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**MULTIPLE EFFECTS OF BUSINESS PLANS ON NEW  
VENTURES**

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Research Paper No 2/09

## **MULTIPLE EFFECTS OF BUSINESS PLANS ON NEW VENTURES**

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## **MULTIPLE EFFECTS OB BUSINESS PLANS ON NEW VENTURES<sup>1</sup>**

### **Abstract**

We investigate the impact of writing a business plan prior to start-up on new venture performance. Our analysis makes new contributions by examining multiple effects of business plans. This approach allows the impacts of business plans to be disentangled from selection effects due to differences in the profile and business context of ventures that are more or less likely to write a business plan. We offer an empirical methodology and apply it to UK data where we find that business plans promote employment growth. This is found to be due to the impact of the plan and not selection effects.

Keywords: New Ventures, Business Plans, Switching Regression Modelling

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# 1. Introduction

Business plans are a prevalent feature of new venture management and are encouraged by government agencies, education institutions and consultants. They are frequently a core input to seeking loan and equity finance. There is also a widespread belief that writing a business plan will impact favourably on the performance of a venture. As a consequence, entrepreneurs may feel pressurised to signal their worth by having a written business plan outlining their vision for future business expansion. Honig (2008) and Honig and Karlsson (2004) argue that this widespread writing of business plans by entrepreneurs has more to do with coercive and mimetic forces to legitimise their business venture. Subsequently, these authors raise the valid question of whether or not business plans really add any value to a new venture.

Bhide (2000) adds depth to the question by suggesting that the impact of business plans on new venture performance is unlikely to be a generic positive, negative or negligible effect. Instead, he argues that the efficacy of business plans are likely to be governed by the context within which, business plans are written. Some are written to raise loan finance with the purpose of reassuring lenders of the low risk and secure positive cashflow position of the business; others are written to help a founding self funded entrepreneur devise a market entry and growth strategy for a high risk innovative new product in an emerging uncertain market. The effects on performance are unlikely to be the same in such widely varying contexts.

The added complication is that the propensity of entrepreneurs to select to write a business plan may itself be influenced by the profile of the new venture and its business context. A venture which contains people with plenty of relevant experience may feel that writing a business plan is a costly use of time. By contrast, an entrepreneur that knows little about the market and with 'lower' entrepreneurial capabilities may feel that the paper exercise of writing a business plan is both informative and instructive. Equally, a venture with access to support and advice may find it easier to write a business plan than those lacking support. It is, therefore, likely that due to selection effects the profile and context of ventures with business plans may vary systematically from those without plans. The issue here, in terms of measuring the effect of business plans on performance, is that it is easy to confuse the true effects of business plans with differences due to selection effects. In other words, any empirical study which seeks to assess the impact of writing a business plan needs to ensure that it does not confuse the impact of the business plan with selection effects which cause the profile or context of a venture with a business plan to systematically differ to one that does not have a plan.

Therefore, robust empirical proof that writing a business plan has an impact on the performance of a new venture requires isolating the following elements:

- (1) It should estimate, separate and account for the manner in which the profile and contexts of ventures that select to write business

plans might differ systematically from those that do not write a plan. This is to ensure that differences due to *selection* are not mistaken for the *impact* of writing a business plan. In short, it should control for observable and unobservable differences between those that write plans and those that do not.

- (2) It should also account for the possibility that the impact of writing business plans on new venture performance will itself depend on the profile of the new venture (e.g., previously unemployed person) and the context in which the plan was written (e.g., writing a business plan in order to secure bank finance).

At present the *modus operandi* is to use discrete (1, 0) dummy variables (see, for example, Reid and Smith, 2000; Vivarelli, 2004) to test the impact of a venture having a written business plan. This approach typically entails using a single equation estimation approach to simply capture a biased and inconsistent *average* effect of business plans. It neither allows for the isolation of *impact* effects from *selection* effects nor does it show how impact effects vary with the context in which the plan was written (see, Appendix 1). The end result is an ambiguous interpretation of the impact of business plans. For example, if plans are found to be efficacious, is this really a true impact effect or could it be due to more ambitious ventures being more likely to write a business plan (selection effect)? Alternatively, if business plans are not found to improve venture performance, might this be a signal that writing a business plan is a time consuming distraction from simply getting on with the business (i.e. a zero or negative *impact* effect)? Does it, instead, indicate a selection effect where more able entrepreneurs feel they don't need to write a business plan (i.e. a negative selection effect)? Or, yet further, is it the case that a positive impact effect is being offset by a negative selection effect of equal magnitude? Overall, the impact of business plans is likely to be clouded by venture profile and contextual differences that are not accounted for in the *average* effect provided by the single equation estimation approach.

