Study of the impact of Enterprise Investment Scheme (EIS) and Venture Capital Trusts (VCT) on company performance

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Executive Summary

Background and objectives of the study

The Institute for Employment Studies (IES) was commissioned in early 2007 by HM Revenue & Customs (HMRC) to evaluate econometrically the impact of the Enterprise Investment Scheme (EIS) and Venture Capital Trust scheme (VCT) on recipient companies.

The Government's introduction of the Enterprise Investment Scheme (EIS) and the Venture Capital Trust (VCT) programmes were practical policy responses to a perceived market failure in the provision of sufficient amounts of risk capital for smaller and younger UK companies with growth potential. Accordingly, the purpose of both of these publicly financed schemes was to encourage informal and private (ie non-institutional) investors to provide greater sums of seed, start-up and early growth risk capital finance by altering the nature of the risk-return ratio in favour of equity investors.

The aim of policy evaluation is to assess ex post the impacts of EIS and VCT tax relief on the UK economy and whether these interventions have been worthwhile overall. In this context, the present study has sought to ascertain the nature of the benefits of EIS and VCTs by reference to a control group of matched, non-recipient companies, using a panel data approach over the period 1994 to 2005. This report presents new empirical evidence on EIS and VCT drawing on HM Revenue & Customs' own administrative data which was then complemented with financial information. This provided a rich dataset of thousands of relevant companies tracked over a maximum of eleven years thereby allowing a quantitative, and methodologically robust, assessment of the impact of the schemes on recipient company development.

Companies in receipt of EIS and/or VCT support have been assessed in terms of standard criteria of economic and financial performance against matched, non-recipients of these two sources of finance. Outcome measures used in the comparative assessment included: trading performance (profitability and sales); capital structure

(fixed assets, debt gearing, capital formation); factor utilisation (labour productivity); and survival.

In particular, this research has three primary aims:

- to compare the performance of UK companies that have received funding through the EIS and/or VCT schemes[1] against the performance of similarly matched companies that have not received such funding
- to compare the performance of recipient companies dynamically, ie before and after receiving initial EIS or VCT investment, and
- to quantify the effect on business performance indicators for each scheme of key variables including, for example, company age, size and sector.

Setting the context for this study

While there is a considerable body of empirically based evaluation research looking at the impact of publicly supported interventions in the market for small company debt finance, comparatively little evidence is available for *equity* based schemes similarly targeted at smaller and younger companies. Much the same can be said regarding the dearth of broader research looking at the effects of financial structure on the performance of SMEs and particularly young, innovative companies. This present research is thus capable of providing new insights into the relationship between improved access to equity based finance and the subsequent performance of recipient companies when compared to unsupported companies. However, before we review the findings of our econometric analysis, it is pertinent to outline some of the caveats that must be born in mind when considering our results:

- Due to the nature of the dataset used, the impact of other publicly supported schemes which respondent companies may have accessed cannot be examined. This may lead to the estimated effects of EIS and VCT being biased.
- Again, due to the dataset used, many potentially important company characteristics are not available for inclusion in our analysis. For example, we hold no data on the experience and quality of the entrepreneurs involved. These unknown characteristics may influence the demand for equity based finance and/or the inability of a particular company to raise equity through conventional (ie unsupported capital market) means. As our estimates of EIS and VCT effects cannot capture these company characteristics, this may also represent an area of potential bias.
- The company accounts data drawn for both our EIS and VCT recipient companies and our control group from industry databases has substantial variability in terms

[1] Some companies are in receipt of funds through both schemes.

of missing data across key variables. Databases dealing with small and medium sized enterprise (SME) accounting and financial data are particularly vulnerable to missing or inaccurate information when compared to larger company data. This means that generalising our results to a broader SME population should be done cautiously.

- Finally, the time-series element of our dataset is too short to permit robust analysis of the nature of causality in the relationships found using appropriate dynamic models.

While we have raised some areas of potential bias resulting from imperfect data, it is difficult to predict to what extent we might expect these factors to bias our results. Nor can we comment on the likely direction of such bias in terms of either raising (or lowering) our estimated effects above (below) their actual effects.

Having sensibly raised some potential limitations which are inherent in such large scale analyses, we can also state that our study has some important advantages over similar evaluations and more general studies on the financing and performance of smaller and younger companies. Our overall confidence in the results is supported by the following factors:

- The HM Revenue & Customs dataset used in our study is unique. It permits us to examine the absolute and relative effects of two equity based schemes across a large number of observations (for some analyses, the number of total observations is approximately 100,000) over a period of time (averaging four to five years).
- As both schemes have broad sectoral coverage and are focused on smaller and younger companies, this study can provide some important insights into a relatively under-researched segment of the UK economy. Most studies concerned with the influence of equity on company performance look at much larger and older companies but less commonly over a significant period of time.
- We use actual recorded performance data in our estimations. This is often found to be superior when compared to survey based, subjectively reported measures.
- Our use of advanced panel data estimation techniques allows us to be more confident statistically that our estimates accurately represent the underlying relationships examined.
- Panel data methods allow the use of more effective econometric techniques to address and control for unobservable company effects. This further increases our confidence in the results.

Key findings[2]

To examine the comparative impact of EIS and VCT on recipient companies, econometric modelling is required which enables the effect of other extraneous factors to be controlled for. This analysis allows a more robust and precise assessment of the two schemes and their impact. Using panel data analysis, IES identified the following key findings at the aggregate level (ie across all companies).

General Capacity Building

- Investments made under EIS and VCT, but particularly EIS, tended to be associated with general capacity building (growth in fixed assets and employment) and an expansion in sales.
- EIS and VCT were, in general, found to be associated with higher (real) fixed asset formation, (real) sales turnover and employment.
- Company size of EIS and VCT scheme investments was found to be positively related to fixed asset accumulation and employment
- Age of company receiving EIS investments tended to be positively associated with gearing (the ratio of company debt commitments to equity ownership), employment and fixed asset accumulation.

Profitability

- On average, the EIS and VCT schemes generally had little discernible impact on real gross profits or investment, although the latter estimation was problematic for missing data reasons.
- Investments made under EIS and VCT tended to be negatively associated with company profit margins.
- Increased company size of EIS and VCT recipients was associated with reduced effectiveness of scheme investments by reducing both (real) gross profits (and labour productivity).
- The age of company receiving VCT investments tended to enhance employment and profit margins.

Productivity

- The VCT scheme appeared to have no statistical effect on labour productivity.

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[2] Some findings are repeated under separate headings to add clarity to this summary.

- For EIS only, the scheme was associated with lower gearing and higher labour productivity.
- Company size of EIS and VCT was negatively associated with labour productivity.

Sector

- Companies operating in multiple sectors (ie having more than one SIC code) with EIS investment were associated with higher sales and employment.
- Scheme investments in business services companies were associated with higher fixed asset formation (VCT only) and higher employment.
- In contrast to business services, 'other' service sector companies performed relatively poorly in terms of associations with sales (VCT only) and labour productivity (EIS only).

Age

- The age of the company receiving EIS investments was associated with gearing, employment and fixed asset accumulation.
- The age of the company receiving VCT investments tended to enhance both employment and profit margins.

Survival

- Survival rates for EIS and VCT supported companies were lower than those recorded in matched but unsupported companies. However, for companies receiving both EIS and VCT support, survival rates were broadly comparable with those of unsupported companies. However, non-survival is measured imperfectly, and refers to all companies not currently trading which might include genuine failure alongside a host of other reasons.

Overall, these results indicate that EIS and VCT investments have a positive effect on capacity building in recipient companies. However, in material terms, these effects remain at present very small. There is some additional limited evidence of a profit enhancing effect. However, we also note that both schemes appear to be associated with differentials in performance depending on the size, age and sector of the recipient company.

It is important that these findings are interpreted within the context of the target community of young, growth-orientated small companies in higher risk trades. That general capacity building (ie real assets and employment growth) appears a strong positive consequence of the two schemes (especially EIS) is to be applauded. The purpose of any public scheme is essentially to strengthen the *future* capability of the

economy. It is the growth of capacity that is likely to be of more importance than the factors of profitability or productivity for young and growing businesses in the short term. (The discussion of the interpretation of these findings for small companies is continued in the Conclusions chapter).

1 Policy Context

The availability of risk capital[3] for high potential, young companies has been a key policy issue for government in the context of promoting economic development via the growth of innovative (new knowledge-based) small and medium sized enterprises (SMEs)[4]. Issues regarding the importance of risk capital to the early growth stages of young companies have been debated widely in political and academic circles for the last twenty-five years both in the UK and continental Europe[5]. Example and reference has been strongly influenced by US experience, particularly the several conspicuous successes of new US companies growing rapidly into position of international dominance within areas of new technology and knowledge-based opportunities.

This debate on the effective financing of entrepreneurial activity has necessarily to be set in a wider context of small and medium sized enterprise support. We know that, at any moment of time, it is only a small minority of young companies that will need, and will also seek, external equity finance in order to accelerate development in their early years[6] [7]. Yet, it is also widely accepted that this relatively small number of high potential young enterprises will likely have a disproportionately large impact on future measures of value-added including net employment creation and additional innovation within their host economy.[8]

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[3] The terms 'risk capital' and venture capital' are used interchangeably in this report. They both refer to equity investments in start-up and early growth enterprises by knowledgeable investors for the purposes of an eventual capital gain. Venture capital is used in the US sense in that it does not relate to management buy-outs nor other types of private equity activity with large and established businesses.

[4] Aho et al, 2006.

[5] HM Treasury, 1998 and 2003; European Commission, 2003, 2005 and 2006 a,b; Cressy and Olofsson, 1997 and Cressy, 2002.

[6] Small Business Service, 2006; Maula and Murray, 2007.

[7] Myers and Majluf, 1984.

[8] Storey, 1998, Westhead and Cowling, 1995.

Such companies, given their potential, remain of considerable interest to policy makers. Impediments to the genesis or growth of such companies, for example if the factor markets on which these companies rely are seen to be imperfect or discriminatory, are a cause for concern and often policy prescription. Evidence of capital constraints or credit rationing[9] provides the motivation for governments to initiate processes by which public capital can be channelled to these growth orientated but often highly risky companies. Government support at the earliest stages of these companies' growth is seen as particularly important as nascent enterprises are particularly vulnerable and tend to have a relatively high, and frequently unmet, demand for external finance. Given the fragile financial state of many growth oriented, early stage companies and particularly their lack of collateral, bank debt financing is often highly problematic[10]. Accordingly, less traditional sources of enterprise finance that can accommodate higher risk and uncertainty, for example additional equity from business angels and/or venture capitalists, frequently assume a more critical role. It is therefore very common for policy makers in advanced economies to institute initiatives and incentives that directly foster an environment conducive to the growth of both formal and informal risk capital markets.

The fact that capital markets do not always function efficiently and/or fail to produce a socially optimum outcome, provides the rationale for public intervention in the market provision of risk capital to growth orientated, innovative younger companies at a relatively early stage in their development[11]. On the part of potential investors, investment in young companies is forgone because they do not widely hold the view that expected returns will compensate them fully for the considerable risks they will invariably incur. Theory suggests that the socially optimal level of risk capital may not be made available for several reasons. Firstly, positive externalities are not accounted for (eg knowledge spillovers) as they prevent private investors from capturing the total (private plus social) benefits of an innovation. Secondly, information asymmetries might distort the market. Due diligence costs and scale economies in the provision of risk capital can militate against investing where information asymmetries are present[12]. Thirdly, the infrastructure might not facilitate networking externalities in the sense that all the key stakeholders required to support a successful, venture-based economy might not be present or, even if they are present, not effectively co-ordinated via experienced entrepreneurs, financiers and support service providers. This requirement has been termed by Gilson as the 'simultaneity problem'.[13]

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9 Bank of England, 1996.

10 Denis, 2004; European Commission, 2000 and 2005.

11 Murray, 1998 and 2007; Lerner 1999 and 2002.

12 Cressy, 2002; Cassar, 2004..

13 Gilson, 2003.

As argued by Maula et al[14] and several other academics[15], *'the key role of government in fostering growth-orientated entrepreneurship is to provide a conducive framework and environment for informed and profitable risk-taking by private investors.'* They further contend that the primary function of government, in the context of entrepreneurship, should be to ensure that the tax and legal frameworks do not inhibit well functioning markets, specifically those that influence the supply and demand for both informal and formal venture capital. These views, with their strong implication for more indirect government interventions, have increasingly been adopted by national policy makers in Europe. This policy perspective assumes the pre-eminence of market mediated decisions with government only intervening exceptionally to remove barriers to effective market actions. The importance of working with extant capital markets was a focus of the UK government's Venture Capital Summit held in London in Autumn, 2005[16]. It was also the main outcome and conclusion of a 2005 Expert Group of the European Commission and US government officials convened to determine, and communicate, good practice in the public support of early-stage venture capital markets.[17] OECD reviews of venture capital activity and the role of public intervention come to similar conclusions regarding the primacy of using market agents to meet public policy objectives[18].

The UK government has taken a pro-active stance in response to the well documented difficulties in both the demand for and supply of risk capital to smaller and younger entrepreneurial ventures[19]. As well as supporting formal venture capital through a range of policy measures, the UK government has also made the encouragement of informal venture capital, provided by high net worth individuals or business angels, a major plank of its entrepreneurship policies[20]. Such a policy recognises that at the earliest stages of investment in nascent but high potential, entrepreneurial companies, the formal venture capital industry plays a modest if not incidental role[21]. There is an increasing awareness that informal investors represent a considerably more powerful policy instrument than professional VC companies at the earliest stages of new

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14 Maula, Murray, and Jaaskelainen, 2007.

15 Bottazi, Da Rin and Hellmann, 2005; Cumming, Fleming and Schweinbacher, 2006.

16 UK Presidency of the EU and European Commission, 2005.

17 US Dept of Commerce and European Commission, 2005.

18 OECD, 2004 and 2006.

19 The UK government has a long tradition of financing robust investigations of the financial environment facing UK small and medium sized enterprises going back to the Macmillan Report 1931 and the Bolton Report 1971. More recent and influential reports have included a series from the Bank of England on SME financing and several recent reports from the Treasury on the 'equity gap'.

20 See Small Business Service's Action Plan for Small Business, 2004.

21 The Bank of England's 1996 report argued that the role of formal venture capital had an extremely small contribution to the financing of new technology based firms.

company formation. This experience of the diminishing role of formal venture capital organisations at the earliest stages of new enterprise investment is a phenomenon not restricted to Europe or the USA[22].

Schemes to stimulate informal investment to small and medium sized enterprises by private individuals require incentives that are meaningful to such investors as both economic agents and private citizens. This is quite a different scenario to that required to encourage professional venture capital companies or institutional investors to allocate some of their funds under management into venture capital funds undertaking earlier stage, equity deals. Frequently, the latter groups are tax exempt (eg pension funds) or operate through a tax transparent vehicle where tax liabilities rest with the final recipients of the investment returns. At the forefront of UK government's strategy in this area of promoting the activities of informal investors have been two schemes: the Enterprise Investment Scheme (EIS) and Venture Capital Trusts (VCTs). Below we briefly review the scope of each scheme and nature of their intervention.

1.1 Enterprise Investment Scheme (EIS)

The EIS was first introduced in 1994. It succeeded the Business Expansion Scheme which, while groundbreaking in its focus on individual rather than institutional action, produced several anomalies which diluted its focus and impact on target recipient companies. The purpose of the EIS is to help certain targeted types of small higher-risk unquoted trading companies to raise external growth capital[23]. It does so by providing a range of tax relief for private individuals investing in qualifying shares in these companies. Any person who subscribes for shares in a company which qualifies under the scheme may be able to get an income tax reduction based on the amount invested. They may also be able to postpone the charge to capital gains tax on gains arising on the disposal of other assets around the time that they make their investments. In addition, they may be eligible for tax relief on share disposals if it takes place after five years and gives rise to a gain. After April 5th 2000, this period of eligibility was reduced to three years. Subscriptions must be for new ordinary shares. From April 6th 2006, investment limits eligible for income tax relief at 20 per cent for individuals making subscriptions into qualifying EIS companies rose from £200,000 to £400,000 per annum. Capital Gains tax deferral relief at up to 40 per cent remains. Subscriptions during the first half of the tax year can carry back relief to the previous year. Limits increased from £25,000 to £50,000.

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22 Prowse, 1998; Riding et al, 1993; Sohl, 2003 and 2006; Mason and Harrison, 2001.

