deadweight loss. All these other factors suggest that overall

[39] See Girma et al. (2007, 2006) and Görg and Strobl (2006, 2007).

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benefits from grant support are likely to have been substantially greater in Ireland than would be suggested from taking our empirical findings at face value.

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