Perhaps not surprisingly, the empirical literature points inconclusively to any association between business plans and venture performance. Indeed, despite considerable efforts (Robinson and Pearce, 1983; Robinson *et al.* 1986, Boyd, 1991, Bhide, 2000), there has been little in the way of an agreed consensus, even amongst studies that have examined established ventures as to the value of business plans (e.g. Fredrickson, and Mitchell, 1984; Fredrickson and Iaquinto, 1989; Brews and Hunt, 1999). This also applies to new ventures. Studies such as those by Perry (2001), Delmar and Shane (2003) and Liao and Gartner (2006) all point to a positive relationship between business plans and survival whilst Gruber (2007) finds that plans help achieve marketing objectives. Meanwhile, Tornikoski and Newbert (2007), Haber and Reichel (2007) and Honig and Karlsson (2004) all struggle to find any relationship between business plans and performance.

The contribution of this paper is to develop an econometric methodology which is able to estimate both selection and impact effects. To successfully achieve this, two criteria need to be *jointly* satisfied. The first is that any model must allow for the endogeneity of business plans in venture performance. For example, if it is the case that more able entrepreneurs are more likely to write business plans (self-selection) they are also likely to have better performance regardless of business plans. If endogeneity is ignored, biased and inconsistent estimates of the impact of plans (due to the conflation of plan effects with unobservable ability/motivation) are likely. A traditional resolution of this problem is to use a Heckman selection model. However, such models fail to allow for the *interaction* of business plans effects with venture/entrepreneur profiles and the context for plans. Equally, whilst the use of a moderating/mediating approach (see Baron and Kenny, 1986) satisfies the need for interaction, it fails to deal with the issue of endogeneity.

Our approach is to use an endogenous switching regression model (see Maddala and Nelson, 1975; Maddala, 1983) to control for both endogeneity and interaction effects. In common with others, we define business plans as those activities conducted by a venture founder to gather information to exploit a business opportunity, typically documented in a written business plan (Delmar and Shane, 2003; Castrogiovanni, 1996). Our model provides a natural framework in which to analyze the multiple effects of business plans because it identifies *selection* effects and shows how the *impact* effects vary depending on the planner profile and the context for writing a business plan (interaction effects). At the same time it deals with the issue of endogeneity by controlling for selection bias caused by unobservable variables such as the ability of the venture founder. We emphasize that whilst, within this framework, ventures may still be characterized as either having or not having a business plan at start-up this does not imply the *effects* of business plans are one dimensional: impact effects in the endogenous switching regression are an explicit function of venture profiles/contexts rather than a constant (in contrast to the dummy variable approach: see Appendix 1).

The net result is that this approach allows for more insightful estimates on the effect writing a business plan on new venture performance. We apply the model to UK data on 622 *de novo* entrepreneurs in relation to one performance measure, namely growth in the size of the venture as measured by employment size. The dataset allows us to identify some contextual variables, such as whether the new venture is launching a new product/service and whether it was trying to raise bank finance, and profile variables such as whether the entrepreneur has run a business before (serial entrepreneur) and whether she was previously unemployed.

The remainder of the paper is structured as follows. In the next section we explain how theory relating to business plans requires an empirical methodology sufficient to account for selection and impact dimensions of the relationship between business plans and new venture performance. We then discuss the data set and follow this by a

discussion of the methodology. The results are then presented next followed by discussion and conclusions

## **2. Theory background and hypotheses development**

In this section we outline various theories from management (with some relevant contributions from finance and economics) which contribute to our understanding of how writing business plans may affect or be related to new venture performance. The central thrust of this paper is that the relationship between new venture performance and writing business plans is comprised of a *selection* and an *impact* effect where both of these vary depending on the profile and business context of the venture. It is these interaction effects that are important in explaining the subsequent performance of the venture.