23 See: www.hmrc.gov.uk/eis/index.htm

1.2 Venture Capital Trusts (VCTs)

VCTs were introduced in 1995, and were designed to increase the supply of finance to small unquoted, higher-risk trading companies by encouraging individuals to invest in young enterprises *indirectly* through a managed fund structure[24]. VCTs are companies broadly similar to investment trusts. They are essentially a retail venture capital product for private investors who wish to invest in a diversified portfolio managed by a professional investment manager. They must be listed on the Stock Exchange and can invest up to £1 million per annum in each qualifying company in their portfolios. Funds are exempt from corporation tax on any capital gains arising on the disposal of their investment. The main conditions a VCT must satisfy are that its income must be wholly or mainly from shares or securities, and at least 70 per cent of its investments must be 'qualifying holdings'. The VCT has three years from the time it raises money to meet the 70 per cent requirement. A qualifying holding broadly consists of newly issued shares or securities (including loans of at least five years) in companies similar to those which would qualify for the EIS. Subscribers of new ordinary shares in VCTs are entitled to claim income tax relief on their subscriptions provided their shares are held for at least three years (previously five years prior to 6 April 2000). The maximum annual investment for which income tax relief is available increased from £100,000 to £200,000 in April 2004. No income tax is payable on dividends received from ordinary shares in VCTs, or on their disposal. Following a temporary two-year boost to income tax relief to 40 per cent, the rate of relief was permanently increased to 30 per cent from 6 April 2006. However, the Income Tax relief period was raised from three to five years. Maximum relevant assets before the raising of funds were reduced from £15m to £7m, and the value of assets after funds have been raised was reduced from £16m to £8m.

Given that the UK government has initiated these two schemes, which both represent a tax forgone cost to the Treasury, it is appropriate that the net benefit (or otherwise) of the EIS and VCT programmes are evaluated in the context of their stated aims of promoting the flow of risk capital to smaller, unquoted, higher-risk companies. A rigorous analysis and evaluation assumes even greater importance as both schemes have been in existence for more than a decade which has allowed each scheme to establish itself. Finally, the salience of both schemes, at least in their demonstration effect, extends beyond the UK. Despite the popularity of government subsidies to attractive and 'worthy' recipients, such as high-tech young companies, there remains a serious deficiency in our knowledge regarding the efficacy of tax-based interventions in the market for risk capital. A number of governments are presently looking at the effectiveness of such schemes (eg Ireland and Finland) in order to encourage greater

[24] See: www.hmrc.gov.uk/guidance/vct.htm

early stage support for entrepreneurial companies in the absence of well developed risk capital markets prepared to invest at the earliest stages of new enterprise.[25]

[25] Policy discussions at the Norface Entrepreneurial Finance Seminar in Helsinki October 2006 confirmed the present policy interest in fiscal incentives for entrepreneurial investment activity in several developed economies. The lack of an established body of empirical research in the area (with a few notable exceptions) was also noted.

2 Study Aims and Objectives

The study is designed to evaluate quantitatively the impact of the availability of both government programmes (EIS and VCT) on those young companies in receipt of financial investments directly from the two programmes. The detailed ambitions of the study are as follows:

- to compare the performance of UK companies that have received funding through the EIS and/or VCT schemes[26] against the performance of similarly matched companies that have not received such funding
- to compare the performance of companies dynamically, ie before and after receiving initial EIS or VCT investment, and
- to quantify the effect on business performance indicators for each scheme of key variables including, for example, company age, size and sector.

In addition, the study is to consider how EIS/VCT investment interacts with other forms of equity raised by companies (eg commercial loans, grants, share issue).

[26] Some firms are in receipt of funds through both schemes.

3 Data and Methodology

The core data for this evaluation are derived from two sources. Firstly, we were provided with full EIS and VCT scheme records for each company that received at least one investment under either scheme. These data, collected over the period 1994 to 2006, represented in excess of 12,000 companies using the EIS scheme and more than 1,000 companies under the VCT scheme. In addition, some 660 companies had received investments from both schemes.

We first constructed a large 'control' (non treatment) group of unsupported companies using the FAME company accounts database. The parameters were such that initial matching was conducted to ensure appropriate sectoral, fixed assets and incorporation date (age of company) distributions. We opted to use fixed assets as this variable had a high reporting coverage in the FAME database (some 87 per cent of companies had fixed asset data). In total, the control group contained in excess of 80,000 companies. This control group was necessarily large in scale because of the difficulty in matching individual companies on multiple criteria[27]. We also collected company accounts information for the target and matched companies for the years 1994-2006 inclusive where these data were available. The information included:

- company demographics (ie date of incorporation, sector, current survival status)
- profit measures (gross profits, operating profits, profit margins)
- asset measures (fixed assets)
- debt/equity measures (gearing ratio)
- capital and investment measures (new investment)
- size measures (sales turnover, employment).

[27] In future, a more efficient method might be to generate one, or possibly several, 'matched' companies *at the time of initial funding* on a one-for-one basis across a small number of variables (eg size, sector and age).

The following narrative is a description of the nature of IES cleaned and matched datasets for the purpose of this study, rather than a description of the characteristics of the entire population itself.

3.1 Descriptive data on target and control companies

3.1.1 Fixed assets

From Table 3.1, which reports the summary statistics for the variables in our data set, we note that the mean level of fixed assets is largest for our VCT group at £4.02m (median = £1.37m) and smallest for our EIS group at £1.15m (median £0.11m). Our control group mean is £2.20m (median = 0.10m). The *between* statistic is calculated over the number of company data observations and the *within* statistic over the number of company-years of data and refers to the deviation from a company's average. The former is a measure of the cross-company variation in fixed assets and the latter a measure of how fixed assets vary within a specific company over random years. For example, we see that the between and within deviations for our VCT companies (£7.59m and £7.63m) are very similar. This implies that the variation in fixed assets across companies is nearly equal to that observed within a company over time. If a variable does not vary over time, its within standard deviations will be zero. An interesting feature of the EIS group is that their within deviations are much higher than their between deviations. This shows that the within company variation over time is much larger than that across companies in respect of fixed assets. More generally, the larger standard deviations for our control group suggest a wider and flatter distribution of fixed assets. Importantly, this ensures that we have substantial numbers of control companies within the 95 per cent confidence intervals around the VCT and EIS means. Finally, we note that the average number of years (time periods) we observe for a company was 5.8 for the VCT group, 4.7 for the EIS group and 6.2 for our control group. As the peak funding year for EIS and VCT initial funding was 2000, and an absolute majority of funded companies were either new starts at the point of first investment or within their first year of trading, this would imply that our data typically covers the period 1999–2005.

3.1.2 Profits

For gross profits, we note that the means were £3.94m for the VCT group (median = £1.90m), £1.66m for the EIS group (median = £0.38m) and £1.41 for our control group (median = £0.43m). In addition, the respective average time periods in our data were 4.3 years, 3.4 years and 4.2 years. Here, we also note that the variation between companies was much larger than within companies across all three groups. On profit margins we see that the mean for VCT and EIS companies (at -7.88 and -6.34 respectively) was lower than the mean for our control group which was +5.29. This might imply that average returns on investments are lower for supported companies.

Table 3.1: Sample descriptive statistics

Variable	Group	Obs	Mean	Median	Std Dev	Between	Within	Average number of years data
Fixed Assets (£'000s)	VCT	5,903	4,021.04	1,371.33	10,967.89	7,589.66	7,631.64	5.79
	EIS	52,732	1,154.92	113.30	31,766.05	12,029.53	28,653.40	4.70
	Control	429,980	2,204.55	104.79	89,469.54	71,283.18	68,711.43	6.19
Gross Profits (£'000s)	VCT	3,395	3,937.11	1,895.06	7,337.50	5,275.34	4,328.00	4.30
	EIS	16,068	1,659.23	375.11	4,325.28	3,386.03	2,094.23	3.42
	Control	112,942	1,409.99	429.10	12,430.51	11,066.60	6,314.13	4.15
Operating Profits (£'000s)	VCT	5,023	-1,957.42	-87.75	82,118.59	31,769.72	74,907.99	5.35
	EIS	26,116	-313.27	-30.79	3,814.05	2,259.69	3,061.02	3.88
	Control	192,439	42.65	20.72	29,166.69	19,186.75	23,170.02	5.05
Profit Margins	VCT	2,917	-7.88	0.25	25.09	24.07	16.62	4.13
	EIS	14,107	-6.34	-0.22	26.12	25.69	16.25	3.31
	Control	115,583	5.29	3.45	19.54	18.51	12.03	4.13
Employment	VCT	3,637	177.58	67.00	593.51	383.24	293.94	4.50
	EIS	11,879	103.99	33.00	392.04	247.96	251.41	3.84
	Control	93,515	57.24	18.00	690.96	623.70	370.27	4.05
Investment (£'000s)	VCT	1,841	1,089.76	75.00	3,515.34	3,954.81	1,449.25	3.49
	EIS	10,524	1,234.65	12.71	6,964.43	12,7019.7	5,179.94	3.37
	Control	82,553	7,174.04	29.91	192.701	12,9835.3	153,974.9	4.84
Sales (£'000s)	VCT	1,542	13,078.75	1,830.93	29,693.77	22,617.63	12,927.58	4.01
	EIS	3,370	9,181.33	1,909.93	17,075.79	18,750.23	7,495.41	3.48
	Control	148,768	6,982.10	1,089.46	89,716.08	60,861.38	50,055.72	4.57
Gearing Ratio	VCT	4,178	220.70	59.30	576.10	646.52	390.79	4.58
	EIS	28,610	214.07	48.12	645.20	613.54	458.61	3.66
	Control	281,867	240.92	42.98	769.83	848.37	502.00	5.21
Labour Productivity (£'000s)	VCT	1,355	95.73	77.65	115.28	110.83	49.90	3.72
	EIS	2,816	116.40	76.24	202.31	185.32	88.92	3.42
	Control	71,999	481.22	93.26	10,727.14	8,802.94	2,761.22	4.37
Capital/Labour Ratio(capital per employee £'000s)	VCT	3,793	74.25	14.58	276.08	223.90	186.63	4.58
	EIS	12,416	140.58	14.03	4,908.46	1,740.27	4,044.70	3.81
	Control	94,809	210.17	9.96	5,569.97	4,053.62	3,098.53	4.47

We also note that the VCT and EIS groups have very similar deviations both within and between companies and a broader overall distribution in profit margins than our control group. The average data years (time periods) for the VCT group, EIS group and control group were 4.1 years, 3.3 years and 4.1 years respectively. Regarding operating profits, we note that only our control group had, on average, positive operating profits

of £42,650 (median = £21,000). This compares to *negative* operating profits of £1.96m (median = -£90,000) in our VCT group and £313,273 (median = -£31,000) in our EIS group. In all our three groups, within variation was greater than between variation, although the scale of these variations was much closer in our control group. The average time period for which data was available was 5.3 years for the VCT group, 3.9 years for the EIS group and 5.1 years for our control group.

That the operating profits (and thus profit margins) of the EIS and VCT recipients were negative is likely to be an indication of young companies at an early stage of their planned growth trajectory. A transition from positive gross margins to negative net margins suggests that the fixed costs presently incurred are not fully defrayed by the present scale of operations. The companies remain in the cumulatively negative cash flow region of the 'J Curve' characteristic of many high potential young companies with significant set up, infrastructure and operating costs early in their life cycle. If this is the case, such companies are likely to find traditional debt-based sources of finance closed to them in their early years. If so, they might fit the profile of high potential but currently loss making enterprises that these equity-based schemes are targeted to address. Alternatively, it might be indicative of lower overall quality of EIS/VCT supported companies compared to our control group of unsupported companies. In the latter case it is unlikely that conventional investors would provide funding for such companies.

3.1.3 Employment

On employment we note that the mean for our VCT group is 177.58 (median = 67) employees, which is larger than the mean for the EIS group at 103 (median = 33). employees and our control group at 57.24 employees (median = 18). However, at the 95 per cent confidence interval we note that our control group covers the upper end of the VCT employment distribution. We also observe that between company employment variation for our VCT and control group is larger than the within company variation. Yet, for our EIS group, the between and within variation is almost equal at 247.96 and 251.41 respectively. Finally, we observe that the average time-periods available in our data are 4.5 years for the VCT group, 3.8 years for the EIS group and 4.1 years for our control group.

3.1.4 Investment

With regard to investment, we note that it is substantially larger on average in our control group at £7.1m (median = £30,000). This compares to £1.1m (median = £75,000) in our VCT group and £1.2m (median = £13,000) in our EIS group. These differences are large and hint at relative under-investment in our two supported groups. What is potentially interesting is that for our VCT and EIS groups, between company variation is larger than within company variation. For our control group the reverse is true, ie within company variation is larger than between companies. This suggests that

investment patterns are more volatile in unsupported companies. Again, the fact that supported companies have had less investment than the control group could suggest that the schemes are identifying appropriate, resource constrained, young enterprises albeit that the levels of under-investment have not yet been resolved. Alternatively, it could be that they are of substantially lower quality, and hence less attractive, and they consistently fail to either generate internal funds for re-investment or are incapable of attracting external funds from conventional sources. However, we note that on this variable data coverage is very poor in comparison with other performance variables across all groups.

3.1.5 Sales

For sales turnover, we see that the VCT group have the highest means sales at £13.08m (median = £1.83m). The EIS group had mean sales of £9.18m (median = £1.91) and our control group £6.98m (median = £1.09m). This suggests that the two schemes are selecting companies of differing scale characteristics. This is probable given that there are restrictions on the scale of finance available to any one eligible enterprise through a single VCT scheme (maximum of £1 million)[28], and the income tax benefits are capped (at £400,000) to the EIS investor in any one year. VCT managers have greater capital to invest at their disposal through the creation of a multi-investor fund structure. In line with our employment data, we also note that the 95 per cent confidence interval for our control group data means that our control group has adequate coverage at the upper end of the VCT group sales distribution. Across all three groups, we see that within company variation is smaller than between company variation. The average time-periods covered in our data are 4.0 years for the VCT group, 3.5 years for the EIS group and 4.6 years for our control group.

3.1.6 Gearing

With regard to gearing (the ratio of a company's debt commitments to its equity ownership), we note that our control group of companies had the highest gearing ratio at 241 (median = 42.98). Our VCT group had a ratio of 221 (median = 59.30) and the EIS group 214 (median = 48.12). For all groups, the between company variation is greater than the within company variation. The average time periods covered in our data are 5.2 years in our control group, 4.6 years for the VCT group and 3.7 years for the EIS group.

[28] A single VCT can only invest a maximum of £1m in a specific company. However, the investee firm is not proscribed from raising more financing from other VCT funds.

3.1.7 Labour productivity

On labour productivity, the respective mean sales per employee (measured in £'000s) are 95.73 (median = 77.65) for the VCT group, 116.40 (median = 76.24) for the EIS group and 481.22 (median = 93.26) for our control group. We also note that within company variation across all three groups is much lower than between company variation. The respective average time-periods are 3.7 years, 3.4 years and 4.4 years. For capital/labour ratios measured as £'000s of capital per employee, we observe means of 74.25 for the VCT group, 140.58 for the EIS group and 210.17 for our control group indicating more capital is available, on average, in unsupported companies. Again this could be an indicator of genuine capital constraints or lower average quality of supported companies which makes them unattractive to external investors. Data, on average, is available for 4.6 years in our VCT group, 3.8 years in our EIS group and 4.5 years in our control group.

3.1.8 Mean differences between datasets

To summarise, we have observed some quite large differences in means across our performance measures between our target and control datasets. This is in part because we selected our control group to reflect the respective fixed asset distributions in our scheme recipient groups (the most consistently reported variable) and other variables were not part of this procedure. As we noted in Table 3.1, on several performance measures, target companies were, on average, lower performing. This could potentially imply that recipient companies are of lower quality. It could also mean that there is an inbuilt and downward bias in terms of the identified scheme impact on performance ie the real scheme effects are more positive than implied by our results. However, as we noted in our descriptive data discussion, the actual scale of the control group and the distributions across our relevant performance variables means that we have large numbers of control group companies for every part of the target group distribution so this may, in reality, not be a critical issue. Further, the medians across our three groups are much smaller and more tightly clustered.

3.2 Panel data structure and methodologies

In this section we outline the basic structure of panel data and discuss a series of econometric approaches which have been employed to estimate models with data of this type. It is worth reiterating at this point that, in general, we have a large number of companies including the VCT group, the EIS group and our control group. Thus, in cross-section, we have a large sample of potentially 90,000 companies. Yet as we observed from our descriptive data in the previous section, the average time-period for which we have annual observations on many variables of interest is around five years.

3.2.1 Methodology

Panel data analysis is a method of studying a particular subject within multiple sites, periodically observed over a defined time frame. Within the social sciences, panel analysis has enabled researchers to undertake longitudinal analyses in a wide variety of fields. In economics, panel data analysis is often used to study the behaviour of companies over time. With repeated observations of enough cross-sections, panel analysis permits the researcher to study the dynamics of change with short time series. The combination of time series with cross-sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions[29]. For us, panel analysis provides a robust framework for exploring the performance of companies and the effects of EIS and VCT investments, as we consider both the space and time dimension of the data.

