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Mixing the grant cocktail: towards an understanding of the outcomes of financial support to small firms

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Abstract. One of the key policy objectives of government at national and regional level, is to overcome the constraints preventing local industry achieving greater competitiveness in the international marketplace. This paper examines the impact of grant assistance to Northern Ireland small firms delivered over the period 1994 – 97 by the former Local Enterprise Development Unit through its Growth Business Support Programme (GBSP). Previous work by the authors showed that there was some tentative evidence to suggest a link between employment growth and grant aid provided to very small firms (fewer than 10 employees) assisted under the GBSP. The central objective of the empirical work reported in this paper is to extend the previous analysis by understanding the extent to which the value of financial assistance influences growth (employment, turnover, and productivity measures) and if differential impacts arise depending on the nature and timing (lag structures) of the grant assistance.

Introduction

One of the key policy objectives of government at national and regional level, is to overcome the constraints preventing local industry achieving greater competitiveness in the international marketplace. Within Northern Ireland such sentiments have guided the structure and delivery of industrial development policy by the Department of Enterprise, Trade and Investment (DETI—formerly the Department of Economic Development) and its agencies since the mid-1980s. Industrial policy has switched its focus since 1990 from support for direct job creation to indirect support for employment through raising the competitiveness of assisted firms. Alongside these shifts in emphasis of industrial policy has been the growing debate on the evaluation of such policies.

In brief, the debate on the impact of small-firm policy has focused on three interrelated considerations: first, methodological considerations which have culminated in important developments in evaluation design which seek to control for selection bias; second, measurement of the impact of assistance on the actual business performance of assisted firms; third, the contribution of individual policies to wider economic performance, which in turn has provoked a debate on the importance of capturing intermediate or end outcomes (for example, rising regional productivity) as opposed to simple programme outputs (for example, x number of firms experiencing a rise in productivity).

The evaluation of the impact of public policies in improving the performance of the small business sector has provoked a great deal of debate and research activity in recent years (for example, Fraser, 2003; Hart and McGuinness, 2003; Hart and Roper, 2004; Robson and Bennett, 2000; Roper et al, 2001; Storey, 2000; Westall and Cowling, 1999). Using data from the Business Link (BL) Impact Indicators Database constructed by the Small Business Service of the Department for Trade and Industry for

the period 1994–2000 together with a survey of assisted firms and nonassisted firms, and adopting an econometric approach designed to make allowance for both *assistance* and *selection* effects, Roper et al (2001) and Hart and Roper (2004) concluded that there was little evidence that, after allowing for selection bias, BL assistance (or 'treatment' in econometric terms) over the 1996–98 period was having any significant effect on firms' sales, employment, or productivity growth performance over the 1996–2000 period. They did, however, conclude that making no allowance for selection bias does suggest a positive employment growth effect from BL assistance over the 1996–2000 period. This effect is biased upwards, however, by the selection process, emphasising the importance of the sample selection methodology in this type of policy evaluation (see Storey, 2000). This conclusion was similar to that of Robson and Bennett (2000) who found that there was a negative and insignificant relationship between small-firm performance and the use of government-backed providers of business advice such as BL. Both these multivariate studies incorporated a range of control variables, such as firm type (age, sector, and size of business), business strategy, innovative activity, and technological development.

In this paper we set out to make a contribution to that wider debate by examining the impact of grant assistance to Northern Ireland small firms delivered over the 1994–97 period by the Local Enterprise Development Unit (LEDU) through its Growth Business Support Programme (GBSP). The main difference to previous studies is the attempt to move beyond a simple 'assistance' parameter in the multivariate analysis and to seek to investigate the ways in which different types of assistance and their lagged structures may impact upon business performance. The aim is to illustrate the value in disaggregating what has often been treated as an 'assistance' dummy variable in the econometric treatment modelling.

LEDU was merged with other industrial development agencies in Northern Ireland in April 2002 to form Invest NI. However, for the purpose of this paper we continue to refer to a LEDU programme of support to ensure a clear demarcation between the interventions of the previous agency and the current new arrangements. In practice, it should be noted that little has changed in terms of the detail of support for small and medium sized enterprises (SMEs) in Northern Ireland. LEDU's strategic remit focused on firms with fewer than 50 employees in the manufacturing sector and those service sectors with activities potentially tradable beyond Northern Ireland. LEDU was also responsible for the promotion of enterprise in Northern Ireland, including the encouragement and fostering of self-employment and microbusinesses. LEDU's activities in this area included the part funding of a regional network of Local Enterprise Agencies, which largely provide workspace and services to small firms in their locality, and the provision of functional assistance, financial assistance, and advice to individuals considering entering self-employment. LEDU's cumulative budget for the eight-year period 1989/90 to 1996/97 was £267 million and accounted for just under 7% of total expenditure on the Industry, Trade and Employment programmes in Northern Ireland in that period.

The central objective of the empirical work reported in this paper is to extend the previous analysis of LEDU assistance (Hart et al, 2000) by understanding the extent to which the value of financial assistance influences growth (employment, turnover, and productivity measures) and if differential impacts arise depending on the nature and timing (lag structures) of the grant assistance. A further set of explanatory variables (size, sector, legal status, and location) potentially relating to variations in small-firm growth rates was also included within the models. Within our models the level of assistance measures the impact of the actual financial value of grants, and the nature of assistance and the differential impact of the various programmes are controlled for

by the inclusion of dummy variables. All models were estimated by using an ordinary least squares (OLS) methodology.