We begin by looking at theories outlining how writing a business plan can make an *impact* and then look at instances where there may be a correlation but without an actual causation (i.e. cases where due to *selection* effects the profile or nature of ventures with business plans systematically differ from those that do not engage in this activity). Nearly all of the theories related to an *impact* effect are based around how they affect the competencies and/or resource base of the firm. In this setting writing business plans are seen as making existing resources more effective (e.g. increasing judgemental ability of the senior management in relation to entrepreneurship) or augmenting the resources used by the firm (e.g. raising new finance and hence more optimally capitalizing the firm). We also outline some theory which argues that business plans have a negative impact on the performance of new ventures. These are based around notions that business plans can make management less effective (e.g. promote an over reliance on planning in uncertain environments that may be less suitable for planning) and can be an excessively time consuming (costly) activity which draws entrepreneurs away from doing more productive activities (for example, like pilot a product launch in order to gauge the existence and extent of a perceived market gap). Throughout all of the above discussion we also highlight theory indicating that the efficacy of business plans is likely to be affected by the context in which they are written.

With this background we then move on to discuss theory relating to *selection* effects which may give the illusion of business plans making an impact when in fact the observed difference in performance is simply due to differences in the profile/context of those more and less likely to write business plans.

### *Impact Effects I: enhancing or retarding the efficacy of existing resources?*

If entrepreneurial performance is driven by the ability of new ventures to successfully exploit new profit opportunities, then entrepreneurial performance is itself driven by two core dimensions (Casson, 1982, Schultz 1975, Audretsch *et al.*, 2001, Shane,

2003). Firstly, it is about *entrepreneurial acumen or capability* - the ability to perceive a profit opportunity (Kirzner, 1973) as well as devise a means (including a strategy) to exploit it (Sharma and Erramili, 2004). This requires robust market information about the existence of a market gap, creative talent to make the leap to generate an idea for a service/product to satisfy the unmet consumer desire and a vision/strategy for a new venture to enter, grow and prosper in this market. Secondly, entrepreneurial performance depends on the ability to *acquire resources* so that a new venture has the capability to deliver the strategy. This typically requires resources such as technology, market/industry expertise, credibility (with suppliers and customers), consumer awareness (marketing and promotion), sufficiently skilled and motivated team of people, premises and finances. We adopt this taxonomy in order to discuss theories outlining means through which writing a business plan can impact the performance of a venture. We first discuss its effect on entrepreneurial capability to identify a business opportunity and devising a means to exploit it. We then move on to discuss business plans as a document used to attract resources e.g. finance, sweat equity, non executive directors and so on.

Bygrave and Zacharakis (2004) and Timmons (1999) have argued that the development of an entrepreneurial idea alongside a sound execution plan are the key means through which writing a business plan can enhance the performance of a new venture. They point out that most business plans are boundary spanning activities that an author adopts to employ analysis/techniques from, *inter alia*, strategy, marketing, economics, operations, human resources and accounting and finance. A central benefit, therefore, is that the discipline of engaging with these areas of management is likely to result in a better thought out, prepared and realistic market entry and growth strategy. Delmar and Shane (2003) go one step further and argue that through this same exercise business plans may stimulate faster and better decision making speeds because they allow entrepreneurs to test their assumptions before expending valuable resources. In essence, they claim that having a business plan enhances a venture's performance.

The ensuing debate in the strategic management literature between planning and emergent strategies outlines various means through which writing a business plan can impact the performance of the venture. Proponents of business plans argue that entrepreneurial contexts make business plans valuable undertakings (Castrogiovanni, 1996). One reason for this is the belief that business plans are likely to promote more efficient managerial decision making such as managing supply and demand and, by doing so, reducing bottlenecks (Delmar and Shane, 2003). In the same vein the need to 'write' a business plan is often seen as a discipline which encourages entrepreneurs to more rigorously think through (elaborate and stress test) their business strategy and subject it to market research (Gruber, 2007) i.e. a reality test.