Panel data analysis endows regression analysis with both a spatial and a temporal dimension. The spatial dimension pertains to a set of cross-sectional units of observation. With our data the spatial unit of observation is companies. The temporal dimension relates to periodic observations of a set of variables characterizing these cross-sectional units over a particular time span. In our case we note that the typical time span is four to six years.

Using the example of our panel data set, it is a collection of UK companies for which there are the same economic and accounting variables—such as fixed assets, gross profits, investment, employment, sales, profit margins, gearing ratios, labour productivity and survival—collected annually for a maximum of 11 years (from 1994 to 2005), although the average in our data is four to six years. This pooled data set, sometimes called time series cross-sectional data, contains a 'potential' maximum total of 90,000*11=990,000 observations. In other words, if all companies were trading in 1994, they would be followed for eleven years and would be sampled annually as we are only interested in the time period around which companies were potentially in receipt of EIS and VCT funds (the schemes were in operation). In actual fact, as receipt of EIS and VCT funds occurred over the full sample period, we also have the entry of new recipient and control companies and the exit of non-surviving companies. We also have missing data which is an issue for us in terms of restricting the time dimension of our analysis, and, in the case of our investment variable, making the modelling process particularly problematic. It is also an issue if the missing data is non-random (see Table 5.1 for tests).

3.2.2 Panel data set structure

Panel data sets generally include sequential blocks or cross-sections of data, within each of which resides a time series. See Table 3.2 for our panel data set, including company, year, sales, employment, and capital stock from 1994 through 2005.

Apart from the variable number, the data structure confers upon the variables two dimensions. They have a cross-sectional unit of observation, which in this case is company *i*, and they have a temporal reference, *t*, in this case the year. The error term has two dimensions, one for the company and one for the time period. In this example, assume that there are three companies and 11 years of time. If there are no missing values, the data set is called a balanced panel, but if there are missing values, the data set is referred to as an unbalanced panel. As we have entry and exit (as new recipients of EIS and VCT funds join our panel along with control group countries and existing companies leave the panel) and missing data, our data can be referred to as an unbalanced panel.

Table 3.2: Panel Data Structure

Company id	Year	Sales ('000s)	Employment	Capital stock ('000s)
Xcompany	1994	34,000	250	60,000
Xcompany	1995	35,000	260	71,000
Xcompany	1996	36,050	265	72,000
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Xcompany	2005	45,000	350	92,000
Ycompany	1994	23,000	190	55,000
Ycompany	1995	24,000	201	57,000
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Ycompany	2005	40,000	350	88,000
Zcompany	1994	30,999	200	63,000
Zcompany	1995	31,000	210	62,030
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Zcompany	2005	36,000	280	69,040

As we are interested in explaining performance in our panel of companies, and identifying any potential scheme effects on performance, the equation explaining performance might be expressed as:

$$Y_{it} = a_i + \beta_1 X_{it} + e_{it}$$

eg

$$Gross\ Profits_{it} = a_i + \beta_1\ Employment_{it} + \beta_2\ Age_{it} + \beta_3\ Scheme_{it} + \beta_4\ Sector_t + \beta_5\ (Size * Scheme)_{it} + \beta_6\ (Age*Scheme)_{it} + \beta_7\ (Sector*Scheme)_{it} + \beta_8\ Time + e_{it}\ [Eq\ 1]$$

where,

Gross profits =	real gross profits expressed in 2005 prices
Employment =	number of employees
Age =	years since incorporation
Sector =	1-digit Standard Industrial Classification codes
Scheme =	dummy variables for the existence of an EIS, VCT or joint-EIS-VCT investments, or a variable indicating the actual (real) value in £s of the EIS or VCT investment (see Section 5 on treatment variables for a full explanation and derivation of each scheme variable)
(Size*Scheme) =	employment size / scheme variable interaction terms
(Age*Scheme) =	age of company / scheme variable interaction terms
(Sector*Scheme) =	1 digit SIC codes / scheme variable interaction terms
Time =	Individual year dummy variables.

Variables which are collected and expressed in monetary values have been converted into 2005 values using the Retail Prices Index (RPI). The performance variables in the sets of models for fixed assets, employment, sales and labour productivity have been expressed in natural log form. In the latter case, labour productivity is expressed as real output (sales) per employee and includes an additional explanatory variable which defines the capital/labour ratio (fixed assets per employee) expressed in monetary terms.

There are several types of panel data analytic models. The two specifications we use are fixed effects models (FE), and random effects models (RE). This reflects the fact that models have to be estimated by methods that handle the problems afflicting them. When researchers use ordinary least squares (OLS) on data pooled across companies, they implicitly assume that unobserved company factors do not exist[30]. This can result in incorrect parameter estimates if there is variation in the intercepts (the αs) and mean levels of the independent variables across companies. Missing variables can also

[30] Wilson and Butler, 2004.

constitute a problem if they are company specific, as opposed to randomly distributed within, and across, companies (an assumption of pooling).

This can be addressed by explicitly modelling the differences between companies as some variables vary from year to year within companies, but other variables are constant across years and vary only between companies. The RE model assumes that the αs are random while the FE model assumes the αs are fixed. The FE model then generates estimates that are unbiased and efficient. The model is estimated by subtracting the company specific mean from each observation and estimating an equation of the form $Y_{it} - \text{mean}Y_i = \beta (X_{it} - \text{mean } X_i) + v_{it}$. Again, the Ys are the performance variable and the Xs are variables explaining performance.

The two main empirical drawbacks to the FE model are that it can use up degrees of freedom as it introduces new parameters into the model. The second is that variables that are fixed over time cannot be included, and variables that only change slowly over time are likely to have large standard errors. The alternative is the RE model, which requires that the unobserved effects are not systematically related to the other explanatory variables (Xs) in the model. This assumption can often be violated. Whether or not this is the case, for the companies in our data set, this is an important issue empirically.

3.2.3 Omitted Variable Bias

In terms of our data, an issue for us is that omitted variables bias[31] might be present. For example, self-selection into VCT and EIS funding by 'higher' quality companies might be a cause of endogeneity. Simple cross-sectional analysis, which relies on the between-company comparison is not appropriate in this case, but panel data can identify the true effect even in the presence of self-selection. Indeed, if most omitted variables are time-constant (eg quality measures), FE works well with this assumption.

3.2.4 Unbalanced panels

A further issue is that we have an unbalanced panel where T differs over companies. This type of data is particularly suited to the FE estimator and we also have attrition in the data as companies cease trading. In this case, attrition, even when correlated with v_i, does not bias FE estimates. In the context of our data, we rely on the quality of company data reported and collated from Companies House.

3.2.5 Dynamic models

A final issue for us is the appropriateness of more dynamic panel data methods. Our problem is that we have a small average number of time series observations. If, for

[31] Unobserved heterogeneity.

example, we used Arellano and Bond (1991), dynamic type models, then we would lose one observation through differencing (to remove the fixed effects) and one more observation for each lag of the dependent variable in the model. So assuming our model uses only one lag of the dependent variable, then we have an average of two time series observations per panel. This is clearly not much to infer dynamics from. On this basis, we feel a more appropriate modelling strategy is to estimate static models. Further, we proceed in a more general sense by estimating relatively parsimonious models as identifying treatment effects for specific groups using interaction terms will be difficult, particularly as there is unlikely to be much variation over time.[32] Obviously, in an ideal evaluation framework, we would have liked to have observed the performance of our sample companies over a much longer time frame than the average period of four to five years we have in our dataset. This would have allowed more sophisticated, dynamic model specifications and also allowed enough time to have elapsed since an EIS or VCT investment for the full effects to work their way through the system. Thus our analysis is limited by the time-series in our sample data.

3.2.6 Hausman Test for Fixed versus Random Effects

To determine whether FE or RE specifications of our performance models are more appropriate, we employ a Hausman (1978) test which is the common way of model selection. The Hausman specification test is a classical test for significant correlation between the unobserved company-specific random effects and the explanatory variables. If there is such a correlation, the RE model is rejected in favour of the FE model.

[32] We thank Stuart Fraser (Warwick Business School), Ed Greenberg (Washington University, Mo), Raquel Fonseca (RAND Institute) and Simon Parker (Durham Business School) for detailed responses to a number of issues relating to panel data methods and the use of interaction variables.

4 Creating Variables for Analysis

Here we discuss the creation of our variables intended to capture the impact of EIS and VCT (and joint-EIS/VCT) funding. The most commonly used approach in evaluations is to create a dummy variable coded 1 if the unit of observation has had the 'treatment' and 0 otherwise[33]. We define two dummy variables in the first instance (nEIS and nVCT). Each dummy is coded 1 if the company received an EIS or VCT investment. As a small subset of companies received both VCT and EIS investment, we also created three other dummy variables (nEIS_only, nVCT_only and, nEIS_nVCT), the latter capturing those companies who received both types of funding. These types of variables act to shift the intercept in our models (upwards if the treatments had a positive impact and downwards if they had a negative impact). For example, this would be analogous to examining the impact of marriage on wages if the individual got married within the panel time series (and remained married).

But we also have data on the scale of investments made under both schemes, expressed in £s. In this case we can create a continuous variable which captures the amount of funding received under each scheme. These variables are named C_eis and C_vct respectively and are expressed in real 2005 £s (ie all figures are adjusted by the RPI to their 2005 equivalent). In this case, the coefficients on the treatment variables reflect the relationship between the amount of funding and the performance variable. This would be interpreted in the same way as years of schooling would be in a wage equation example cited above. As we are also interested in the way that investment affects performance in a dynamic sense, we also create current and lagged investment variables (Reis_0, Reis_1, Reis_2 and Rvct_0, Rvct _1, Rvct_2). Here the 'Rs' indicate that the variables have been adjusted to equate to 2005 price equivalents. This allows us to identify if there is a relationship between the time the company receives an EIS/VCT investment and any changes in subsequent performance. As the time series element of our data is relatively short, we cannot explore this dynamic other than in the very short-run. It would be preferable to have a time series of at least ten years. In an interpretative

[33] See for example, Oxera, 2007.

sense, if the coefficients on these three variables are different we can see how an initial investment impacts on performance in the year it was made, one year later and two years later. We also create equivalent time dummy variables (Neis_0, Neis_1, Neis_2, Nvct_0, Nvct_1, Nvct_2).

Finally, our data contains some companies which have received multiple funding rounds under the EIS and VCT schemes. To capture any potential differences between companies that only received a single investment and those who received more than one investment, we create a variable which switches from 0 to 1 if a company receives an EIS (VCT) investment and an additional variable which switches if that company receives a further round of EIS (VCT) investment. These variables are One_eis, Multi_eis, One_vct and Multi_vct. It is important to note here that a smaller subset of companies have received 3rd, 4th and 5th funding rounds. However, these companies represent a very small proportion of the total of those receiving multiple funding rounds that for estimation purposes it was more appropriate to include them in an aggregated multiple funding round dummy variable. Thus in total, we have 6 sets of 'treatment' variables, each capturing a different aspect of VCT and EIS funding.

Table 4.1: Scheme variables and definitions

Scheme variable	Definition
nEIS	dummy variable coded 1 if company has received an EIS investment and 0 else
nVCT	dummy variable coded 1 if company has received a VCT investment and 0 else
nEIS_only	dummy variable coded 1 if company has received an EIS investment and 0 else
nVCT_only	dummy variable coded 1 if company has received a VCT investment and 0 else
nEIS_nVCT	dummy variable coded 1 if company has received an EIS *and* VCT investment and 0 else
Ceis	cumulative EIS investment measured in real £s at 2005 prices
Cvct	cumulative VCT investment measured in real £s at 2005 prices
Reis_0	Value of current year EIS investment measured in real £s at 2005 prices
Reis_1	Value of one year previous EIS investment measured in real £s at 2005 prices
Reis_2	Value of two years previous EIS investment measured in real £s at 2005 prices
Rvct_0	Value of current year VCT investment measured in real £s at 2005 prices
Rvct_1	Value of one year previous VCT investment measured in real £s at 2005 prices
Rvct_2	Value of two year previous VCT investment measured in real £s at 2005 prices
Neis_0	dummy variable coded 1 if had an EIS investment in the current year 0 else
Neis_1	dummy variable coded 1 if had an EIS investment in the previous year 0 else
Neis_2	dummy variable coded 1 if had an EIS investment two years previous 0 else
Nvct_0	dummy variable coded 1 if had an VCT investment in the current year 0 else
Nvct_1	dummy variable coded 1 if had an VCT investment in the previous year 0 else
Nvct_2	dummy variable coded 1 if had an EIS investment two years previous 0 else
One_eis	dummy variable coded 1 if had single EIS investment 0 else
Multi_eis	dummy variable coded 1 if had more than one EIS investment 0 else
One_vct	dummy variable coded 1 if had single VCT investment 0 else
Multi_vct	dummy variable coded 1 if had more than one VCT investment 0 else

4.1 Missing data

As we have alluded to thus far, missing data is an issue for us in a general sense. But more importantly if missing data is non-random then this merits more attention at the methodological level. In particular, concerns have been raised that smaller companies might have more missing data. To tackle this potential issue we created a generic variable coded 1 if the company had data on a performance variable and 0 if the relevant data was missing. This procedure was repeated for gearing ratios, gross profits, investment, employment, profit margins, sales turnover and operating profits. Having created this set of dummy variables, we then proceeded to estimate a series of binary probit models of the basic form:

$$\Pr(\text{Performance Data Exists}) = f(\text{Size, Age, Sector})$$

In this case we recoded the size variable, here fixed assets, into quartiles. The use of fixed assets as our size variable was determined by the fact that it had the highest proportion of non-missing data at 87 per cent of any potential size proxy. Despite this, it could still be an issue if the smallest companies in our sample were disproportionately represented in our 13 per cent of missing fixed assets data. Age is a continuous variable and sector includes the full set of 2-digit SIC codes. Table 4.2 below reports the outcomes of these models. To facilitate ease of interpretation we report the marginal effects using the smallest size quartile as our reference category.

Table 4.2: Missing data by company size binary probit models (marginal effects reported)

Performance data model	Size lowest quartile	Size 2nd quartile	Size 3rd quartile	Size highest quartile	Pseudo rsq
Gearing	ref	5.4%	8.6%	9.4%	0.10
Gross profit	ref	(1.3%)	(1.7%)	(1.8%)	0.02
Investment	ref	1.0%	2.8%	4.4%	0.12
Employment	ref	1.4%	2.2%	4.0%	0.08
Profit margin	ref	1.9%	2.1%	2.7%	0.06
Sales	ref	1.9%	2.1%	2.8%	0.06
Operating profit	ref	1.9%	2.2%	3.5%	0.07

Note: Figures in parentheses denote negative marginal effect

Taking our gearing ratio model, we observe that companies in the 2nd size quartile are 5.4 per cent more likely to have data on their gearing ratio than companies in the lowest size quartile. Companies in the 3rd size quartile are 8.6 per cent more likely to have gearing ratio data than those in the lowest size quartile, and companies in the highest size quartile are 9.4 per cent more likely to have gearing ratio data. From looking at the rest of the table, we observe two things. Firstly, all companies in the 2nd size quartile or above are **less** likely to have gross profit data than those in the lowest quartile. Secondly, even though all size quartiles are significant at the 1 per cent level throughout each model, the actual probability differences are typically quite small. For example, companies in the highest size quartile are only 4.4 per cent more likely to report

investment data (than those in the lowest size quartile) and 2.7 per cent more likely to report profit margin data (than those in the lowest size quartile). So we are left with two key questions; are small companies more likely to have missing data? and; if so, is it a problem? On the former, the answer is yes (with the notable exception of gross profit data). On the latter, we would suggest that the general magnitude of these differences is small enough so as not to be an issue in terms of unduly biasing our performance estimation. However, a caveat is necessary. If the companies with missing size (fixed asset) data were disproportionately drawn from the very smallest companies, then there may be a downward bias in our results.

4.2 Control group

Another issue is whether our control group is fundamentally different in terms of its characteristics from our treatment (supported) companies. To provide a basic test of this, we constructed a dummy variable coded 1 if a company was in our control group and 0 if a company was in our treatment group. We then followed the same procedure as above for our investigation of missing data. The basic finding was that (compared to our lowest size quartile) the control group was 0.9 per cent more likely to be from the 2nd size quartile, equally likely to be from the 3rd size quartile and 1 per cent less likely to be from the highest size quartile. Again, we would suggest that these differences, as small in magnitude as they are, are unlikely to bias any estimation due to substantive underlying differences in the core characteristics of our control and treatment groups. Again we must add the caveat that if the companies most likely to have missing data in our sample were disproportionately drawn from the very smallest companies then this might introduce a bias into our results.