Hart et al (2000) have shown from an analysis of growth (employment and turnover) of two groups of assisted small firms in Northern Ireland, that growth clients grew faster than established clients in the 1991 – 97 period and provide tentative evidence that a more intense and directed package of assistance is clearly associated with faster business growth. Therefore, the authors concluded that the shift in LEDU policy in the 1990s towards a greater concentration of effort on firms with growth potential would appear to have been successful. The extent to which this differential growth performance was related to LEDU assistance and not simply to the selection of better performing small firms as growth firms in the first instance remains a matter of some contention (Hart et al, 1993).[1]

Another important point to emerge from the analysis of LEDU-assisted clients is that employment growth consistently outstripped turnover growth over the period 1991 – 97, with the resultant impact on productivity. This is particularly the case for firms designated by LEDU as growth firms, which, under the evolving strategy, were to be the recipients of a more intensive and varied package of assistance. Indeed, the fastest growing 100 growth firms in terms of employment recorded a negative annual rate of productivity growth in the period 1991 – 97. At a time when promoting jobs was no longer the primary aim of LEDU assistance, these trends are somewhat surprising.

Therefore, although it was reported at the outset that previous research had revealed that LEDU-assisted firms were performing better in employment terms than their counterparts elsewhere, this would appear to have been at the expense of productivity growth. The implication is that this situation is not sustainable and that the long-term profitability of firms will be affected. That scenario depends, of course, on what the additional workers are being hired to do. As Roper and Hewitt-Dundas (1998) argue, the more worrying situation is one in which grant support encourages firms to overman in their core activities. The withdrawal of financial support will, therefore, make it more difficult for firms to respond to a decrease in productivity.

However, the fact that falling productivity has been a consistent trend for these LEDU clients over the period 1991 – 97 might suggest that the financial support provided by LEDU may well be used as working capital and, in effect, maintain profit levels within these firms. Such an interpretation has already been suggested with respect to government financial assistance to manufacturing firms in Northern Ireland (Roper, 1993). The study concluded that in 1988 government grants and subsidies were raising profit rates in Northern Ireland relative to Great Britain above their expected level. A detailed financial review of LEDU growth clients, focusing on such issues as profitability (net profit on sales, return on net worth, or return on investment) and growth (increase in sales, net work, gross and net profit), and the nature and scale of financial assistance provided by LEDU, would be invaluable in order to provide further insight into the impact of assistance on business performance. Further, the multivariate analysis presented by Hart et al (2000) showed that there is some tentative evidence to suggest a link between employment growth and grant aid provided to very small firms (fewer than 10 employees) assisted under the GBSP.

The analysis by Hart et al (2000) raised a number of questions about the role that public policy may play in influencing the growth and efficiency of small firms in Northern Ireland. However, a clear understanding of the nature of the relationship between firm growth and public policy has not yet been fully developed. One of the conclusions of that earlier analysis was the need to undertake a more detailed assessment

[1] For a more detailed discussion of the need to control for 'selection bias' in evaluating the impact of policy support to individual firms see Roper et al (2001) and Hart and Roper (2004).

of the precise nature of assistance received by LEDU clients and the way it impacts upon business performance. As we have argued above, the rationale for this is based on the observed declining productivity (defined crudely in the study as turnover per employee) of the more intensively assisted firms with employment growth outpacing turnover growth in the 1991 – 97 period. This finding suggests that there may be an issue of timing associated with assistance and also the type of assistance being accessed by these small firms.

Assisting firms with 'internal organisation' issues covering both human resources management (for example, specialist recruitment, training, and new ways of organising the workforce) and production processes, were ways in which productivity growth may take place. These 'efficiency gains' may in some cases be a prerequisite to any potential future growth in sales, profits, and employment. Further, assistance may initially lead to short-term increases in employment as the firm seeks to recruit the requisite skills in its workforce that will enable it to meet anticipated orders generated by innovative activity and technological developments. This may have the effect of leading to static or falling productivity in the short term.

The aim of this paper is to address these issues by undertaking a multivariate analysis which seeks to test the relationship between the type of assistance received from LEDU and performance. The results will inform the construction of evaluation methodologies and the ways in which an 'assistance variable' should be considered in any econometric modelling work. This approach is data demanding as it requires access to individual firm details on the amounts and nature of financial assistance received from a government agency (in this case LEDU).

Data and methods

The information contained within this paper was derived from a secondary dataset provided to the authors by LEDU. A total of 551 firms within LEDU's client base were categorised as growth clients, of which 507 were established prior to 1994 within the dataset. Our current sample is therefore drawn from that population of 507 and represents a coverage rate of 64%. The dataset used in this paper comprises information for 324 surviving LEDU growth firms over the period 1994 – 97 who were in receipt of assistance between 1994 and 1996.