By contrast, Bhide (2000) argues that there are often more efficient uses of entrepreneurs' time than writing a business plan. He argues that particularly in new markets for novel products/services it is not possible to gauge customer demand



unless one actually tries to sell to them. Bhide (2000) argues that in these circumstances business plans are a poor means of reducing uncertainty. Instead, he claims that more accurate information can be secured by undertaking a pilot launch where the venture tests out the appeal of the product service by attempting to sell it to a small segment or share of the market. If entrepreneurs have limited time at their disposal so that writing a business plan detracts from time spent piloting the product/service then in this situation Bhide (2000) believes that it can reduce the performance of the venture; as it means that managerial decision making will be based on less accurate information.

However, the research literature indicates that whether business plans have a positive or negative impact is in fact likely to depend on the specific *context* in which they are being used. This is a point not only acknowledged but in fact emphasised by Bhide (2000) who argues that business plans are likely to have a positive impact in more static and predictable/stable markets or in cases where entrepreneurs are undertaking more imitative ventures. By contrast, he argues that in highly uncertain markets where entrepreneurs are introducing highly innovative products/services business plans may not be able reduce this uncertainty and hence be a waste of time. This view is contested by Matthews and Scott (1995) and Zollo and Winter (2002) who while conceding that business plans will be less accurate in predicting market opportunities in situations of uncertainty argue that they can in fact highlight the degree of uncertainty present in the markets and hence prime entrepreneurs to think and respond more effectively (so, for example, being deliberately more flexible - keeping the venture agile and having an innovative strategic mindset in preparedness of what the unknown may throw at the firm) than what would otherwise have been the case. Hence, these authors argue that, whilst entrepreneurs typically ‘fight fires’ with few resources to spare, those entrepreneurs that write business plans have not only the ‘substantive’ capability to solve problems (Winter, 2003), they also have better “...dynamic ability to change or reconfigure existing substantive capabilities ...” (Zahra *et al.* 2006: 921).

This discussion highlights the importance of *contexts* and venture *profiles* which will influence the amount of information available to an entrepreneur and how a business plan might help reduce this. So for example, if one assumes that a person who is previously unemployed is less informed about markets and industry practices/techniques then it may be the case that the information enhancing impact of writing a business plan may be more beneficial to this type of person. Likewise, a similar logic may apply to a serial versus a novice entrepreneur – the latter probably generating more benefit from writing a business plan than the former. Similarly, a portfolio entrepreneur facing the challenge of juggling the complexity of the simultaneous involvement in different ventures may feel that the presence of written business plan assists their focus and information when shifting their input from one venture to the next. So there are good reasons to believe that the *impact* of business plans on venture performance may not be uniform when viewed across different types of ventures and entrepreneurs. Likewise, a venture that is launching a new product or

service to market faces different challenges to one which is more imitative and so one might not expect to find the impact of business plans on venture performance to be identical in both circumstances. For these reasons we will later test whether contextual factors such as these play a role in influencing the scale and sign (positive versus negative) of the impact of business plans on venture performance – in the case of this paper on one performance dimension: new venture growth in employment.

*Impact Effects II: increasing the level of resources available to the venture*

Another school of thought regarding the impact of business plans on venture performance is that they act as a marketing or communications document in order to ‘sell’ or explain the firm’s vision and strategy to financiers (investors and banks) and those considering offering sweat equity (e.g. employees willing to work for reduced or no wages in return for equity and non executive directors). In this case the business plan does not need to enhance vision, strategy or execution plan of the venture in order to enhance its performance, it merely ensures that a venture is better resourced (not or less undercapitalized) so that it can effectively enter a market and grow at its ideal rate<sup>2</sup>.