4.3 Performance variables

We are interested in identifying any potential effects of EIS and VCT funding on a number of key performance variables of the recipient companies. So the issue here is to select variables which have relevance to potential investors and also to the achievement of stated government objectives in relation to the EIS and VCT schemes. On the investor side, it is normal to assume that they are motivated by the potential returns to an investment[34]. In a broad sense, profit measures capture these returns to capital as the investment decision is based upon the expected returns being higher than the opportunity cost of capital (the returns to alternative potential investments). The actual mechanism by which new investment feeds through into higher profitability can be related back to efficiency arguments rooted in the theory of production. This may be particularly relevant in this case as our companies are typically small or medium sized

[34] We know that in practice perhaps a majority of angels have a range of other 'psychic' outcomes from being investors in addition to any economic returns achieved (Freear, Sohl and Wetzel, 1994; Van Osnabrugge, 1998; Mason and Stark, 2004).

on accepted definitions. The EU definitions are as follows; 1-9 employees = micro enterprise; 10-49 employees = small; 50-249 = medium, and; 250+ employees = large.[35]

Briefly, it is often assumed, and also empirically supported, that new, and smaller, companies face higher average costs as they are operating at a scale which is too small to exhaust all economies of scale (see Cowling, 2003). In short their output is not high enough and their per unit costs of producing that output are higher than larger companies. Thus, new investment in productive capacity enables them to operate at a larger scale and thus benefit from lower average costs per unit of output. This problem is exacerbated in situations where technology is changing quickly. With these issues in mind, we collected data on gross profits, operating profits and profit margins to capture short-run returns to investment. In addition, as a proxy for new investment in productive capacity, we collected data on investment in fixed assets (as, for example, the Small Firms Loan Guarantee Scheme excludes investments in working capital), given that we are really interested in longer-term investment in productive capacity. We also derive a measure of labour productivity to explicitly model any potential impacts of the schemes' funding on efficiency. With these issues in mind we propose three hypotheses:

- H1: publicly supported companies will have higher levels of profitability
  - H1a measured as Gross Profits (£)
  - H1b measured as Profit Margins (%)
- H2: publicly supported companies will have higher fixed asset levels
- H3: publicly supported companies will have higher levels of labour productivity.

A related, and very important, argument is that smaller companies are constrained in their ability to raise capital on equivalent terms to larger companies of equal risk[36]. This market failure argument is implicit (and often explicit) in any government intervention in capital markets.[37] This is often attributed to information based problems (asymmetries) as potential investors do not have enough information about company quality or the probability of success of a specific investment project.[38]

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35 New definitions of a micro, small and medium companies were adopted by the European Commission and became operational from the 1 January 2005. The definition embraces three criteria per size group: headcount, sales turnover, and balance sheet total. See http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=32003H0361&model=guichett

36 Berger and Udell, 1998.

37 Cowling and Mitchell, 2003.

38 Stiglitz and Weiss, 1981.

In this case, where external equity has been sought, there is an additional constraint as venture capitalists and business angels have shorter time horizons than the recipient companies' owner-managers in respect of wanting a quicker return on their investment[39].

It is also the case that smaller companies tend to use a lot of debt finance and very little equity[40]. This can cause two problems. Firstly, debt repayment burdens are large and have to be made regardless of the success of a project. This can squeeze cash flows and create liquidity problems. Secondly, smaller companies often benefit from enhanced human capital when experienced investors take stakes in their companies[41]. The net result of under-investment in smaller companies is that they are less likely to bring new products and services to market and are thus less likely to survive and grow[42]. As is the case in many government interventions in financial markets relevant to smaller companies, there is a potentially important 'demonstration effect' in that successfully supported interventions can lead to higher levels of unsupported funding in the future as informational barriers are reduced[43]. With these issues in mind we collected data on gearing ratios (debt/equity ratios) and investment. *A priori*, we predict that gearing will be reduced by EIS and VCT investments, and that there may be a positive investment multiplier as scheme funding is complemented by other un-supported sources of investment funding.

- H4: publicly supported companies will have lower gearing ratios.
- H5: publicly supported companies will have higher levels of (private) investment.

Finally, we consider more general, and commonly used, variables which can be used as proxies for company performance. In the empirical literature, and in the overwhelming majority of company level evaluations, the issue of company survival, size and growth are used as proxies for performance. On survival, it is noted that the vast majority of new business start-ups do not continue trading beyond their fifth year[44]. For an investor, this represents a potential loss of investment, although many venture capitalists take a portfolio approach thus reducing the impact of one failure[45]. On size, most studies use sales turnover and employment to capture these effects. Smaller companies in particular are associated with higher net job creation rates. This is

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39 Gompers and Lerner, 1999.

40 Berger and Udell, 1998 op cit.; Davidson and Duita, 1991.

41 Sapienza, 1992.

42 Cressy and Olofsson, 2006.

43 Murray, 1998.

44 Bruderl et al, 1992; Gimeno et al 1997.

45 Norton and Tenenbaum, 1993; Bergemann and Hege, 1998.

particularly evident in technology based sectors[46]. In the short-run, we might expect that scheme funding raises the survival probabilities of companies and increases their scale measured in sales or employment terms by allowing companies to expand the scale of their activities and build up new capacity. Thus, we can posit three final hypotheses:

- H6: publicly supported companies will have higher survival rates.
- H7: publicly supported companies will have higher sales turnover.
- H8: publicly supported companies will have higher levels of employment.

Thus far, we have presented the descriptive statistics for the companies in our data set. We have discussed some of the issues inherent in using panel data methods to estimate performance equations using data with the characteristics of our panel companies. We have also detailed how we constructed our treatment variables and what we hypothesise about expected relationships between scheme intervention and performance outcomes. Before turning to the econometric modelling of performance, we present more detailed information about the dynamics of companies supported through the EIS and VCT schemes.

[46] The Anglo-German Foundation report by Burgel, Fier, Licht and Murray (2004) showed that the annualised growth rates of surviving high-tech start-ups for their first five years is a creditable 25-35 per cent per annum (sales) and 17-25 per cent per annum (employment).

5 General EIS and VCT Dynamics

Here we present a summary of the basic descriptive evidence for supported companies funded through EIS and VCT.

5.1 Age profile of companies

The majority of both EIS and VCT recipient companies were incorporated after 1998. The peak formation years were 1999 and 2000. This period reflected a time of unprecedented popular interest in both creating and investing in young, high potential enterprises in the UK (as well as several other mature economies). Newly formed companies using VCTs tailed off dramatically post-2000 and remained at a level below that recorded in 1995 between 2004 and 2006. Again, this pattern is linked to the exceptional period over the New Millennia when stock markets were extremely bullish towards entrepreneurial companies, particularly in new technologies, before a savage downward correction of stock markets internationally in Q1, 2000[47]. The decline in newly formed companies using EIS post-2000 was broadly similar. The net result of these market movements was to imperil the equity position of investors in over-valued young businesses. Business angels and early-stage venture capital companies were particularly badly hit by these market movements. The net result was a decidedly jaded appetite for investing risk capital in speculative young companies over the period post Q1, 2000. UK Global Entrepreneurship Monitor figures show that business angels annual investment values had still not recovered to pre-2000 levels by 2006.

5.2 EIS/VCT investment profile

From Figure 5.1, we observe that the general pattern of EIS and VCT first investments is remarkably similar over time. Both schemes experienced rapid growth in new take-up between the early 1990s and 2000, followed by a substantial decline to 2003.

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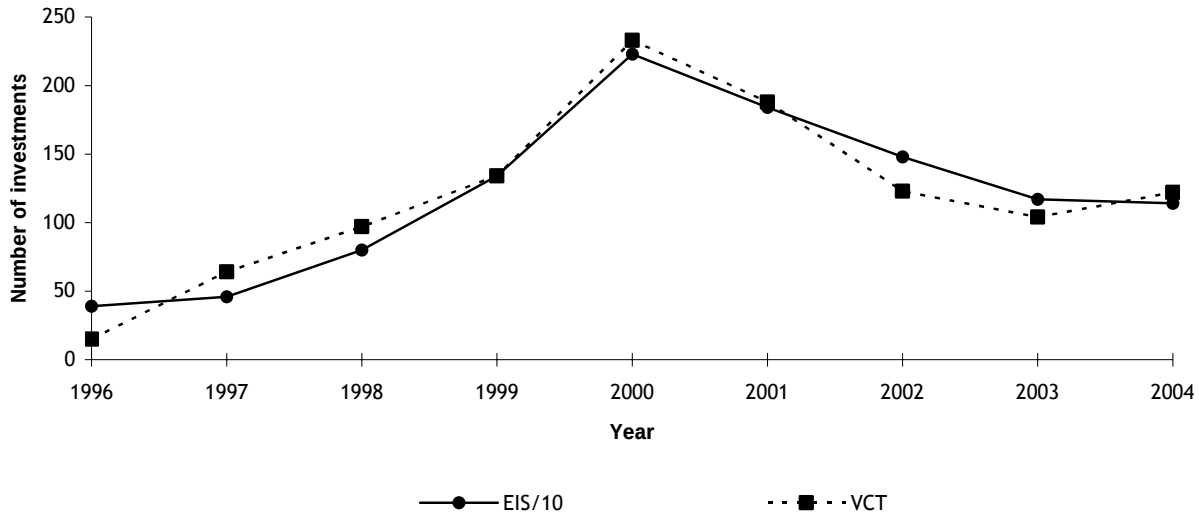
[47] Sohl, 2003.

Subsequently, however, new take-up of VCT levelled off whilst new take-up of EIS continued to decline. From 1998 to 2000 the patterns were quite similar in EIS and VCT take-up. Subsequently, all indexes fell.

Figure 5.1: Number of First Time EIS and VCT Users



Source: Institute for Employment Studies

5.3 Year of incorporation and initial EIS/VCT funding

Table 5.1: Duration between year of EIS/VCT support and year of incorporation

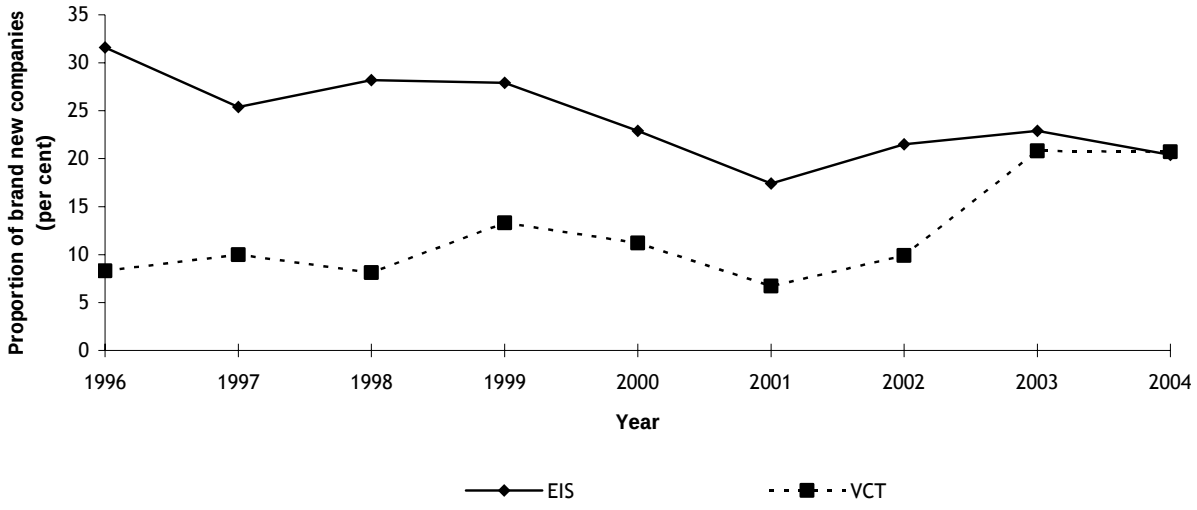
	EIS %	VCT %
Same year	22.2	12.0
One year	36.9	43.3
Two years	12.5	22.2
Three years	7.1	11.6
Four or more years	21.3	10.9
Total	100.0	100.0

Source: IES analysis of HMRC and FAME (excluding cases for which FAME data are missing)

Some 55.3 per cent of companies receiving their first VCT investment, and 59.1 per cent of companies receiving their first EIS investment do so within a maximum of two years from incorporation (Table 5.1). The proportion of brand new companies using EIS in their start year has fallen over time (Figure 5.2). The most dramatic reduction was between 1999 and 2001 (from 27.9 per cent to 17.4 per cent), although the current trend is downwards. In contrast, brand new companies using VCT in their start year increased substantially between 2001 and 2003, from 6.7 per cent to 20.8 per cent. The latter behaviour of VCT funds may reflect professional investment managers' behaviour. One outcome of the market correction in 2000 was that company valuation

reduced sharply in the succeeding years giving investors the opportunity of buying into young companies at aggressive prices. It is likely that professional investment managers are more aware of, and able to exploit, cyclicality in stock markets in a more professional manner than individual investors using the EIS route.

Figure 5.2: Time profile of brand new companies receiving EIS/VCT Investment



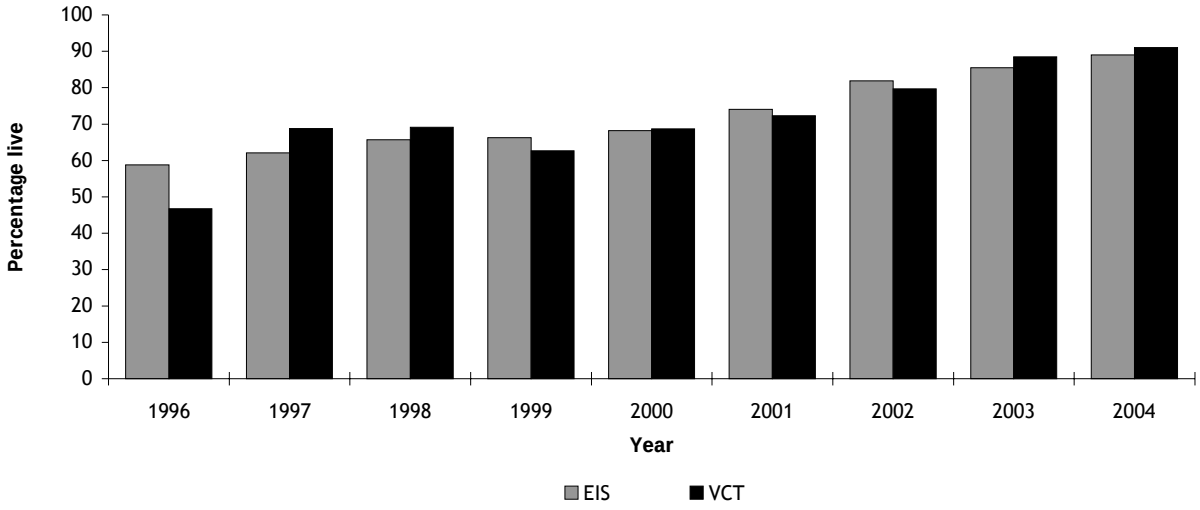
Source: Institute for Employment Studies

5.4 Survival after EIS/VCT investment

Figure 5.3 shows the level of survival of scheme companies over time. From the underlying data we know that 26.0 per cent of total VCT recipients are non-survivors or not currently trading. The comparable figure for EIS recipients is 24.8 per cent. Importantly, we cannot ascribe a reason for these statistics. Some companies will have failed and others will have not. The way survival is captured from FAME is simply that the company is no longer actively trading. As FAME data are drawn from Companies House we have a degree of confidence in it and most importantly it is consistently measured across our treatment and control groups. The attrition rate for new and young companies is relatively high, and typically peaks around two years post-start. The propensity to cessation is clearly related to company age (which is highly correlated with year of initial investment), with around 40 per cent of companies who received investments pre-1997 not currently live and trading. For companies receiving their initial investments in 2004 this figure is only ten per cent. Given the increased likelihood of the non-survival of a company over time, this pattern would be expected. To put these figures into context, of the UK start-ups financed by Barclays Bank plc in 2003, 66 per cent were still active after 24 months of trading. Beyond this period,

conditional closure rates fall continuously. By month 120, only some 17 per cent of companies are still alive and trading[48].

Figure 5.3: Current company status and year of first investment



Source: Institute for Employment Studies

[48] We are indebted to Richard Roberts (2007), SME Research Director of Barclays Bank plc, for the cited figures.

6 Econometric Modelling and Results

In this section, we discuss the core findings of our econometric analysis. For each performance variable, we report seven models in one table.[49] This allows the reader to compare the impact of treatments across models. As indicated in our panel data methodology, we use the Hausman test to identify whether the RE or FE models are more appropriate in each case (see Section 4.2.6) In addition, we also present some survival models. We then estimate the same set of models but include time dummy variables. Finally, we report further models which include scheme and sector, scheme and size, scheme and age interaction terms. Here, we note that we refer to companies that have multiple sectors. By this we mean that we have coded companies that report several sectors, and do not distinguish between them, to this multiple sector as we assume they operate fairly equally across the various sectors reported. This section of the report is divided into nine sub-sections in order to look at the impact of the two programmes across a defined range of (desired) outcomes, namely: gross profits; profit margins; fixed assets; gearing; investment; sales; employment; labour productivity; and survival.