The impact of assistance is assessed by using a standard OLS procedure. The fact that the data consist of both cross-sectional and time-series components suggests that a pooled technique might have been appropriate. However, the time series was of insufficient length to facilitate such an approach. The models assess the impacts of annual assistance in the three calendar years 1994, 1995, 1996 on firm growth in 1997. The models are run separately on employment, turnover, and productivity and are estimated on the aggregate dataset and for subsamples based on employment size (either <25 or $\geqslant 25$ employees). The 1997 grant data were excluded from the analysis because of difficulties associated with using contemporaneous variables. Although the aim of the analysis is to assess the differential impact of assistance on a cohort of firms who all have received some form of support over the period (as opposed to a matched study involving the use of a nonassisted control group) we must still be mindful of potential issues relating to selection bias. Selection problems will still arise if the agency has a tendency to target high levels or particular types of support to faster growing firms. The standard approach to selection problems is the adoption of a two-stage Heckman model, and the potential usefulness of this methodology with respect to any postassistance selection effects is considered in more detail later in the paper (Hart and Roper, 2004; Heckman, 1979; Roper et al, 2001).

Sample characteristics

The firms had a mean age of 16 years (table 1) in 1994 and as such can be considered as a stock of relatively well-established firms. This is important in any subsequent analysis of growth in that the issue of faster growing start-up or new firms is effectively removed from the interpretation of the results. Given the relatively 'older' age profile of the cohort it is not surprising that over four fifths of firms employed 10 or more persons in 1994 with a further 5% employing more than 50 persons (figure 1). Approximately two thirds of the LEDU-assisted firms were engaged in manufacturing activities, with the remainder operating within the service sector (table 2, over). Within the manufacturing cohort almost a third of firms were within the food, drink, and tobacco and basic metals sectors with the remaining industries accounting for between 2% and 10% of total manufacturing firms.

In 1994 full-time employment within the cohort stood at 6954 persons rising to 8256 persons in 1997, representing an average annual growth rate of 5.9% (table 3, over). Real annual turnover growth for the period stood at 8.4%, with an average year-on-year increase in productivity (measured by turnover per worker) of 2.4%. A clearer illustration of the dynamics behind these annual growth rates is given in figure 2 (over). There appears to be a lagged relationship between the expansion of real turnover and employment within the cohort. The rate of turnover growth was particularly rapid between 1994 and 1996, with employment growth accelerating between 1995 and 1997. As a result, productivity growth follows a very uneven pattern, with the annual growth rate rising whenever turnover leads employment and then falling as turnover growth begins to slow and employment continues to expand. One possible explanation for this pattern is that firms are reacting to cyclical fluctuations in market conditions; that is, turnover growth may have an immediate reaction to increased market demand, with companies expanding their workforce in the next period in line with new market conditions.

Table 1. Age profile of firms assisted by the Local Enterprise Development Unit (source: NIERC).

	Range	Mean age	Median age
Year of birth	1900–93	16 years (1978)	11 years (1983)

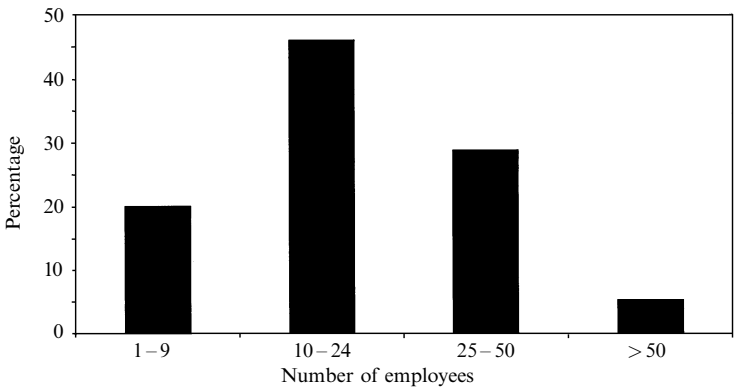

Figure 1. Percentage distribution of companies by firm size in 1994.

Table 2. Sectoral distribution of LEDU (Local Enterprise Development Unit) growth firms (source: NIERC GBSP database).

Industrial sector	Number of firms	Percentage
Food, drink, and tobacco	30	9
Textiles, clothing, and leather	20	6
Wood and wood products	19	6
Paper and printing	11	3
Coke, petroleum, and nuclear fuel	0	0
Chemicals and man-made fibres	7	2
Rubber and plastics	21	6
Ad hoc nonmetallic mineral products	7	2
Basic metals and fabricated metal products	41	13
Ad hoc machinery and equipment	23	7
Electrical and optical equipment	10	3
Transport equipment	12	4
Ad hoc manufacturing not elsewhere specified	19	6
Nonmanufacturing	104	32
All firms	324	100

Table 3. Aggregate indicators 1994 – 97 (source: NIERC GBSP database).

	Employment	Turnover (£ million) [a]	Productivity [a]
1994	6 952	440.9	63 422
1995	7 206	493.9	68 534
1996	7 888	543.3	68 881
1997	8 256	562.0	68 049
Annual growth (%)	5.9	8.4	2.4

[a] 1997 prices.

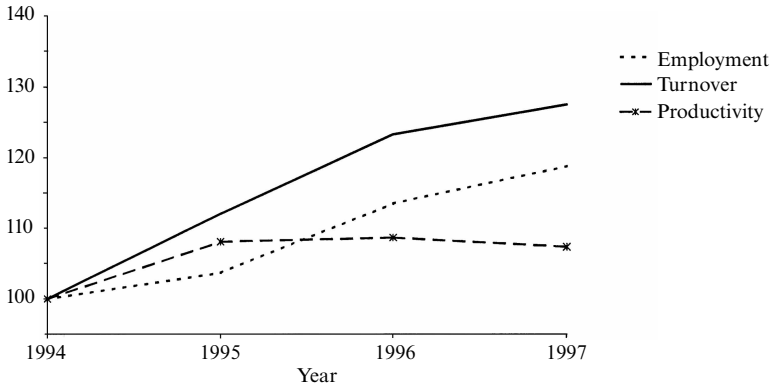

Figure 2. Employment, turnover, and productivity, 1994 – 97 (1993 = 100).