This insight acts as a counter to some authors who claim that writing a business plan delays the movement from thinking about an idea and putting it into action. Carter *et al.* (1996) argue that improvisation is the key: entrepreneurs are better served if they concentrate on acquiring and mobilizing resources such as buying equipment or hiring people. In essence, this incremental approach favours the accretion and employment of tacit (non-theoretical) knowledge and, by implication, has a ‘bias for action’ (McGrath, 1995). However, authors such as Storey (1994) and Evans and Jovanovic (1989), Burke *et al* (2000), Haber and Reichel, (2007) have argued that a lack of resources (particularly finance) is one of the main obstacles to firm start-up and growth. At the heart of this resource constrained view is the problem of asymmetric information (Stiglitz and Weiss, 1981; Cressy, 1996) where resource providers such as investors know less about the business than the entrepreneur and hence face higher uncertainty (plus associated problems of adverse selection and moral hazard). In the area of bank finance, venture capital and to a lesser degree business angel finance,

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<sup>2</sup> One main purpose of business plans is to solve a problem of a lack of information for third parties. This is most likely to involve banks since they form the main source of external financial support to new ventures. Data from the UK Survey of SME Finances (UKSMEF: see Fraser, 2005) indicates that, whilst non-market finance (owner’s savings) was used by almost 70% of start-ups, the main external source of finance was bank loans (20%) with less than 1% using venture capital. US data again suggests the owner was the main source of finance for new ventures (aged less than 2 years) in the form of equity (20%) or debt (6%) (see Berger and Udell, 1998). However, as in the UK, the main external source of finance is bank loans (16%) with only a very small percentage using venture capital (Berger and Udell, 1998). Without a track record or good information on the profit opportunity, banks often find it difficult to evaluate the likely risk/reward profile. Hence, business plans act as an information provider and screening device for these resource providers so that they will be more able to assess the risk of financing a venture (Aldrich and Fiol, 1994).

business plans have become a major means through which these financiers seek to become better informed in order to be able to make a commercially valid assessment of the risk /reward profile of any particular venture. In this case business plans provide a *screening* function for financiers – in order to better enable them to assess the risk of providing resources (e.g. loans, equity, sweat equity, or supplier credit) to the venture.

What is also interesting about this practice is that regardless of whether business plans actually enable financiers to better screen ventures, if they are deemed to be an important component of an application for finance, then a venture with a business plan is likely to be better resourced than one without. This observation is an important antidote to the criticism of business plans as generating no value added except to legitimise the venture. Both Stinchcombe (1965) and Aldrich and Fiol (1994) argue that central to the development of a new venture is the need to legitimate it in the eyes of outside agents, not only to acquire resources but also simply to overcome any liability of newness. Macmillan and Narasimha (1987) argue that these pressures to legitimate mean that investors tend to use business plans as vehicles for testing the credibility of the new venture. Likewise, Tornikoski and Newbert (2007) argue that business plans are deployed symbolically (Castrogiovanni, 1996) to influence the perceptions of external audiences. Two particular strands of theory stand out here. First, the institutional theoretic approach implies that business plans might be seen as a device to make the new venture seem more predictable (Hannan and Freeman, 1984; Meyer and Rowan, 1977). This approach, therefore, argues that new ventures face pressures to conform and homogenize with existing institutional forms: to ‘act as if’ they are similar to other organizations in their urge to gain resources (Tornikoski and Newbert, 2007). Honig and Karlsson (2004) have also argued that the expectation amongst outside agents is that new ventures ought to have a business plan because of an isomorphic imperative to mimic other organizations.

Therefore, to sum up the discussion so far, we have outlined a set of views that have identified two means through which business plans have potential to make a positive *impact* on venture performance, namely enhancing the amount of resources at the firm’s disposal (particularly financial resources) and also improving the venture’s entrepreneurial capability (vision, strategy, and method of implementation). Regarding the latter channel, we have also outlined a set of literature which argues that business planning may in fact worsen vision, strategy and method of execution by diverting time away from more productive endeavours. We have also indicated how these effects are likely to be affected by the context in which a business plan is being written.

We now move on to discuss the need to deal with potential for a spurious correlation between writing a business plan and new venture performance which could be due to a *selection* effect – namely, where the pre plan capability, ambition, context and hence performance of firms with a propensity to write business plans may systematically differ from those with a lesser inclination.