Our seven models differ in the dummy variables they use to estimate the impact of EIS and VCT:

- **Model 1:** FE with dummies for **any scheme use** (nEIS and nVCT).
- **Model 2:** FE with dummies for **any use of EIS only** (nEIS_only), **VCT only** (nVCT_only), **or both** (nEIS_nVCT).
- **Model 3:** FE with the value of **cumulative investment** raised through EIS (C_eis) and VCT (C_vct).
- **Model 4:** FE model with up to two years **lagged values of investment** raised through EIS and VCT (ie Reis_0 to 2, etc).

[49] Random Effects (RE) or Fixed Effects (FE) models using six alternative treatment variables as discussed previously in Chapter 4.

- Model 5: FE model with dummies with up to two years lagged indicator of any scheme usage (ie Rvct_0 to Rvct_2, etc).
- **Model 6:** FE model with dummies **single or multiple years** of scheme usage (ie One_eis, Multi_vct, etc).
- **Model 7:** RE model with dummies for **Standard Industrial Classification** (SIC) (eg Sic_transport_eis).

Before we begin our reporting, we again reiterate that, in an ideal evaluation framework, we would have liked to have observed the performance of our sample companies over a much longer time frame than the average period of four to five years we have in our dataset. This would have allowed more sophisticated, dynamic model specifications and also allowed enough time to have elapsed since an EIS or VCT investment for the full effects to work their way through the system. Thus our analysis is limited by the time-series in our sample data.

6.1 Gross profits £'000s (Appendix Table A)

Hypothesis (H1a): Publicly supported companies will have higher levels of Gross Profits (£)

Key findings:

- There is some weak evidence that EIS is associated with higher real gross profit levels, although this is far from conclusive.
- VCT investment is not associated with higher real gross profits per se.
- VCT investments in the hospitality sector outperform those in all other sectors.
- The larger the size of company receiving EIS or VCT investment, the lower their real gross profit levels.

The first point of note is that FE models are preferred to RE models in models (1) to (6). From models (1) and (2), we observe no significant associations between gross profits and our scheme dummy variables (nEIS, nVCT, nEIS_only, nVCT_only and nEIS_nVCT). Nor do we find any such associations in model (3) using our cumulative scheme investment variables (C_eis and C_vct). There is no evidence that this differs over the years post the investment (model 4), although there is some evidence of lower gross profits in the year of EIS investment (model 5; Neis_0 = -685.05). Model (6) indicates that single or multiple EIS and VCT investments make no difference to gross profits (One_vct, Multi_vct, One_eis, Multi_eis).

In model (7), which is an RE model with time and scheme–sector interaction terms, we do observe a significant and positive association for EIS (nEIS = 1400.46). No similar pattern was identified for VCT investments. We do, however, identify one sectoral association for VCTs, albeit none for EIS. On the former, we note that VCT investments

in the hospitality sector (Sic_hospitality_vct) had a positive association with a coefficient of 5342.61. This implies that VCT investments in the hospitality sector outperform those in all other sectors in terms of the gross profitability of recipient companies versus non-VCT recipients.

We also see that size of company is significant and negatively associated with gross profits for EIS and VCT recipients (model 7). The respective coefficients are Size*EIS = -16.14 and Size*VCT = -1.74. This implies that the decline in gross profits for an equivalent increase in company size is greater for EIS recipients than VCT recipients. No significant relationship with company age was found.

Regarding gross profits over time, we note that time effects are important post-1997. The year with the most significant and negative association with gross profits was 2001 (model 7; Year 2001 = -738.64). This coincides with the more general downturn in stock markets and company performance in this year. It is also worth noting that 2002 and 2003 were the next worst performing years in terms of reductions in gross profitability.

6.2 Profit margins % (Appendix Table B)

Hypothesis (H1b): Publicly supported companies will have higher Profit Margins (%)

Key findings:

- VCT and EIS investments are generally associated with lower profit margins.
- The negative association with profit margins diminishes over time for EIS investments.
- Single EIS and VCT investments are associated with lower profit margins but not multiple investments.
- EIS and VCT investment in the public administration sector are associated with higher profit margins. For EIS this is also true in construction.
- On average, the older a VCT recipient company is, the higher their profit margins are.

For our profit margin models, we note some variation in our preferred specifications. For example, FE models are preferred in models (1), (2), (5), (6) and (7) and RE models in (3) and (4). On this performance measure, we generally observe negative association with EIS and VCT investments. For example, in models (1) and (2) we note that nEIS and nEIS_only reduced profit margins by 2.19 and 2.70 respectively. The equivalent figures for nVCT and nVCT_only are -2.44 and -4.78, again implying a decline in profit margins for VCT recipients. Further, we note that recipients of EIS and VCT investment (nEIS_nVCT) had lower profit margins of -3.03.

Further evidence of this negative association with profit margins is found in model (3). Here, greater cumulative EIS and VCT investments are associated with lower profit margins. The association is higher for EIS (C_eis = 2.8e-6) than VCT (C_vct = 1.6e-6). While

this could imply a negative scale of investment effect for both schemes, the size of the respective coefficients (around 0.000003 for EIS and 0.000002 for VCTs) is extremely small in a real and quantitative sense, although significant in a statistical sense.

Model (4) shows that there is variation in terms of the timing of this negative effect for both EIS and VCT. For EIS, the negative association with profit margins diminishes with time elapsed since investment (Reis_0 = -3.1e-6 compared to Reis_2 = -1.8e-6). For VCTs, the year of the investment has the smallest coefficient (Rvct_0 = -1.6e-6) and the first year post-investment has the largest (Rvct_1 = -3.1e-6). This suggests that the negative association with profit margins declines more quickly in the case of EIS investments than is the case for VCT investments. Model (5) confirms this for EIS, and implies that after two years there is no identifiable negative association with profit margins. For VCT, the results suggest that timing is largely irrelevant (Nvct_0, Nvct_1 and Nvct_2 are not significant). In model (6), which explores potential impacts from single and multiple investments under both schemes, we note that in both cases single investments had a significant and negative association (One_vct = -4.01 and One_eis = -2.75) and multiple investments had none.

In model (7), we note some sectoral profit margin effects for EIS and VCT. On the former, we observe a positive association for EIS recipients in construction (Sic_construction_eis = 11.69) and public administration (Sic_public administration_eis = 17.51). For VCT we also note that public administration has a positive association (Sic_public administration_eis = 14.41). These coefficients are quite large and it is interesting to note the differences for public administration between the schemes.

The relationship between scheme investment, company age and profitability differs between EIS and VCT. We find a marginal (at the ten per cent level), negative association with company age in model (7) for EIS (Age*EIS), but a significant positive one for VCT (Age*VCT). No significant relationships were identified by company size.

Regarding time, we observe that profit margins were lowest in 2001 and 2002 where the respective coefficients (Year 2001 and Year 2002) imply a reduction in profit margins of 2.72 and 2.78. This again is consistent with more general downturns in the economy and stock markets.

6.3 Fixed assets £'000s (Appendix Table C)

Hypothesis (H2): Publicly supported companies will have higher fixed asset levels

Key findings:

- EIS and VCT investments are generally associated with higher levels of fixed asset formation.
- Companies receiving both EIS and VCT investments have the highest level of fixed asset formation.

- The positive association of VCT investment on fixed asset levels diminishes over time.
- For both EIS and VCT the results, though statistically significant, are quantifiably small.
- VCT investments have more substantial associations in the transport, public administration, 'other' services and business services sector.
- For both EIS and VCT, the larger a company is, the stronger the positive association.

For fixed assets specifications, we note that FE models are preferred in all seven cases. In our dummy scheme variable models (1) and (2) we observe that all scheme variables are positive and significant. For EIS we see that the coefficients range from 0.28 (nEIS) to 0.30 (nEIS_only). For VCT, coefficients range from 0.34 (nVCT) to 0.42 (nVCT_only). We also note that recipients of EIS and VCT have higher fixed assets with a coefficient of 0.57 (nEIS_nVCT) in model (2). These results imply that EIS – VCT have the largest association with fixed asset formation, then just VCT, and finally EIS.

In model (3), we observe that both cumulative scheme variables (C_eis and C_vct) have positive and significant associations with fixed assets. Whilst the statistical significance is high (at the 1 per cent level in both cases), we again find that the actual magnitude of these coefficients (0.00000015 for EIS and 0.00000013 for VCT) is extremely small. As we see, in this case, EIS has the larger impact for a given level of scheme investment.

In model (4), which explores the timing of any scheme effects, we note that EIS association peaks in the first year post-investment (Reis_1) and then reduces to below the investment year level. For VCTs, scheme coefficients are greatest in the year of investment (Rvct_0), then roughly halve in the first year after investment (Rvct_1), before the association disappears completely in the second year post-investment (Rvct_2). It is interesting to note that for both schemes the coefficients diminish substantially within two years of the investment. Model (5) confirms these findings.

We also observe some quite important differences in the relationship with fixed assets between the two schemes in terms of single and multiple investments. Model (6) shows that for VCTs, multiple investments are more highly associated with fixed asset formation than single investments (One_vct = 0.30 and Multi_vct = 0.37). This contrasts with the EIS where both single and multiple investments have an equivalent association over and above non-recipient companies (One_eis = 0.28 and Multi_eis = 0.28). This would imply that follow on investments are particularly important, in terms of fixed asset formation, for recipients of VCT investments.

In model (7), which explores any scheme specific differential effects across sectors, we note that there is substantial variation on the VCT scheme. For EIS, only companies in 'other services' are associated with higher fixed asset formation (Sic_other_eis = 0.30). This is a slightly weaker relationship than was the case for 'other services' with VCT (Sic_other_vct = 0.34). Furthermore, VCT recipients in transport (Sic_transport_vct = 0.79), public administration (Sic_public administration_vct = 0.61) and business services (Sic_business_vct = 0.27) all have positive and significantly higher levels of fixed asset

formation. It is interesting to note that these relationships are generally stronger than those recorded for other scheme variables in alternative models.

Finally, we note that both age and size have positive and significant effects for EIS recipients (Age*EIS and Size*EIS): the older and larger the EIS company, the higher its level of fixed asset formation. For VCTs, we observe no relationship with company age, but we do find a positive association with company size (Size*VCT); one that is greater than for EIS (0.15 compared to 0.11).

6.4 Gearing Ratio (Debt/Equity) (Appendix Table D)

Hypothesis (H4): Publicly supported companies will have lower gearing ratios

Key findings:

- Although our results are far from conclusive, there is some evidence to suggest that EIS investments are associated with reduced gearing. This is not the case for VCT investments.
- The (negative) gearing association for EIS increases in scale over time.
- Only single EIS investments are associated with reduced gearing.
- EIS investments in public administration and 'other' services have more substantial associations.
- The older an EIS recipient is, the higher their gearing ratio.

In terms of preferred model specifications, models (1) to (6) are FE models and model (7) which includes time and sector–scheme interaction variables is RE. Across our various models, scheme effects are mixed. For example, in model (1) which incorporates two scheme dummy variables, no significant relationship is reported for either scheme. In model (2), which adds in an additional dummy variable for companies that have received both EIS and VCT investments, we note that EIS investments are associated with reduced gearing by 47.83 (nEIS_only). Model (3), our cumulative scheme investment model, reports no significant scheme associations for either EIS or VCT.

In model (4), which explores the time dynamics of scheme investments, we observe some differences on the EIS scheme. Broadly, the negative association with gearing (ie reduction in debt/equity ratios) increases in the second year post-investment (Reis_2) compared to the actual year of investment (Reis_0) and the first year post-investment (Reis_1). The magnitude of this year two coefficient is 0.000035 compared to 0.000033 in the year of investment. No similar pattern was observed for VCT investments. In model (5) we only identify a negative and marginally significant (at the ten per cent level) association for EIS (Neis_0 = -35.54).

The next issue we address is whether or not receiving follow on scheme investments has a greater association than single investments. Model (6) shows that single EIS investments have a large and negative association with gearing (One_eis = -70.14), but

additional EIS investments have no association. This implies that further EIS investments are matched with equi-proportional increases in debt financing (hence no change in gearing). Interestingly, no similar effects were identified for VCT investments.

In model (7), which includes time and scheme–sector interaction variables, we observe very few sector specific scheme effects. For EIS, only two sectors were found to have differential scheme coefficients, business services (Sic_business_eis = -125.90) and 'other' services (Sic_other_eis = -137.29), although these were substantial. No such variation was found for VCT.

In terms of company age and size effects, we find that size has no association for EIS or VCT recipients. However, age for EIS was found to have a positive and significant relationship with gearing (Age*EIS = 3.50). This is interesting as it implies that the older a company is, the more the equity based investment supported through EIS is matched by additional debt financing.. This is consistent with banks using track record and length of relationship as a key determinant of debt funding.

Finally, we observe some important time variation in terms of gearing. We note that 2001 was a year when gearing rose (ie higher debt levels and/or lower equity) and evidence of a relaxation in equity markets from 2002 onwards. In fact, by 2003 our evidence is consistent with a significant upturn in the availability of equity (Year 2003 = -31.94 compared to Year 2001 = +3.99).

6.5 Investment £000s (Appendix Table E)

Hypothesis (H5): Publicly supported companies will have higher levels of private investment

Key findings:

- Modelling real investment levels was problematic due to higher than average incidence of missing data.
- No scheme variables were significant.
- Real investment peaked in 2000.

For real investment, we note that the preferred specifications in models (1), (3) and (4) are FE. In models (2), (5), (6) and (7) RE specifications are preferred. It is worth noting here that all our real investment models are the least well specified of all our performance models. This is primarily due to the relatively high incidence of missing data on investment. As we noted in our methodology section, this is exacerbated in panel data if there is little variation in investment over time anyway. Our models suggest that this is indeed the case.

In short, none of our alternative models find any scheme variables to be significant. This is true for other non-scheme explanatory variables in general, with a few notable

exceptions. For example, in general, companies operating in multiple sectors (Sic_multiple) had significantly higher levels of real investment in all our RE models ((2), (5), (6) and (7). In terms of more general variation over time, we note that 2000 was the peak year for investment (Year 2000 in model (7)). But overall we caution against putting too much emphasis on the results in this set of real investment models for the reasons outlined above.

6.6 Sales turnover £000s (Appendix Table F)

Hypothesis (H7): Publicly supported companies will have higher sales turnover

Key findings:

- VCT investments were generally associated with higher real sales turnover. The evidence for EIS was less conclusive, but where it was significant it was positively associated.
- Multiple VCT investments were more associated with higher real sales levels than single investments.
- Here we also note that whilst scheme effects were highly significant in a statistical sense, they tended to be quantifiably small.
- EIS investments in companies operating in multiple sectors had the greatest positive association with real sales.
- VCT investments in public administration businesses showed the strongest positive association with real sales and 'other' services the strongest negative relationship.

For this set of models for real sales turnover, we note that FE specifications are preferred in all cases. In model (1) we find that only VCT had an effect. In this case the coefficient was positive and significant (nVCT = 0.15) indicating that VCT investments were associated with higher sales levels. In model (2) we also observe that recipients of EIS and VCT also had significantly higher sales levels (nEIS_nVCT = 0.13) although the effect was smaller than for VCT on its own (nVCT_only = 0.19). Again, we do not find evidence that EIS was associated with higher sales levels.

However, in our cumulative scheme investment model (model (3)), we find that investment scale had a positive and significant association for EIS and VCT. In this case, the magnitude was higher for EIS (C_eis = 8.6e-8) compared to VCT (C_vct = 4.8e-8). We note that whilst both scheme variables were significant in terms of generating higher real sales levels, the actual scale of these impacts was extremely small at 0.000000086 for EIS and 0.000000048 for VCT respectively.

In model (4), which explores any time variation in investment impact, we note that there was no significant variation between effects in the year of investment compared with one year and two years later for EIS. For VCT, we observe the strongest relationship for one year after the investment (Rvct_1 = 5.3e-8). Again we note that the

actual magnitude of this effect, whilst statistically significant, is small in real terms. Model (5), in contrast, shows a large and negative coefficient for EIS in the year of investment (Neis_0 = -0.12), although this completely dissipates by the second year post-investment.

Model (6) explores any potential effects of receiving follow-on investments under both schemes. Here, we see that on the VCT, multiple investments have a much stronger association than single investments (One_vct = 0.12 and Multi_vct = 0.21). No comparable effects were found for EIS. This implies either that follow-on VCT investment helps foster higher sales levels in recipient companies or that companies subject to multiple VCT investments tend to have higher sales.

From model (7), we find that EIS recipient companies operating in multiple sectors (Sic_multiple_eis = 2.40) had significantly higher sales levels. Further, VCT recipient companies operating in utilities (Sic_utilities_vct = 0.90), and public administration (Sic_public administration_vct = 1.05) had higher sales levels and those in 'other' services (Sic_other_vct = -0.43) had lower sales levels.