The level and nature of assistance

Over the period 1994 to 1996 the 324 LEDU growth firms received a total of £8.30 million in grant assistance, averaging £2.77 million per annum (table 4). The LEDU payments system enables firms to draw down assistance over a number of years. Hence payments in any one year may relate to offers made in previous years. This point is

Table 4. Assistance from the Local Enterprise Development Unit to growth companies, 1994 – 96 (source: data from LEDU, 1998).

Financial year (ending December)	Grant assistance (£ million)
1994	0.93
1995	3.45
1996	3.92
Total	8.30

Table 5. Distribution of payments on 1994 offers (source: data from LEDU, 1998).

Financial year	Payment (£ million)	Percentage of offer
1994	0.93	19
1995	2.05	43
1996	0.80	17
1997	0.24	5
1998	0.07	1
Total	4.81	86

Table 6. Aggregate financial assistance by grant type 1994 – 96 (source: data from LEDU, 1998).

	Offered (£ million)	Paid (£ million)	Average grant	Take up (%)
Capital	1.82	1.58	36 856	86.8
Working capital	3.09	2.59	22 282	83.8
Management	1.87	1.32	9 496	70.6
Marketing	2.54	1.32	7 674	52.0
Other	1.86	1.49	1 768	80.0
Total	11.18	8.30	6 315	74.2

illustrated in table 5, which gives details of the distribution of payments made on 1994 offers of assistance which totalled £5.63 million of which £4.81 million (86%) had been drawn down by the end of 1998. The majority of assistance, 62% in the case of 1994 offers, will be drawn down in the 24 months following the offer being made, with the level of annual payments diminishing in size thereafter. The process of grant take-up is more or less complete at the end of year 4, with firms having drawn down approximately 85% of the amount offered.

LEDU financial assistance can be broken down into five categories of assistance: management, marketing, capital, revenue, and other. Management, marketing, capital, and revenue programmes typically involve larger levels of assistance (table 6), whereas the other category comprises mainly small levels of ad hoc assistance delivered under programmes such as consultancy, setting up or removals, and small-scale R & D initiatives. The level of assistance varies from £2.59 million paid under working-capital programmes to £1.32 million for marketing and management initiatives. It should be noted that after 1996 there was a substantial fall in the level of physical capital assistance whereby payments made under management and marketing programmes increased significantly, which was indicative of a rebalancing of LEDU assistance towards softer forms of support.

Empirical analysis

The central objective of the empirical work is to understand the extent to which the value of financial assistance influences growth and if differential impacts arise depending on the nature and timing of the grant. The dependent variable in the analysis is defined as the log difference of employment, turnover, and productivity (that is, turnover per employee) between 1996 and 1997. The focus was on this one year to allow analysis to be undertaken on the lagged structures of the effects of financial assistance.

A further set of explanatory variables potentially relating to variations in growth rates was also included within the models and is listed below in table 7. We control for the size and age of the firm as the literature suggests that growth will be fastest amongst smaller and younger companies (Barkham et al, 1996; Hart and Roper, 2004; Reid, 1993; Roper et al, 2001). The influence of sector on growth is modelled through the use of a dummy variable indicating whether or not the firm is engaged in service activities.

An urban dummy is included for the Derry and Belfast District Council Areas as a priori reasoning might suggest that urban companies are at an advantage relative to rural firms in terms of a ready access to labour markets, infrastructure, and centres of innovation (North and Smallbone, 2000). In the context of Northern Ireland Belfast and Derry are the principal urban areas, with the rest of the region considered to be rural or semirural. Unfortunately, we do not have information on all possible influences which previous studies have shown to have a significant explanatory impact on growth, such as the characteristics of the owner-managers or business strategy (see Barkham et al, 1996; Hart and Roper, 2004; Robson and Bennett, 2000; Roper et al, 2001). However, we believe that the analysis contains sufficient controls to enable us to draw meaningful conclusions vis-à-vis the impact of financial assistance on firm performance. Within our models the level of assistance measures the impact of the actual financial value of grants and the nature of assistance and the differential impact of the various programmes are controlled for by the inclusion of dummy variables.

Table 7. Variables in ordinary least squares estimates of growth equations.

Variable	Description
Dependent	log difference 1997 to 1996 of employment turnover productivity
Control variables	
Size	log of employment in 1996
Age	log of age in months at January 1994
Urban	1 = urban, 0 = rural
Service	1 = service sector; 0 = manufacturing
Assistance variables	
Total	log of total financial assistance received from the Local Enterprise Development Unit in the period 1994–96
Ad hoc grants	in 1996 (t_{-1}), 1995 (t_{-2}), and 1994 (t_{-3})
Marketing grants	in 1996 (t_{-1}), 1995 (t_{-2}), and 1994 (t_{-3})
Working capital	in 1996 (t_{-1}), 1995 (t_{-2}), and 1994 (t_{-3})
Capital grants	in 1996 (t_{-1}), 1995 (t_{-2}), and 1994 (t_{-3})
Management grants	in 1996 (t_{-1}), 1995 (t_{-2}), and 1994 (t_{-3})

Regression results

All models were estimated by using an OLS methodology and all standard errors were heteroskedastic consistent. Although the focus in the paper is on identifying statistically significant growth models with only significant variables included, the overall general models for growth in employment, turnover, and productivity are presented against which the subsequent parsimonious models can be assessed (table 8). We include an *F*-test of the null hypothesis that the coefficients on the explanatory variables are jointly zero in each regression. The regressions are run on the entire sample in the first instance, with subsequent separate regression equations estimated on the basis of firm size in 1996. Table 8 shows that only the general employment model is statistically significant.