*Selection effect: The relationship between venture type/nature and the correlation between writing a business plan and new venture performance:*

Bhide (2000) highlights the causes of profile differences between entrepreneurs who have a higher versus lower propensity to write business plans. He notes that it is difficult to gauge which group are likely to have the more able/productive entrepreneurial profile. On the one hand, more able entrepreneurs may feel that writing a business plan is a poor use of time since they can effectively convince investors (who frequently claim to invest in people over ideas) and banks to finance their business without a business plan. Likewise, they may be able to devise an effective vision, strategy and method of implementation for their venture without having to write it up as a business plan. If this was the only consideration then one would expect the profile of ventures without a business plan to be more promising from a performance point of view.

But Bhide (2000) also points out that it might easily be the other way around as more ambitious and complex ventures with rapid growth potential may benefit from a written plan at start up. Similarly, higher ability entrepreneurs may find the strategic, economic, marketing, operations, human resource management, SME management, accounting and finance managerial analysis/research in business plans easier to do and hence the time they require (and external support needed) to write a business plan is less than that of less talented/skilled entrepreneurs. Both of these factors could give rise to a situation where the profile of ventures with a business plan has higher growth potential than those without.

It may also be the case that screening by resource providers will affect the profile of the types of businesses who make use of this common form of external funding. Given that banks prefer low risk ventures, they screen ventures in order to distinguish between high and low risk borrowers so that the profile of ventures who borrow from banks is likely to be of lower risk (Parker, 2003). If business plans are an effective means of enabling banks to screen ventures in order to select less risky borrowers, then it is possible that among new ventures who borrow from banks, that those who write business plans differ in their performance from those who do not simply because their profile is different.

Likewise, we know that entrepreneurs with higher levels of wealth are less likely to face liquidity constraints (e.g. Evans and Jovanovic, 1989, Burke *et al.* 2000). Burke and Hanley (2003, 2006) also show that their propensity to take risks is likely to be affected by the level of their wealth and that banks appear to alter interest rate margins in response to these variations in wealth and hence risk profile. Since business plans are frequently used to attract resources at start-up higher wealth individuals might be less likely to select to write a business plan since they are less likely to require external finance. As a result another selection effect emerges where the risk taking propensity of ventures with business plans may systematically differ from those without.

Therefore, in order to estimate the impact of business plans on new venture performance one must make sure that selection effects such as these do not get mixed up and mistaken for an impact effect. Furthermore, we note that as was also the case with impact effects, that the literature indicates that the scale and direction (positive or negative) of these selection effects may also vary depending on the context and profiles of ventures choosing or refraining from writing a business plan. Our econometric methodology ensures that this level of discrimination can be estimated/reported and notably accounts for the effect of unobservable profiles. This leads us to our core questions and hence testable hypotheses. In the first hypothesis we test whether the theory purporting a positive *impact* of writing a business plan on new venture performance is supported by the evidence.

*Hypothesis 1: Controlling for selection effects, a written business plan has a positive effect on new venture performance.*

We noted above a number of theories which indicated that the differences in the profiles of ventures and context in which business plans are written can influence the scale and direction of both selection and impact of effects. These are important factors governing the multiple impact of business planning on new venture performance. For example, in terms of context, one might expect the emphasis of a business plan written to convince a banker that the venture is low risk may have a different *impact* than one written to flesh out a high growth/risk strategy for market entry by an innovative venture in a new emerging industry. It is also the case that any *selection* effect is unlikely to be uniform across both of these contexts as the profile of ventures who select to write a business plan in order to raise bank finance (from risk averse lenders) is likely to be somewhat different to the profile of ventures writing business plans in order to devise a strategy for an innovative and highly risky venture in a new industry. Venture/entrepreneur profile differences also affect selection and impact effects. As we observed above aspects such as previously being unemployed, as well as being a novice, serial and portfolio entrepreneur are all likely to have a bearing on the magnitude and direction of impact and selection effects. This leads to our second and final hypothesis.

*Hypothesis 2: The scale and direction (positive or negative) of the selection and impact effects of writing a business plan on new venture performance are likely to be affected by the profile of the venture and the context in which business plans are written.*

We summarise our discussion of the theory and hypotheses by illustration with reference to Figure 1. We start at the left of the figure and show that ventures select between writing or not writing business plans based on their profile and business context. The top arrow represents ventures who have selected to write business plans while the bottom those who have not. Each translates into a total effect on performance which is comprised of both the real *impact* of writing a business plan and the *selection* effect due to the fact that there will be some systematic differences

between the profile and contexts of ventures with written business plans compared to those without written business plans.