We find no evidence that size or age had a differential impact across schemes. However, we find that all years post-1997 were associated with lower sales levels, although this effect diminished between 1998 and 2003 in general and had disappeared by 2004.

6.7 Labour productivity (Sales Turnover per Employee) (Appendix Table G)

Hypothesis (H3): Publicly supported companies will have higher levels of labour productivity

Key findings:

- Whilst not conclusive, there is some evidence that EIS, and to a lesser extent VCT, had a positive association with labour productivity.
- Single EIS investments were found to have a lower association than multiple investments.
- EIS investments in companies operating in multiple sectors had the greatest positive association with labour productivity.
- VCT investments in the primary and public administration sectors had the largest positive association and those in 'other' services had the largest negative association.
- Small companies using EIS and VCT had higher labour productivity.

In this set of models we use (real) sales per employee as our dependent variable with (real) capital per employee on the explanatory side of each equation. Our preferred method of estimating productivity would have been to estimate a multi-factor model using capital, labour (employment) and materials (raw materials, unfinished goods and

services, energy etc) to explain variations in sales or alternatively to use value added as our dependent variable (the one we are seeking to explain variations in) with capital and labour as explanatory variables. As we have no materials data, the first approach is not feasible for us as the model would be unspecified and generally give unreliable (typically over-estimates) of the true underlying relationships[50]. Furthermore, as we also have no robust value added data, option two is not feasible. So what we are able to estimate is labour productivity as outlined above. One further addition to our labour productivity model is that we incorporate a squared term for the capital per employee variable to capture any potential non-linearity caused by diminishing marginal productivity of capital at very high levels (ie adding one more unit of capital per employee in companies with already high levels would add proportionately less to overall output). As is usual in this form of model, the dependent variable is expressed in natural logs.

As to our model specifications, for this set of performance models, FE is the preferred specification in all cases. Starting with our dummy scheme variable specifications, models (1) and (2), we note that only the VCT dummy in model (2) is marginally significant at the 10 per cent level (nVCT_only = 0.11). In our cumulative investment model (model (3)) we note that EIS is significant and positive (C_eis = 6.1e-8). As was the case for some other performance variables, whilst the scheme variable has statistical significance, the coefficient of 0.000000061 is, in absolute terms, extremely small.

In model (4), which explores potentially differential time effects, we observe no significant effects other than a marginally negative effect (at the ten per cent level) for VCT in the year of investment (Rvct_0 = -4.9e-8). In model (5), we note that the initial association for EIS in the year of investment (Neis_0) is negative and this holds in the first year post-investment (Neis_1) albeit at a reduced level. By the second year, this negative effect dissipates.

In addition, model (6) shows a negative association with single investments made under the EIS (One_eis = -0.09). Follow-on investments have no association for EIS. For VCT, there is marginal evidence that multiple investments (Multi_vct = 0.10) outperform single investments, albeit only at the 10 per cent level of significance. Thus on balance it would appear that multiple funding rounds under both schemes do better than single funding rounds, although the evidence is clearly very tentative on this.

Model (7), by contrast, is more conclusive and reports a positive association for both EIS and VCT. Here, we observe that the coefficient is more than twice as large for VCT than EIS (nEIS = 0.33 and nVCT = 0.74). Some differential impacts are also apparent across sectors. For example, companies using EIS and operating in multiple sectors had higher labour productivity (Sic_multiple_eis = 2.17). On VCT, companies operating in the utilities sector (Sic_utilities_vct = 0.91) and the public administration sector (Sic_public

[50] See Cowling, 2003.

administration_vct = 0.95) had higher levels of labour productivity, whilst those operating in 'other' services had lower labour productivity (Sic_other_vct = -54).

From model (7) we also note that whilst company age did not have any differential impacts for either scheme, company size did. Here we observe that the larger a company receiving EIS or VCT investments is, the lower their labour productivity, especially for VCT (Size*VCT = -0.105 and Size*EIS = -0.086). Thus, in terms of labour productivity, smaller companies outperform larger companies invested in under EIS and VCT.

Regarding time effects, we also observe that the years prior to 1997 and post-2003 were more productive. Further, 2000 and 2001 were the least productive. In terms of capital/labour effects, we note that the coefficients on the level (Ln Capital/Labour Ratio) and squared terms (Capital/Labour Ration squared) are both positive and significant indicating positive and increasing returns to more capital per employee. This evidence suggests that many of the companies in our sample would benefit from more investment in terms of raising their labour productivity.

6.8 Employment (Appendix Table H)

Hypothesis (H8): Publicly supported companies will have higher levels of employment

Key findings:

- There is consistent evidence that EIS and VCT are associated with higher employment levels.
- Here we also note that whilst scheme effects were highly significant in a statistical sense, they tended to be quantifiably small.
- The VCT association is larger than the EIS effect.
- The VCT and EIS associations increase over time.
- Multiple investments under both schemes outperform single investments.
- EIS investments in companies operating in multiple sectors, finance, public administration, 'other' services and business services had the greatest positive association with employment levels and those in hospitality had the lowest association.
- VCT investments in business services had the greatest association and in transport the lowest.
- Larger and older companies using EIS and VCT had higher employment levels.

We note that for all seven employment models the FE specification is preferred to RE. We also see that scheme variables are statistically significant across all models. From model (1), we see that EIS and VCT scheme dummy variables are positive and significant (nEIS = 0.35, nVCT = 0.65). It is also the case that the positive relationship with employment levels for VCT recipients is substantially larger than for EIS. In model

(2), we also observe that joint EIS and VCT investments have a positive and significant association with employment levels and one larger in magnitude than VCT or EIS individually.

From model (3), our cumulative investment model, we again observe a positive and significant association with employment levels for both EIS and VCT (C_eis = 2.0e-7, C_vct = 3.0e-7). As has been the case for other performance measures, we note a high degree of statistical significance in our model for the two scheme variables but very small actual coefficients of 0.0000002 for EIS and 0.0000003 for VCT.

In model (4), which explores time dynamics of scheme investments, we note that the strength of the relationship with employment for EIS investments grows the longer the time elapsed since the investment (Reis-2 = 7.5e-8). For VCT we note that the association is immediate (Rvct_0 = 1.9e-7) and increases slightly in the second year post-investment (Rvct_2 = 2.1e-7). Model (5) broadly confirms these results (Nvct_0 = 0.26 and Nvct_2 = 0.28). Again we see that employment coefficients are generally larger for VCT within and across years since investment.

Model (6) tests for differential effects from receiving multiple investments. In this case we find that multiple investments under both schemes have larger employment coefficients than single investments. The differential is large for EIS (One_eis = 0.26 compared to Multi_eis = 0.64) and VCT (One_vct = 0.46 compared to Multi_vct = 0.78). These results imply that follow-on investment maximises employment in supported companies.

In our final employment model (model 7), which explores time dynamics and sector–scheme interactions, we note these differ for both schemes across sectors. For example, positive and significant associations with employment levels were found for companies operating in multiple sectors (Sic_multiple_eis = 0.56), finance (Sic_finance_eis = 0.54). business services (Sic_business_eis = 0.15), public administration (Sic_public administration_eis = 0.49) and 'other' services (Sic_other_eis = 0.32). A negative relationship with EIS was found in construction (Sic_construction = -0.19). For VCT, we find a positive coefficient for business services (Sic_business_vct = 0.18) and a negative one for hospitality (Sic_hospitality = -0.40).

We also observe that company size and age are significant in the relationships with employment for both schemes. Size coefficients are positive, significant, and larger for EIS (Size*EIS = 0.65) than VCT (Size*VCT = 0.32). Age coefficients are also positive and significant for both schemes (Age*EIS = 0.014, Age*VCT = 0.012) although marginally greater for EIS. With regard to time, we find that 1997 and 2001 were the years associated with higher employment levels.

6.9 Survival

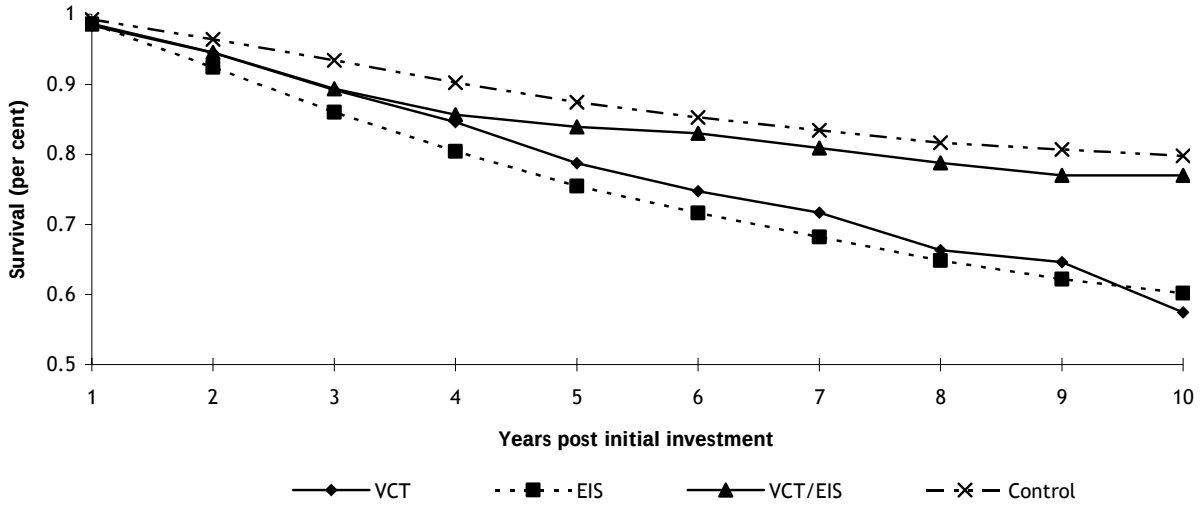
Hypothesis (H6): Publicly supported companies will have higher survival rates

Key findings:

- EIS and VCT companies both had a lower survival rate than unsupported companies.
- Companies in receipt of joint-EIS/VCT funding had a survival rate broadly comparable with unsupported companies.
- Survival rates for EIS and VCT companies were fairly constant over time.
- For unsupported companies and recipients of joint EIS/VCT funding, non-survival rates diminished over time.
- Only four out of ten EIS and VCT companies will survive ten years.
- Eight out of ten unsupported or joint EIS/VCT supported companies will survive ten years.

In this section we depict the survival rates for each group of companies. These are shown below in Figure 6.1 As we observe, supported companies have a lower survival rate over all time periods. The interesting feature is that the survival rate trend is fairly constant from year to year for our EIS and VCT groups. For our control group, and recipients of EIS and VCT funding this was not the case. Here, we note that after year 4 survival rates flatten out (ie a lower chance of exit as companies move from years 4 to 10).

Figure 6.1: Survival rates for companies incorporated post-1995



Turning our attention to the econometric results, we find evidence broadly in support of the survival tables in that EIS and VCT recipients exhibit a lower survival rate than control group companies, although the evidence is less conclusive for VCT recipients. For EIS recipients, the non-survival rate is 36.5 per cent higher and the basic survival

difference is 34.4 per cent lower. By contrast, companies receiving joint-EIS/VCT funding had similar survival patterns to our control group companies.

6.10 Results summary

The basic structure of Table 6.1 is such; column 1 describes the performance measure and column 2 the hypothesis which relates to each specific performance measure. Column 3 shows the predicted sign (direction) of the relationship between EIS and VCT investment and each performance measure. In column 4 the actual results from our econometric models are shown. Here, a '+ve' indicates that the relationship is statistically significant and is positively associated with the performance measure. A '-ve' indicates statistical significance, but a negative association with the performance measure. A zero indicates no statistical significance. Column 5 gives an indication of the magnitude (or scale) of the statistical association between EIS and/or VCT and the performance measure. Finally, columns 6,7 and 8 report more detailed results for sectors, company size and company age. From the results summary table , we can see that scheme variables generally have little discernible impact on real gross profits or investment, although the latter estimation was problematic for missing data reasons. Further, VCT appears to have no impact on labour productivity. Investments under both schemes tended to be negatively related to profit margins. Where scheme variables did show positive relationships in general were in respect of real fixed assets, real sales turnover and employment. For EIS only, the scheme was also associated with reduced gearing and improved labour productivity. Thus on balance, scheme investments, and particularly EIS, tended to be associated with general building of capacity (fixed assets and jobs) and an expansion in sales, but not with any corresponding increase in profitability. Indeed, we find strong evidence that investments reduced margins.

Table 6.1: Results summary

Performance measure	Hypothesis (section 5.3)	Hypothesised effect	Statistical significance of scheme results	Scale of scheme results	Sector variation	Size effects	Age effects
Gross Profits	H1a: publicly supported companies will have higher levels of Gross Profits						
EIS		+ve	(+ve)	n/a		-ve	0
VCT		+ve	0	n/a	hospitality (+)	-ve	0
Profit Margins	H1b: publicly supported companies will have higher levels of Profit Margins						
EIS		+ve	-ve	small	construction (+)	0	0
VCT		+ve	-ve	small		0	+
Fixed Assets	H2: publicly supported companies will have higher fixed asset levels						
EIS		+ve	+ve	small	other services (+)	+ve	+ve
VCT		+ve	+ve	small	transport (+) business services (+) other services (+)	+ve	0
Gearing	H4: publicly supported companies will have lower gearing ratios						
EIS		-ve	-ve	n/a	business services (+) other services (+)	0	+ve
VCT		-ve	0	n/a		0	0
Investment	H5: publicly supported companies will have higher levels of (private) investment						
EIS		+ve	0	n/a		0	0
VCT		+ve	0	n/a		0	0
Sales	H7: publicly supported companies will have higher sales turnover						
EIS		+ve	+ve	small	multiple sectors (+)	0	0
VCT		+ve	+ve	small	utilities (+) other services (-ve)	0	0

Performance measure	Hypothesis (section 5.3)	Hypothesised effect	Statistical significance of scheme results	Scale of scheme results	Sector variation	Size effects	Age effects
Labour Productivity	H3: publicly supported companies will have higher levels of labour productivity						
EIS		+ve	(+ve)	small	multiple sectors (+)	-ve	0
VCT		+ve	0	n/a	utilities (+) other services (-ve)	-ve	0
Employment	H8: publicly supported companies will have higher levels of employment						
EIS		+ve	+ve	small	multiple sectors (+) hospitality (-ve) finance (+) business services (+) other services (+)	+ve	+ve
VCT		+ve	+ve	small	hospitality (-ve) business services (+)	+ve	+ve
Survival	H6: publicly supported companies will have higher survival rates						
EIS		+ve	-ve	n/a			
VCT		+ve	-ve	n/a			

Notes: '+ve' indicates generally positive and statistically significant effects for scheme variables. '(+ve)' indicates some statistically significant and positive scheme variables. '0' indicates insignificant scheme variables. '-ve' indicates generally negative and statistically significant effects for scheme variables. 'small' indicates scheme variable coefficient is quantifiably small.

Regarding general size effects in respect of EIS and VCT, we find that company size reduced the effectiveness of scheme investments in terms of gross profitability and labour productivity and increased the effectiveness of scheme investments in terms of fixed asset accumulation and employment. With regard to the age of recipient companies, we note that older companies actually increased their gearing on EIS. In contrast, older companies tended to generate more employment, on VCT higher profit margins and on EIS more fixed assets.

With regard to sector we find that public administration is a sector where there is the highest probability of a positive, scheme related, association. This holds for profit margins fixed assets (only VCT), sales (only VCT), labour productivity (only EIS) and employment (only EIS). However, these results may well be overstated given the likelihood of omitted variable bias and the fact that the underlying data shows that only a small handful of companies in this sector have participated in the schemes.

Companies operating in multiple sectors (ie those with not one but several main SIC codes) also performed well on EIS in terms of sales and employment. Business services companies had higher fixed asset formation (only VCT) and higher employment. In contrast, 'other' service companies performed poorly in respect of sales (only VCT) and labour productivity (only EIS). Finally we note that the survival rate for EIS and VCT supported companies is significantly lower than that of unsupported companies, although those receiving both EIS and VCT investments had broadly comparable survival rates.

7 Conclusions

7.1 Background

The Enterprise Investment Scheme (EIS) was first introduced in 1994 to promote access to risk capital for certain types of smaller company by providing private individuals with tax relief on their direct investments. Venture Capital Trusts (VCT) were introduced in 1995 and promoted indirect investment into similar companies through a managed fund structure for private individuals. Again, as with EIS, a tax-based incentive structure was employed. This report sets out to evaluate econometrically the impact of these two government supported programmes on companies receiving investments. In doing so, the study has three key objectives:

- to compare the performance of EIS and VCT supported companies against that of matched, un-supported companies
- to compare the performance of EIS and VCT supported companies before and after receiving their initial investment, and
- to quantify the effect on business performance indicators for each scheme of key variables including, for example, company age, size and sector.