The results from the backward stepwise regression models of small firm growth (all firms) are reported in table 9 (over). Dealing first with the control variables we confirm the general consensus within the research literature that firm size is inversely related to growth in employment and turnover. Employment growth was also higher in the urban areas of Belfast and Derry, suggesting that agglomeration economies or externalities such as the ready access to labour markets, infrastructure, etc are associated with small-firm growth. In relation to the impact of Selective Financial Assistance on employment growth, a significant and positive relationship was found vis-à-vis the level of assistance, suggesting the effectiveness of such interventions in stimulating employment increases within small firms in the short-term. This finding holds to a lesser extent for turnover growth.

Table 8. Regression results for firms assisted by the Local Enterprise Development Unit.

	Employment	Turnover	Productivity
Constant	0.018 (0.130)	0.179 (0.103)*	0.160 (0.154)
Size	−0.063 (0.019)***	−0.036 (0.017)**	0.027 (0.024)
Age	−0.002 (0.013)	−0.011 (0.012)	−0.010 (0.016)
Urban	0.061 (0.030)**	0.005 (0.026)	−0.056 (0.039)
Service	−0.046 (0.027)	−0.027 (0.023)	0.019 (0.033)
Total	0.022 (0.011)**	0.007 (0.010)	−0.014 (0.015)
Ad hoc grant t_{-1}	0.070 (0.027)***	0.011 (0.023)	−0.059 (0.036)*
Ad hoc grant t_{-2}	−0.018 (0.026)	0.011 (0.020)	0.029 (0.031)
Ad hoc grant t_{-3}	0.022 (0.037)	0.001 (0.024)	−0.021 (0.033)
Marketing grant t_{-1}	−0.089 (0.055)*	0.038 (0.038)	0.128 (0.062)**
Marketing grant t_{-2}	−0.037 (0.042)	−0.006 (0.038)	0.031 (0.052)
Marketing grant t_{-3}	0.058 (0.063)	−0.034 (0.046)	−0.098 (0.071)
Working capital t_{-1}	0.022 (0.036)	0.013 (0.031)	−0.010 (0.044)
Working capital t_{-2}	−0.021 (0.045)	−0.020 (0.041)	0.001 (0.055)
Working capital t_{-3}	0.071 (0.097)	0.028 (0.055)	−0.042 (0.113)
Capital grant t_{-1}	−0.063 (0.038)*	0.013 (0.041)	0.076 (0.050)
Capital grant t_{-2}	−0.000 (0.045)	0.003 (0.055)	0.004 (0.069)
Capital grant t_{-3}	0.035 (0.051)	0.032 (0.062)	−0.003 (0.089)
Management grant t_{-1}	0.040 (0.067)	0.039 (0.048)	−0.001 (0.054)
Management grant t_{-2}	−0.101 (0.061)*	−0.051 (0.033)	0.051 (0.065)
Management grant t_{-3}	0.091 (0.089)	0.010 (0.043)	−0.081 (0.100)
Number of observations	324	324	324
R^2	0.117	0.047	0.054
F-test	2.02***	0.745	0.873

* significant at 0.10 level; ** significant at 0.05 level; *** significant at 0.01 level.
Note. Standard errors are given in parentheses.

Table 9. Regression results for firms assisted by the Local Enterprise Development Unit.

	Employment	Turnover	Productivity
Constant	−0.013 (0.096)	0.112 (0.070)	0.071 (0.023)**
Size	−0.063 (0.019)***	−0.039 (0.016)**	
Urban	0.051 (0.031)*		
Total	0.024 (0.009)***	0.011 (0.006)*	
Ad hoc grant t_{-1}	0.070 (0.027)***		−0.058 (0.032)*
Marketing grant t_{-1}	−0.050 (0.027)*		0.117 (0.054)**
Marketing grant t_{-3}			−0.094 (0.052)*
Working capital t_{-1}	−0.068 (0.035)*		0.071 (0.036)*
Capital grant t_{-2}		−0.063 (0.028)**	
Number of observations	324	324	324
R^2	0.089	0.025	0.032
F-test	5.20***	4.16***	2.65**

* significant at 0.10 level; ** significant at 0.05 level; *** significant at 0.01 level.
Note. Standard errors are given in parentheses.

The regression results indicate that it is not correct to assume that all types of financial assistance are designed to, or ultimately, yield a positive influence on growth variables. Relationships, as table 9 reveals, become more complex when we control for the differential impacts associated with both the timing and the nature of the various financial assistance packages provided by LEDU. For example, the provision of ad hoc assistance in the previous year was found to exert a positive influence on employment growth whereas marketing or working capital programmes exerted a lagged negative impact. The majority of ad hoc programmes consist of funding towards private-sector-based consultancy initiatives aimed at improving company development and encouraging improved business practices. Thus, our results suggest that the introduction of such interventions has an immediate effect on employment growth. The result is consistent with the findings of Robson and Bennett (2000) who report that a number of private sector sources of external advice exerted a positive and significant influence on SME employment growth. The impact of marketing assistance will obviously be dependent on the success of firms in accessing new markets. However, the negative coefficient on the first lag of the marketing grant variables raises some questions in relation to the effectiveness of such support mechanisms within the context of the small-firm sector. The negative coefficient on the first lag of marketing might suggest that such assistance is relatively unsuccessful, with firms scaling back employment in the year following a marketing campaign. However, one must also consider the possibility that the time period encompassed in the empirical models may not be sufficient for the full effects of such assistance to be observed.

The coefficient on the working-capital variable is somewhat more difficult to interpret as the a priori impact of such assistance is unclear. Working-capital assistance will essentially be delivered in one of two circumstances. First, if the firm is experiencing serious liquidity problems the assistance will be administered as a rescue mechanism, probably accompanied with the proviso that the firm operates more cautiously, and in this case we would expect the package to exert a negative impact on growth. Second, working-capital assistance can also be administered as a straightforward revenue grant, in which case we would expect the impact on growth to be positive. The fact that the coefficient on the first lag of the working-capital variable was both negative and significant suggests that such assistance was predominantly administered as part of a package aimed at securing company liquidity and thus tended to be associated

with lower levels of subsequent growth. Capital assistance had no discernible influence on employment, implying that any increase in labour demand deriving from increased production ability was at least offset by the drop in labour demand associated with the substitution of capital for labour (Felsenstein, 1992; Wren and Waterson, 1991).

In relation to turnover, assistance paid out under a physical capital scheme in year t exerts a negative influence on turnover growth in t_{+2}. Thus, after assistance, firms appear to have been incapable of sustaining the rate of expansion, which presumably qualified them for capital assistance in the first place. This, in turn, might explain why the postassistance level of output fell below the threshold necessary to outweigh any substitution effect and thus produce a positive influence on employment growth.

Finally, in relation to productivity, the negative employment influences deriving from marketing and working capital assistance in t_{-1} fed through to exert a significantly positive influence on productivity growth in period t. Conversely, ad hoc assistance tended to boost employment without exerting a similar influence on turnover, which significantly reduced productivity growth in the period after assistance. The negative coefficient on marketing in t_{-3} indicates that whatever productivity gains that had accrued to the firm had largely worked their way through the system after three years, raising further questions with respect to the effectiveness of such assistance.

However, it may well be the case that we are aggregating away important differences in the differential impact of assistance. That is, some forms of support may have a greater impact within larger firms and vice versa. Consequently, we have split our sample according to firm size in 1996 and reestimated the models separately for firms with an initial employment level greater than or equal to 25 person ($n = 132$) and firms who employed fewer than 25 persons ($n = 192$).

Larger SMEs

The results for larger firms indicate that the level of assistance was not significant within the model, suggesting that the nature of the assistance package may be more important than the actual amount of the financial assistance package in stimulating employment within this cohort (table 10). Again ad hoc assistance (in the previous year) had a significant effect in stimulating employment growth, while exerting a negative influence on productivity. The variable on the second lag of capital assistance was negative and significant indicating that within larger SMEs the substitution effect of capital assistance outweighed the output effect, resulting in an overall negative influence on employment growth. This result, when combined with the evidence from

Table 10. Regression results for larger firms assisted by the Local Enterprise Development Unit ($\geqslant 25$ employees).

	Employment	Turnover	Productivity
Constant	−0.049 (0.028)*	0.036 (0.015)**	0.110 (0.037)***
Ad hoc grant t_{-1}	0.114 (0.034)***		−0.111 (0.038)***
Marketing grant t_{-1}		0.049 (0.028)*	0.130 (0.077)*
Marketing grant t_{-3}			−0.137 (0.078)*
Working capital t_{-3}		−0.108 (0.054)**	
Capital grant t_{-2}	−0.099 (0.055)*		
Management grant t_{-2}		0.074 (0.045)*	0.122 (0.063)*
Number of observations	132	132	132
R^2	0.097	0.067	0.112
F-test	7.00***	3.06**	4.02***

* significant at 0.10 level; ** significant at 0.05 level; *** significant at 0.01 level.
Note. Standard errors are given in parentheses.

the aggregate model, suggests that capital assistance to SMEs is largely ineffective for the purpose of job creation in the very short term.

Within the turnover model, the first lag on the marketing variable was both positive and significant, indicating that these larger firms are relatively successful in securing business from marketing activities. However, the negative coefficient on the third lag of marketing in the productivity regression again demonstrates that any gains to the firm resulting from the marketing campaign had largely worked their way through the system after three years. Packages aimed at improving management performance also tended to improve turnover growth. However, the third lag of working capital exerted a negative influence and, assuming that such assistance is accompanied with a stipulation that the firm adopts a more conservative approach to its trading activities, the result suggests that larger SMEs do tend to adjust their behaviour over a slightly longer period of time. The impact of assistance on productivity growth largely reflects the relative impacts on employment and turnover growth, with ad hoc assistance in t_{-1} and marketing assistance in t_{-3} exerting a negative influence on growth whereas management and marketing assistance in t_{-1} exerted a positive influence.