To achieve these objectives, we combined HMRC's EIS and VCT administrative data with individual company accounting and performance data from the FAME public database. We also constructed a large 'control' group of companies and collected equivalent accounting and performance data for this comparison group. Having assembled our combined data set, we then explored basic patterns in the characteristics of EIS and VCT supported companies by reference to equivalent matched but non-recipient companies.

7.2 Findings

The first point to note is that in many of our performance models, the absolute size of our scheme coefficients shows a very small quantitative impact on business performance. However, in many cases these effects are statistically significant which

suggests that they cannot be ignored. On the other hand, omitted variable bias may also play a role which might lead to an overestimate of the true scheme effect. In a purely econometric sense, we would have liked to have a much longer time-series of data than was available to us in order to achieve greater clarity about the impact of EIS and VCT on company performance, particularly in terms of the causality of the relationships observed in the data.

In general, we found that the majority of EIS and VCT supported companies were incorporated within the last decade. For both schemes, an absolute majority of companies were founded either in the year of their first scheme investment or less than twelve months before the scheme investment. We noted that activity on both schemes peaked in the year 2000, after which there was a substantial decline in the number of first investments. We also found that the proportion of brand new companies receiving EIS investments was fairly stable over time, while the period post-2001 was characterised by an increase in the share of new companies using VCT investment. Historically, around one quarter of all EIS and VCT recipient companies are no longer actively trading and (as would be expected) the cessation rate increases the more time that has elapsed since the initial investment.

Our econometric analysis took advantage of the panel nature of the dataset we had constructed (ie companies providing the spatial component and repeated annual performance and accounts data providing the time-series element). However, there were a number of issues that needed to be considered before we presented our key results. Perhaps the most significant issue was missing data. Whilst we conducted tests to check for the non-randomness of missing data, we could not fully remove this source of potential error. This proved to be particularly problematic in the case of our set of investment models. Further, as the 'average' time-series element in our panel was four to five years, we did not really have a sufficiently long period over which to explore fully the more dynamic model specifications needed to more rigorously examine the direction of causality in relationships between the schemes and company performance.

We estimated nine sets of performance models using gross profits, profit margins, fixed asset accumulation, gearing, investment, sales, employment, labour productivity and survival as our company level performance measures. Various model specifications were initially estimated for each performance measure and after further testing the preferred models were identified.

Key findings from our econometric analysis indicated that EIS and VCT, in general, were found to be positively associated with (real) fixed asset formation, (real) sales turnover, and employment. For EIS only, the scheme was associated with lower gearing and higher labour productivity. However, on average, the EIS and VCT schemes generally have had little discernible impact on real gross profits or investment. (However, the latter investment estimation is problematic for missing data reasons). Furthermore, investments made under EIS and VCT tended to be associated with companies exhibiting lower profit margins.

On balance, investments made under EIS and VCT, (but particularly EIS) tended to be associated with *general capacity building* (ie fixed assets and employment) and an expansion in sales. However, there was no evidence of a corresponding increase in profitability. Indeed, we find robust evidence that scheme investments were associated with lower profit margins – at least over the period observed. It is also important to note that, whilst we did find several instances of improved client company performance associated with EIS and VCT investments, in most cases the actual quantitative improvements in performance implied by our estimates were very small.

The impact of company size (ie sales turnover, no. of employees) or age (ie the time since formation) depends on the performance or outcome variable being appraised. It also depends on which scheme is being monitored. We found that both schemes had different effects for different sizes and ages of company. For example, the greater the size of company receiving EIS or VCT support, the lesser the effectiveness of scheme investments when appraised by (real) gross profits and labour productivity. In contrast, company size enhanced the effectiveness of scheme investments when measured by fixed asset accumulation or employment.

The age of company receiving EIS investments tended to be positively associated with the ratio of debt to equity (gearing), employment and fixed asset accumulation. Conversely, older companies receiving VCT investments tended to have larger employment numbers and profit margins. Thus, not only do we observe a differential for companies of different ages receiving support, but these relationships vary across the two schemes.

There were also varying EIS and VCT programme effects across sectors. For example, public administration was found to be that sector where there is the highest probability of a positive, scheme-related, effect on performance. This holds for profit margins, fixed assets (VCT only), sales (VCT only), labour productivity (EIS only) and employment (EIS only). Companies operating in multiple sectors also benefited from EIS investments in terms of higher sales and employment. Business services companies had higher fixed asset formation (VCT only) and higher employment. In contrast, 'other' service sector companies performed relatively poorly in terms of sales (VCT only) and labour productivity (EIS only).

Finally, survival rates for EIS and VCT supported companies were also significantly lower than those recorded in unsupported companies. However, for companies receiving both EIS and VCT support, survival rates were broadly comparable with those of unsupported companies.

7.3 Discussion

The results of the econometric analyses of panel data summarised above are not always simple or intuitive to understand. As such, the findings require some brief explanation.

Firstly, it needs to be noted that these results represent our best knowledge at this stage of the recipient companies' life cycles. They are still largely very young companies with less than ten years of economic activity. Thus, we can describe with some (although not perfect) accuracy, the behaviour and outcomes of the companies to date. What we cannot comment on, nor have we sought to estimate, is their future growth trajectories. We can only comment with final authority on the companies which have survived or not survived up to a relatively short period of time after inception, on average.

Secondly, we are talking about small and medium sized companies (SMEs) at a relatively early stage of their growth. As Edith Penrose (1959) famously noted, small and large companies are as different as caterpillars and butterflies. Thus, performance metrics have to be seen and interpreted within an SME context. For example, we would expect immature companies to have low profitability as resources are frequently directed into establishment and market growth. The "J Curve" is particularly likely to be important for high potential young companies in new knowledge and technology based areas. Cumulative net cash flow may frequently be negative for some considerable time given relatively high costs and low margins prior to market establishment. Nascent companies have few economies of scale or scope. Similarly, higher productivity is likely to be more evident as companies establish themselves in markets, find customers, suppliers etc., and through growth accrue additional economies of experience. Young companies frequently have low productivity although the productivity of new ideas and innovation activity is not fully measured through traditional statistics. In short, all other things being equal, profitability and factor productivity are both likely to be positively related to company age. In measuring the modest performance figures, we may well be measuring the immaturity of these companies.

Similarly, the issue of company survivability is not necessarily obvious. Certainly, survivability is a desirable state especially for the firm's owners and employees. We know that most nascent companies will terminate, either voluntarily or involuntarily during their first three years of existence[51]. However, survivability is not necessarily directly correlated with economic benefit to the wider society. Survival is a necessary, but not sufficient condition. Governments are much more likely to be interested in those young enterprises that have the capacity to grow into larger and successful companies even if the attempts at such growth increase the threat of company failure. Thus, a vigorous and entrepreneurial economy – replete with exciting, young companies taking risks to gain commercial advantage – is likely to be widely viewed as a desirable goal by policy makers. Such an environment will also likely record higher failure rates among such companies than would be evident among a majority of more established but low growth companies that are neither significantly innovative or employment creating.

[51] Cressy and Olafsson, 2006)

Taken together, these results indicate that EIS and VCT investments can have positive effects on capacity building in recipient companies, but that in quantitative terms these effects are, as yet, modest. Similarly, there is evidence that injections of funds via the schemes are associated with lower profit margins, at least initially. However, we also note that both schemes appear to have differential effects on performance depending on the size, age and sector of the recipient company and this is an important point. For government and private investors looking forward, the key question is whether or not these supported companies are more likely than comparable companies not in receipt of such support, to turn their investment in general capacity building into higher returns, re-investment, and employment. The present study does not allow us to make such a conclusion. In future, however, a rather longer time-series aspect to the dataset used here may allow us to be more definitive about the overall impact of EIS and VCT on recipient company development and performance. Such a study should also be able to better examine the equally fundamental question of whether the schemes benefit UK economic performance overall – whether outcomes in terms of company performance justify the transfer payments of tax receipts foregone.

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Appendix Tables

Table A: Preferred Performance Model Specifications: Real Gross Profits (2005 prices)

Model specification	Fixed effects (1)	Fixed effects (2)	Fixed effects (3)	Fixed effects (4)	Fixed effects (5)	Fixed effects (6)	Random effects + time +interactions (7)
Employment	19.28***	19.28***	19.28***	19.28***	19.28***	19.28***	19.58***
nEIS	156.59						1400.46**
nVCT	259.69						-26.61
Sic_multiple							1023.91***
Sic_primary							1333.20
Sic_utilities							-951.89
Sic_construction							-392.39
Sic_hospitality							-25.06
Sic_transport							176.82
Sic_finance							2119.82***
Sic_business							413.34
Sic_public administration							-853.10
Sic_other							156.47
Age	60.32***	60.60***	62.75***	59.89***	60.99***	62.38***	-26.93***
nEIS_only		219.57					
nVCT_only		541.19					
nEIS_nVCt		252.34					
C_eis			0.0003				
C_vct			0.0002				
Reis_0				-0.0003*			
Reis_1				-0.0002			
Reis_2				-0.0001			
Rvct_0				0.0002			
Rvct_1				0.0003			
Rvct_2				0.0004			
Neis_0					-685.05**		

Model specification	Fixed effects (1)	Fixed effects (2)	Fixed effects (3)	Fixed effects (4)	Fixed effects (5)	Fixed effects (6)	Random effects + time +interactions (7)
Neis_1					-51.53		
Neis_2					43.71		
Nvct_0					41.55		
Nvct_1					249.51		
Nvct_2					153.99		
One_vct						116.02	
Multi_vct						337.69	
One_eis						95.32	
Multi_eis						553.27	
Year 1996							
Year 1997							-102.91
Year 1998							-459.83**
Year 1999							-557.08***
Year 2000							-455.13**
Year 2001							-738.64***
Year 2002							-448.33**
Year 2003							-682.01***
Year 2004							-657.48***
Sic_multiple_eis							-982.11
Sic_primary_eis							-2528.87
Sic_utilities_eis							2167.92
Sic_construction_eis							283.14
Sic_hospitality_eis							496.36
Sic_transport_eis							281.86
Sic_finance_eis							-1715.02
Sic_business_eis							-666.33
Sic_public administration_eis							13.67

Model specification	Fixed effects (1)	Fixed effects (2)	Fixed effects (3)	Fixed effects (4)	Fixed effects (5)	Fixed effects (6)	Random effects + time +interactions (7)
Sic_other_eis							-1231.39
Sic_multiple_vct							429.75
Sic_primary_vct							-1297.48
Sic_utilities_vct							4130.24
Sic_construction_vct							1570.28
Sic_hospitality_vct							5342.61***
Sic_transport_vct							3232.16
Sic_finance_vct							2187.90
Sic_business_vct							2141.04*
Sic_public administration_vct							4540.59*
Sic_other_vct							2153.79
Age*EIS							-31.30
Age*VCT							17.43
Size*EIS							-16.14***
Size*VCT							-1.74***
Constant	2301.75***	2299.00***	2331.32***	2322.79***	2354.04***	2330.73***	748.42***
No.Obs	78,538	78,538	78,538	78,538	78,538	78,538	78,538
Average Time Period (years)	4.2	4.2	4.2	4.2	4.2	4.2	4.2
F statistic /Wald x2	4,336.39	3,469.11	4,337.32	2,168.75	2,168.86	2,891.05	34,954.94

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table B: Preferred Performance Model Specifications: Profit Margins

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Random effects (3)	Random effects (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions 7)
Employment	-0.00	0.00	6.98e-6	-0.00	-0.00	-0.00	-0.00
nEIS	-2.19***						-5.18***
nVCT	-2.44***						-0.80
Sic_multiple			2.48***	2.49***			
Sic_primary			5.70***	5.69***			
Sic_utilities			-37.85***	-38.25***			
Sic_construction			3.84***	3.84***			
Sic_hospitality			0.26	0.22			
Sic_transport			0.87	0.76			
Sic_finance			9.94***	9.93***			
Sic_business			-3.30***	-3.39***			
Sic_public administration			3.64***	3.58***			
Sic_other			-0.39	-0.46			
Age	-0.02	-0.02	-0.06***	-0.05***	0.01	-0.01	-0.02
nEIS_only		-2.70***					
nVCT_only		-4.78***					
nEIS_nVCt		-3.03***					
C_eis			-2.8e-6***				
C_vct			-1.6e-6***				
Reis_0				-3.1e-6***			
Reis_1				-2.5e-6***			
Reis_2				-1.8e-6***			
Rvct_0				-1.6e-6***			
Rvct_1				-3.1e-6***			
Rvct_2				-2.1e-6***			
Neis_0					-5.00***		

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Random effects (3)	Random effects (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions 7)
Neis_1					-2.89***		
Neis_2					-0.55		
Nvct_0					-0.29		
Nvct_1					-1.02		
Nvct_2					-0.34		
One_vct						-4.01***	
Multi_vct						-0.76	
One_eis						-2.75***	
Multi_eis						0.95	
Year 1996							
Year 1997	0.11	0.11			0.15	0.14	0.10
Year 1998	-0.72***	-0.71***			-0.63***	-0.66***	-0.72***
Year 1999	-1.38***	-1.37***			-1.27***	-1.32***	-1.37***
Year 2000	-1.88***	-1.86***			-1.73***	-1.82***	-1.88***
Year 2001	-2.71***	-2.70***			-2.58***	-2.66***	-2.72***
Year 2002	-2.78***	-2.76***			-2.68***	-2.74***	-2.78***
Year 2003	-1.83***	-1.82***			-1.78***	-1.80***	-1.82***
Year 2004							
Sic_multiple_eis							5.36
Sic_primary_eis							-10.92
Sic_utilities_eis							
Sic_construction_eis							11.69**
Sic_hospitality_eis							3.64*
Sic_transport_eis							0.56
Sic_finance_eis							3.04
Sic_business_eis							0.08
Sic_public administration_eis							17.51***

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Random effects (3)	Random effects (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions 7)
Sic_other_eis							3.55
Sic_multiple_eis							
Sic_primary_vct							-10.13
Sic_utilities_vct							5.83
Sic_construction_vct							5.06
Sic_hospitality_vct							3.62
Sic_transport_vct							2.45
Sic_finance_vct							3.04
Sic_business_vct							-2.94
Sic_public administration_vct							14.41***
Sic_other_vct							-3.11
Age*EIS							-0.07*
Age*VCT							0.16**
Size*EIS							0.00
Size*VCT							0.00
Constant	3.31***	3.33***	-0.61*	-0.58*	3.82***	3.40***	3.37***
No.Obs	76,414	76,414	76,414	76,414	76,414	76,414	76,414
Average Time Period (years)	4.2	4.2	4.2	4.2	4.2	4.2	4.2
F statistic / Wald x2	30.33	28.42	872.18	954.61	29.39	28.07	12.10

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table C: Preferred Performance Model Specifications: Real Fixed Assets (2005 prices)

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Employment	0.55***	0.55***	0.55***	0.55***	0.55***	0.55***	0.53***
nEIS	0.28***						-0.05
nVCT	0.34***						-0.49***
Sic_multiple							
Sic_primary							
Sic_utilities							
Sic_construction							
Sic_hospitality							
Sic_transport							
Sic_finance							
Sic_business							
Sic_public administration							
Sic_other							
Age	0.04***	0.04***	0.04***	0.04***	0.04***	0.04***	0.04***
nEIS_only		0.30***					
nVCT_only		0.42***					
nEIS_nVCt		0.57***					
C_eis			1.5e-7***				
C_vct			1.3e-7***				
Reis_0				6.6e-8***			
Reis_1				9.3e-8***			
Reis_2				5.6e-8***			
Rvct_0				2.2e-7***			
Rvct_1				1.2e-7***			
Rvct_2				5.4e-8*			
Neis_0					0.09***		

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Neis_1					0.10***		
Neis_2					0.07***		
Nvct_0					0.26***		
Nvct_1					0.16***		
Nvct_2					0.04		
One_vct						0.30***	
Multi_vct						0.37***	
One_eis						0.28***	
Multi_eis						0.28***	
Year 1996							
Year 1997	0.04***	0.04***	0.04***	0.03***	0.03***	0.04***	0.04***
Year 1998	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***
Year 1999	0.12***	0.12***	0.12***	0.11***	0.11***	0.12***	0.12***
Year 2000	0.15***	0.15***	0.16***	0.15***	0.15***	0.15***	0.16***
Year 2001	0.13***	0.13***	0.14***	0.12***	0.13***	0.13***	0.13***
Year 2002	0.08***	0.08***	0.08***	0.07***	0.08***	0.08***	0.08***
Year 2003	0.02**	0.02**	0.02**	0.02*	0.02*	0.02***	0.02**
Year 2004							
Sic_multiple_eis							-0.15
Sic_primary_eis							-0.54
Sic_utilities_eis							
Sic_construction_eis							-0.29
Sic_hospitality_eis							0.08
Sic_transport_eis							0.29*
Sic_finance_eis							0.05
Sic_business_eis							-0.13
Sic_public administration_eis							-0.41*

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Sic_other_eis							0.30**
Sic_multiple_eis							-0.35
Sic_primary_vct							0.88
Sic_utilities_vct							0.62
Sic_construction_vct							0.02
Sic_hospitality_vct							0.10
Sic_transport_vct							0.79***
Sic_finance_vct							0.20
Sic_business_vct							0.27**
Sic_public administration_vct							0.61***
Sic_other_vct							0.34**
Age*EIS							0.004**
Age*VCT							0.007*
Size*EIS							0.11***
Size*VCT							0.15***
Constant	4.55***	4.55***	4.54***	4.51***	4.51***	4.56***	4.61***
No.Obs	106,068	106,068	106,068	106,068	106,068	106,068	106,068
Average Time Period (years)	4.3	4.3	4.3	4.3	4.3	4.3	4.3
F statistic / Wald x2	985.78	904.00	982.51	720.63	719.12	834.41	324.50

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table D: Preferred Performance Model Specifications: Gearing Ratio

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Random effects + time + interactions (7)
Employment	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.03***
nEIS	-48.98*						-63.19*
nVCT	2.56						13.01
Sic_multiple							
Sic_primary							
Sic_utilities							
Sic_construction							
Sic_hospitality							
Sic_transport							
Sic_finance							
Sic_business							
Sic_public administration							
Sic_other							
Age	-10.78***	-10.78***	-11.16***	-11.20***	-11.23***	-11.14***	-5.20***
nEIS_only		-47.83*					
nVCT_only		7.09					
nEIS_nVCt		-49.04					
C_eis			1.4e-6				
C_vct			0.00				
Reis_0				-3.3e-5***			
Reis_1				-3.2e-5***			
Reis_2				-3.5e-5***			
Rvct_0				1.05e-7			
Rvct_1				-1.1e-5			
Rvct_2				-2.4e-5			
Neis_0					-35.54*		

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Random effects + time + interactions (7)
Neis_1					-14.70		
Neis_2					27.58		
Nvct_0					4.49		
Nvct_1					-23.31		
Nvct_2					27.63		
One_vct						-29.82	
Multi_vct						17.74	
One_eis						-70.14***	
Multi_eis						53.53	
Year 1996							
Year 1997	2.84	2.83	3.12	3.22	3.31	3.16	1.79
Year 1998	-1.26	-1.28	-1.00	-0.46	-0.81	-0.48	-9.83
Year 1999	11.24	11.22	11.54	12.33	11.97	12.28	1.43
Year 2000	14.79*	14.76*	15.02*	16.33**	15.67*	16.08**	-3.96
Year 2001	28.61***	28.59***	28.71***	30.19***	29.26***	29.72***	3.99
Year 2002	21.55***	21.53***	21.61***	23.04***	21.67***	22.34***	-10.75
Year 2003	3.75	3.73	3.93	4.15	3.90	4.33	-30.03***
Year 2004							-31.94***
Sic_multiple_eis							-95.69
Sic_primary_eis							-97.00
Sic_utilities_eis							-939.89
Sic_construction_eis							-81.02
Sic_hospitality_eis							-52.07
Sic_transport_eis							-23.92
Sic_finance_eis							-42.46
Sic_business_eis							-125.90***
Sic_public administration_eis							-14.37

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Random effects + time + interactions (7)
Sic_other_eis							-137.29**
Sic_multiple_vct							-0.39
Sic_primary_vct							-160.76
Sic_utilities_vct							218.21
Sic_construction_vct							156.23
Sic_hospitality_vct							-91.75
Sic_transport_vct							-247.04*
Sic_finance_vct							-94.83
Sic_business_vct							-41.78
Sic_public administration_vct							84.46
Sic_other_vct							22.81
Age*EIS							3.50***
Age*VCT							-0.36
Size*EIS							-0.01
Size*VCT							-0.04
Constant	444.40***	444.38***	446.86***	449.40***	449.09***	449.19***	405.67***
No.Obs	77,435	77,435	77,435	77,435	77,435	77,435	77,435
Average Time Period (years)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
F statistic / Wald x2	18.14	16.63	17.85	14.27	13.68	16.80	539.18

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table E: Preferred Performance Model Specifications: Real Investment (2005 prices)

Model specification	Fixed effects (1)	Random effects (2)	Fixed effects (3)	Fixed effects (4)	Random effects (5)	Random effects (6)	Random effects + time + interactions (7)
Employment	-59.09***	36.41***	-59.09***	-59.06***	36.40***	36.41***	36.95***
nEIS	2750.98						380.77
nVCT	10614.30						3362.79
Sic_multiple		14148.39**			14359.63**	14068.76**	14414.04**
Sic_primary		1493.90			1626.47	1452.26	1983.36
Sic_utilities		2652.63			2649.80	2196.92	1212.23
Sic_construction		-852.43			-750.58	-902.77	-726.66
Sic_hospitality		-10.48			57.79	-13.09	251.31
Sic_transport		2351.02			2325.51	2326.47	1225.28
Sic_finance		17491.05*			17669.11*	17403.61*	18152.12*
Sic_business		2493.82			2153.59	2497.21	2730.51
Sic_public administration		1439.20			1599.48	1331.54	1370.61
Sic_other		1611.75			1660.51	1509.66	1449.75
Age	315.37	104.95	325.55	356.22	108.62	103.91	111.85
nEIS_only		-1488.98					
nVCT_only		-3260.21					
nEIS_nVCt		-9702.97					
C_eis			0.0002				
C_vct			0.006				
Reis_0				-0.0002			
Reis_1				0.0002			
Reis_2				0.0002			
Rvct_0				-0.003			
Rvct_1				-0.001			
Rvct_2				0.0005			

Model specification	Fixed effects (1)	Random effects (2)	Fixed effects (3)	Fixed effects (4)	Random effects (5)	Random effects (6)	Random effects + time + interactions (7)
Neis_0					620.68		
Neis_1					72.14		
Neis_2					-1444.12		
Nvct_0					-94.43		
Nvct_1					-2829.36		
Nvct_2					-5923.55		
One_vct						-3573.41	
Multi_vct						-6673.94	
One_eis						-2692.68	
Multi_eis						-585.67	
Year 1996							
Year 1997							-436.53
Year 1998							3616.74
Year 1999							5137.31
Year 2000							18079.34**
Year 2001							2125.12
Year 2002							3037.23
Year 2003							3717.12
Year 2004							7444.18
Sic_multiple_eis							-12709.00
Sic_primary_eis							-2523.99
Sic_utilities_eis							-3541.22
Sic_construction_eis							1106.21
Sic_hospitality_eis							-1407.73
Sic_transport_eis							6894.24
Sic_finance_eis							-15997.46

Model specification	Fixed effects (1)	Random effects (2)	Fixed effects (3)	Fixed effects (4)	Random effects (5)	Random effects (6)	Random effects + time + interactions (7)
Sic_business_eis							-2295.49
Sic_public administration_eis							-3180.51
Sic_other_eis							-511.14
Sic_multiple_vct							-12418.33
Sic_primary_vct							-5113.82
Sic_utilities_vct							
Sic_construction_vct							787.59
Sic_hospitality_vct							898.58
Sic_transport_vct							-5335.91
Sic_finance_vct							-5848.27
Sic_business_vct							-961.28
Sic_public administration_vct							10081.35
Sic_other_vct							1940.71
Age*EIS							76.36
Age*VCT							-246.47
Size*EIS							-10.94
Size*VCT							-28.31
Constant	10162.50	-3881.99	10244.51	9841.52	-4194.79	-3770.01	-9152.78
No.Obs	27,123	27,123	27,123	27,123	27,123	27,123	27,123
Average Time Period (years)	3.7	3.7	3.7	3.7	3.7	3.7	3.7
F statistic / Wald x2	93.25	686.35	93.25	46.60	686.12	686.32	702.80

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table F: Preferred Performance Model Specifications: Real Sales (2005 Prices)

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Employment	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***
nEIS	-0.01						0.14
nVCT	0.15***						0.46**
Sic_multiple							
Sic_primary							
Sic_utilities							
Sic_construction							
Sic_hospitality							
Sic_transport							
Sic_finance							
Sic_business							
Sic_public administration							
Sic_other							
Age	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
nEIS_only		0.01					
nVCT_only		0.19***					
nEIS_nVCt		0.13**					
C_eis			8.6e-8***				
C_vct			4.8e-8**				
Reis_0				-1.4e-8			
Reis_1				-1.0e-9			
Reis_2				5.6e-10			
Rvct_0				-2.3e-8			
Rvct_1				5.3e-8*			
Rvct_2				2.6e-8			
Neis_0					-0.12***		

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Neis_1					-0.05*		
Neis_2					0.01		
Nvct_0					0.04		
Nvct_1					0.05		
Nvct_2					0.04		
One_vct						0.12**	
Multi_vct						0.21***	
One_eis						-0.06	
Multi_eis						0.03	
Year 1996							
Year 1997	0.003	0.003	0.003	0.002	0.002	0.003	0.002
Year 1998	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
Year 1999	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***
Year 2000	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
Year 2001	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
Year 2002	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
Year 2003	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
Year 2004							
Sic_multiple_eis							2.40***
Sic_primary_eis							
Sic_utilities_eis							
Sic_construction_eis							-0.10
Sic_hospitality_eis							-0.06
Sic_transport_eis							0.26
Sic_finance_eis							-0.17
Sic_business_eis							-0.05
Sic_public administration_eis							-0.13

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Sic_other_eis							0.33
Sic_multiple_vct							0.78
Sic_primary_vct							-0.42
Sic_utilities_vct							0.90**
Sic_construction_vct							
Sic_hospitality_vct							-0.05
Sic_transport_vct							-0.40
Sic_finance_vct							0.33
Sic_business_vct							-0.12
Sic_public administration_vct							1.05***
Sic_other_vct							-0.43**
Age*EIS							-0.001
Age*VCT							-0.007*
Size*EIS							-0.03
Size*VCT							-0.03
Constant	5.59***	5.59***	5.59***	5.58***	5.59***	5.59***	5.58***
No.Obs	73,003	73,003	73,003	73,003	73,003	73,003	73,003
Average Time Period (years)	4.3	4.3	4.3	4.3	4.3	4.3	4.3
F statistic / Wald x2	3068.50	2812.83	3070.75	2249.50	2251.28	2597.32	1057.45

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table G: Preferred Performance Model Specifications: Labour Productivity

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Ln Capital/Labour Ratio	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***
Capital/Labour Ratio Squared	3.1e-12***	3.1e-12***	3.1e-12***	3.1e-12***	3.1e-12***	3.1e-12***	3.1e-12***
nEIS	-0.04						0.33**
nVCT	0.07						0.74***
Sic_multiple							
Sic_primary							
Sic_utilities							
Sic_construction							
Sic_hospitality							
Sic_transport							
Sic_finance							
Sic_business							
Sic_public administration							
Sic_other							
Age	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***
nEIS_only		-0.03					
nVCT_only		0.11*					
nEIS_nVCt		0.01					
C_eis			6.1e-8***				
C_vct			9.2e-9				
Reis_0				-1.5e-8			
Reis_1				-5.8e-9			
Reis_2				2.2e-9			
Rvct_0				-4.9e-8*			
Rvct_1				1.7e-8			
Rvct_2				1.4e-9			

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Neis_0					-0.11***		
Neis_1					-0.06**		
Neis_2					0.02		
Nvct_0					0.003		
Nvct_1					0.01		
Nvct_2					0.005		
One_vct						0.05	
Multi_vct						0.10*	
One_eis						-0.09**	
Multi_eis						0.001	
Year 1996							
Year 1997	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	
Year 1998	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	
Year 1999	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***	
Year 2000	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***	
Year 2001	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***	
Year 2002	-0.07***	-0.07***	-0.07***	-0.07***	-0.07***	-0.07***	
Year 2003	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	-0.04***	
Year 2004	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	
Sic_multiple_eis							2.17***
Sic_primary_eis							
Sic_utilities_eis							
Sic_construction_eis							-0.07
Sic_hospitality_eis							-0.11
Sic_transport_eis							0.20
Sic_finance_eis							-0.25
Sic_business_eis							-0.06

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Sic_public administration_eis							-0.16
Sic_other_eis							0.21
Sic_multiple_vct							0.74
Sic_primary_vct							-0.39
Sic_utilities_vct							0.91**
Sic_construction_vct							
Sic_hospitality_vct							-0.07
Sic_transport_vct							-0.46*
Sic_finance_vct							0.33
Sic_business_vct							-0.17
Sic_public administration_vct							0.95***
Sic_other_vct							-0.54***
Age*EIS							0.001
Age*VCT							-0.004
Size*EIS							-0.086***
Size*VCT							-0.105***
Constant	3.92***	3.92***	3.92***	3.92***	3.92***	3.92***	3.92***
No.Obs	70,638	70,638	70,638	70,638	70,638	70,638	70,638
Average Time Period (years)	4.2	4.2	4.2	4.2	4.2	4.2	4.2
F statistic / Wald x2	163.89	151.35	164.56	123.11	124.05	141.08	62.63

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table H: Preferred Performance Model Specifications: Employment

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Employment							
nEIS	0.35***						-1.94***
nVCT	0.65***						-0.94***
Sic_multiple							
Sic_primary							
Sic_utilities							
Sic_construction							
Sic_hospitality							
Sic_transport							
Sic_finance							
Sic_business							
Sic_public administration							
Sic_other							
Age	0.003**	0.003**	0.002	-0.002	-0.001	0.004***	0.004***
nEIS_only		0.33***					
nVCT_only		0.59***					
nEIS_nVCt		1.03***					
C_eis			2.0e-7***				
C_vct			3.0e-7***				
Reis_0				-1.1e-8			
Reis_1				5.8e-8***			
Reis_2				7.5e-8***			
Rvct_0				1.9e-7***			
Rvct_1				1.8e-7***			
Rvct_2				2.1e-7***			
Neis_0					-0.06***		

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Neis_1					0.08***		
Neis_2					0.13***		
Nvct_0					0.26***		
Nvct_1					0.31***		
Nvct_2					0.28***		
One_vct						0.46***	
Multi_vct						0.78***	
One_eis						0.26***	
Multi_eis						0.64***	
Year 1996							
Year 1997	0.02**	0.02**	0.02***	0.01**	0.02**	0.02***	0.02***
Year 1998	0.004	0.004	0.01	-0.00	-0.00	0.01	0.01
Year 1999	-0.01	-0.01	-0.01	-0.01**	-0.01**	-0.01	-0.00
Year 2000	0.004	0.005	0.11*	0.001	0.002	0.01	0.01
Year 2001	0.02***	0.02***	0.03***	0.015**	0.02**	0.02***	0.02***
Year 2002	0.01*	0.01*	0.02**	0.006	0.01	0.01**	0.01
Year 2003	-0.01	-0.01	-0.01	-0.013**	-0.01*	-0.01	-0.00
Year 2004							
Sic_multiple_eis							0.56***
Sic_primary_eis							-0.40*
Sic_utilities_eis							
Sic_construction_eis							-0.23
Sic_hospitality_eis							-0.19***
Sic_transport_eis							-0.16*
Sic_finance_eis							0.54***
Sic_business_eis							0.15***
Sic_public administration_eis							0.49***

Model specification	Fixed effects + time (1)	Fixed effects + time (2)	Fixed effects + time (3)	Fixed effects + time (4)	Fixed effects + time (5)	Fixed effects + time (6)	Fixed effects + time + interactions (7)
Sic_other_eis							0.32***
Sic_multiple_vct							0.74*
Sic_primary_vct							-0.16
Sic_utilities_vct							-0.13
Sic_construction_vct							-0.10
Sic_hospitality_vct							-0.40***
Sic_transport_vct							0.22*
Sic_finance_vct							0.04
Sic_business_vct							0.18***
Sic_public administration_vct							0.08
Sic_other_vct							0.12
Age*EIS							0.014***
Age*VCT							0.012***
Size*EIS							0.65***
Size*VCT							0.32***
Constant	2.98***	2.98***	2.98***	2.95***	2.96***	3.00***	3.02***
No.Obs	109,994	109,994	109,994	109,994	109,994	109,994	109,994
Average Time Period (years)	4.4	4.4	4.4	4.4	4.4	4.4	4.4
F statistic / Wald x2	136.47	124.63	128.01	40.98	63.36	152.95	283.61

Notes: "*"indicates significant at 10 per cent level, "**" significant at 5 per cent level, and "***" significant at 1 per cent level.

F statistic is reported for Fixed Effects models and Wald statistic for Random Effects models.

Hausman tests are employed to determine whether Fixed Effects or Random Effects models are preferred.

Time dummy variables are tested for inclusion using a group parameter deletion test.

Table J: SIC codes and total number of observations

N obs	Description
6,071	Primary
204,074	Manufacturing
221	Utilities
54,236	Construction
158,275	Hospitality
33,774	Transport
28,795	Financial Services
119,990	Business Services
42,614	Public Administration
72,098	Other Services
1,070,498	Total