Smaller SMEs

The influence of financial assistance to firms employing fewer than 25 workers is relatively more straightforward (table 11). First, the control variables indicate that employment growth was more rapid amongst urban and manufacturing firms. In contrast to the larger SME cohort, the actual value of assistance was found to be an important factor in generating employment growth. This is perhaps not surprising as a cash injection in the form of financial assistance from a public agency will have a greater relative impact on small firms compared with larger firms. Also, the success in obtaining public sector support may act as a lever on other sources of funding and again this may be of greater relative importance for smaller SMEs.

With respect to the nature of assistance received, the first lag (one year) of a marketing grant exerts a negative influence on employment growth, indicating that perhaps these firms are less capable of effective marketing compared with their larger counterparts. Working-capital assistance has an immediate effect of depressing employment growth. However, it also exerted an immediate positive influence on turnover growth indicating that, relatively speaking, this type of assistance is most effective for modifying the behaviour of smaller firms. We again get a lagged negative

Table 11. Regression results for smaller firms assisted by the Local Enterprise Development Unit (<25 employees).

	Employment	Turnover	Productivity
Constant	−0.067 (0.169)	0.129 (0.022)***	0.226 (0.198)
Size	−0.103 (0.035)***		0.074 (0.041)*
Urban	0.079 (0.037)**		−0.097 (0.049)**
Total	0.050 (0.015)***		−0.043 (0.021)**
Service	−0.072 (0.034)**	−0.052 (0.031)*	
Marketing grant t_{-1}	−0.102 (0.036)***		0.087 (0.048)*
Working capital t_{-1}	−0.099 (0.051)*	0.083 (0.047)*	0.185 (0.060)***
Capital grant t_{-2}		−0.058 (0.034)*	
Number of observations	192	192	192
R^2	0.129	0.036	0.092
F-test	4.59***	2.35*	3.80***

* significant at 0.10 level; ** significant at 0.05 level; *** significant at 0.01 level.
Note. Standard errors are given in parentheses.

influence of the physical capital on turnover, indicating that smaller firms are unable to sustain their historical growth rates for very short periods after the adoption of new plant and/or the move to new premises. The scale (or value) of assistance variable feeds through to exert a negative influence on productivity growth whereas marketing tends to boost productivity. Working-capital assistance had a significant impact on the productivity performance of smaller SMEs by apparently inducing a slowdown in employment whilst simultaneously exerting a positive influence on turnover growth.

Secondary selection effects

As discussed earlier, the above estimates may be prone to selection bias should it prove to be the case that assistance to certain types of support (for instance, marketing or capital grants) was allocated in some nonrandom fashion. Although such 'secondary selection' effects are likely to be much less of an issue relative to potential biases arising from the initial decision to admit firms onto the support programme in the first place, they should still be considered. The standard approach to dealing with such issues centres on the two-stage methodology developed by Heckman (1979). In the first stage a probit model of the likelihood of receiving a particular mode of assistance is estimated and from this an inverse Mills ratio (IMR) is extracted and included in the second-stage OLS as part of an explicit control for selection into particular assistance paths.

The probit models for the various types of assistance are given in the appendix and on the whole the models were poorly specified, with the model *F*-tests indicating that we could not reject the hypothesis that the model coefficients were jointly zero (table A1). The nonsignificance of the probit models indicates that selection into the majority of grant programmes tended to be nonsystematic in nature, implying that secondary selection bias was unlikely to be a problem. Therefore, where probits suggested random entry to grant programmes (at least in terms of the control variables available) which also implied that the models were not sufficiently specified to allow the extraction of an IMR, the second stage of the Heckman procedure was deemed both unnecessary and impractical.

However, in the case of management grants the probit model was sufficiently well specified to facilitate the estimation of the two-stage procedure. The results from the probit (table A1) suggest firms which were older, operating in the service sector, and not located in Targeting Social Need Areas (TSN) were more likely to have received management grants.[2] In order to test for secondary selection effects, where necessary, the OLS models were reestimated to include selection controls. Consequently, the turnover and productivity models for larger SMEs, which contained significant management grant impacts, were reestimated and the results are reported in table A2. However, within neither of the models were the selection terms significant nor were any of the management coefficients substantially affected, suggesting that the initial OLS results were unbiased and confirming that secondary selection influences were not important factors within our analysis.[3]

[2] It should be noted that the TSN variable was included in the modelling procedure in order to ensure that the selection model was properly identified.

[3] The only detectable difference between the OLS and selection models was a slight shift in the significance of the management variables. Relative to the OLS specifications, the statistical significance level of the management effect drops below 90% in the turnover model and rises to above 95% in the productivity model.

Conclusions and policy implications

In the above analysis we have sought to investigate the nature of the relationships between the value, nature, and timing of government financial assistance to small firms and business performance in Northern Ireland. The observed growth rates for the assisted small firms in this study may also be associated with a range of other factors, and the low R^2 in the models reported in this paper is a clear indication of 'missing variables'. These variables may be described as a set of influencing factors which include indicators of previous business performance, the characteristics of the firm, business strategy, R & D activity, market structure and penetration, and the characteristics of the owner-manager (see Roper, 1997). The effect of these factors on small business performance has been discussed extensively elsewhere (for example, Barkham et al, 1996; Hart and Gudgin, 1999; Roper, 1998; 1999; Robson and Bennett, 2000; Roper and Hewitt-Dundas, 1998; 2001; Storey, 1994). For example, in their study of small-firm growth in four UK regions, Barkham et al (1996) demonstrated that six characteristics of managers and eleven aspects of managerial strategy were identified as statistically significant influences on growth after controlling for size, sector, and region. In the specific context of an assessment of the impact of public policy, Roper and Hewitt-Dundas (2001) used a broadly similar set of factors to determine the probability that small firms in Ireland would receive assistance and the impact of that assistance on performance.

Nevertheless, the results presented in this paper, while not attempting to provide a comprehensive model of the determinants of small-firm growth, indicate that, after controlling for firm size, sector, location, and legal status, there are differential impacts on firm growth associated with the timing and nature of the various assistance packages received from LEDU. The importance of the modelling work, beyond the particular relevance for small-firm policy in Northern Ireland, is to illustrate the value in disaggregating the effects of particular forms of assistance provided under broad small-firm business-support programmes. This is of particular relevance to the current arrangements for government-backed business support for small firms provided through the range of BL brokerage models currently in operation or being piloted in England. The challenge in any evaluation of these brokerage models is to construct appropriate methodologies which seek to capture this variety of delivery arrangements.

The results are not the same for smaller and larger small firms in the sample. This immediately underlines the complexity of the relationship between business support mechanisms (in this case financial assistance provided in a variety of ways) and the drivers of small-firm growth. Productivity growth in larger small firms assisted by LEDU would appear to be associated with marketing and management assistance, whereas for smaller LEDU-assisted small firms it is the actual amount of finance received (and the positive influence of working-capital assistance supports this) which is of greater importance. The implication here is that once again business-support strategies need to be sensitive to firm size in understanding how the assistance package can impact upon the range of economic outcomes they are seeking to influence.

One of the major weaknesses of the analysis presented in this paper is the very short time period for which we have data to model the effects of financial assistance. Although we have attempted to introduce some sensitivity to the lagged nature of the effects of public sector support it must be recognised that the analysis has been constrained by the very short time period for which data were made available: 1994 – 97. However, that in turn, raises the more general question over the appropriate time period that public agencies and government should seek to 'claim' the effects of assistance. There must come a time when the observed growth of assisted firms can no longer be directly associated with the financial assistance received from

business-support agencies. The analysis in this paper has begun to explore these timing issues and has provided evidence to illustrate the very complex sets of relationships which exist. It is these sets of relationships that need to be accommodated within evaluation methodologies designed to ascertain the economic impact of public policy to small firms. The bland use of an 'assistance' variable (usually in the form of a dummy variable—assisted or not assisted) would clearly reduce the ability of econometric models to capture the variety of ways in which business support, through advice and direct financial support, can impact on business performance.

Finally, an important extension to the analysis reported here would be to collect information from assisted firms on the broader portfolio of financial support obtained to finance the expansion of the business. Viewing financial support from government in isolation presents a number of interpretative problems. First, it may well understate the importance of government assistance in helping firms lever in additional funds to the business (Hart and Lenihan, 2004; Lenihan et al, 2003). Second, and conversely, it may well overstate the effects of financial support from public agencies by allocating growth to the effects of public sector assistance rather than the perhaps greater sums obtained through the mechanisms of debt finance and the private equity market. Clearly, greater sophistication in research design is required to address these issues.

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Appendix

Table A1. Probit models for selection into various categories of assistance.

	Ad hoc assistance	Working-capital assistance	Capital assistance	Marketing assistance	Management assistance
Constant	1.9533	−0.590	−2.245	−0.197	0.094
	(0.592)***	(0.458)	(0.626)***	(0.420)	(0.434)
Size	−0.018	0.233	−0.099	0.110	0.104
	(0.146)	(0.121)*	(0.158)	(0.108)	(0.113)
Age	−0.119	−0.1649	0.146	−0.083	−0.181
	(0.100)	(0.078)**	(0.110)	(0.073)	(0.076)**
Urban	−0.337	−0.020	−0.395	−0.017	−0.100
	(0.241)	(0.207)	(0.272)	(0.186)	(0.198)
Service	−0.084	−0.162	−0.051	0.253	0.462
	(0.206)	(0.170)	(0.216)	(0.155)*	(0.160)***
TSN [a]	0.071	0.167	0.166	0.051	−0.288
	(0.225)	(0.178)	(0.221)	(0.165)	(0.176)*
Pseudo-R^2	0.018	0.0234	0.028	0.011	0.043

[a] Targeting Social Needs Areas.

* significant at 0.10 level; ** significant at 0.05 level; *** significant at 0.01 level.

Note. Standard errors are given in parentheses.

Table A2. Regression results for larger firms assisted by the Local Enterprise Development Unit ($\geqslant 25$ employees—selection model).

	Turnover	Productivity
Constant	0.041 (0.016)**	0.110 (0.035)***
Ad hoc grant t_{-1}		−0.112 (0.039)***
Marketing grant t_{-1}	0.044 (0.027)*	0.130 (0.068)*
Marketing grant t_{-3}		−0.137 (0.066)**
Working capital t_{-3}	−0.099 (0.057)*	
Capital grant t_{-2}		
Management grant t_{-2}	0.054 (0.042)	0.127 (0.060)**
λ (selection parameter)	0.019 (0.019)	−0.004 (0.029)
Number of observations	132	132
R^2	0.073	0.112
F-test	2.52**	3.20***

* significant at 0.10 level; ** significant at 0.05 level; *** significant at 0.01 level.

Note. Standard errors are given in parentheses.