[Figure 1 about here]

So, for example, a previously unemployed person may be more likely to write a business plan than a person who was in employment. If the average ability of somebody who was previously unemployed is less than that of a person who is employed then this could give rise to a negative selection effect where non business planners will grow faster than business planners. However, if business plans also have a positive impact effect on venture growth (Hypothesis 1) and if this is a bigger effect than the selection effect then the total performance effect (TPE) will be positive. But selection and impact effects are unlikely to be uniform across different venture profiles and contexts (Hypothesis 2). So, for example, it may also be the case that ventures which are trying to raise bank finance may be more likely to write business plans than those that are not. However, in this case the selection effect is likely to be different to that of the above example of the previously unemployed person: all other things being equal the profiles of ventures trying to raise bank finance might be quite different to those of a previously unemployed person e.g. those trying to raise bank finance might be in less risky business contexts and have higher ability profiles (suitable to secure bank loans) than a previously unemployed person. Likewise impact effects across different profiles and contexts would not be expected to be uniform. As we saw above a business plan written to obtain a bank loan has more to do with securing greater resources (impact effect II); whereas a business plan written by a previously unemployed person may be more aimed at enhancing their ability to devise a strategy to manage the launch and growth of their new venture (impact effect I). Our empirical approach is able to isolate and account for these varying effects in exactly this manner (see Appendix 1).

### **3. Methodology**

#### **3.1 Sample and design**

There were two principal purposes underlying the construction and design of our study. First, we were interested in identifying *de novo* ventures rather than those that appeared to be 'new'. This is a common problem given the paucity of information about new ventures (Dess and Robinson, 1984; Sapienza, Smith, and Gannon, 1988) due to their novelty, or the biased/unreliable (Birley, Muzyka, Dove, and Russel, 1995) nature of datasets. To resolve this common problem, and specifically focus upon *de novo* ventures, we sourced the sample from publicly available county telephone lists for the year 2000 (see Figure 2). This has the advantage of being more likely to capture new ventures missed in official statistics but is also likely to be biased to include ventures that were not, in fact, *de novo*.

Hence, to identify *de novo* ventures, we began by collecting British Telecom ‘White pages’ for the year 2000<sup>3</sup>. We then compared these lists with venture lists – again derived from the same data source and for the identical geographic areas - for the year 1995. We then cross-checked 2000 venture entries with that of 1995 entries to see if they had appeared in the 2000 but not in the 1995 telephone directory. If so, we provisionally identified them as new ventures.

Following on from this initial screening exercise, we then telephoned the entrepreneurs of these prospective ‘new’ ventures to establish that they met our specified criteria for a new venture: that they were new ventures, independent of outside control (not subsidiaries or part of larger enterprises), indigenous to the local area, non-retail, still in operation, and were not a charity or other not-for-profit organization. From this process, the total population of wholly new ventures was identified. We then re-telephoned every third venture to arrange face-to-face interviews with the venture founders given that very many new ventures were likely also to be small: indeed, more than a third of our sample had no employees. Respondents answered a structured interview questionnaire, which was subjected to a pre-test in order to check for biased, misleading or confusing questions. Prior to the questionnaire being administered, we again checked that the ventures met our criteria. The structured interview was administered at the normal place of work of the entrepreneur and took about an hour to complete.

[Figure 2 about here]

Our second focus was to ensure that our results could be generalised. Like other countries, England has wide regional disparities in its start up rates (VAT registrations). These differences are pronounced. In the South East of England (London and South East regions), start up rates are around 55 VAT registrations per 10,000 of the adult population. In the Midlands (West and East Midlands regions) the start up rate is around 35 whilst in the North East of England VAT registrations are around 20. These regional disparities are long standing (Storey, 1982). To reflect these differences, our study focused on three specimen English counties with differing entrepreneurial outcomes. The first of these was Cleveland which has remained a low entrepreneurship area (measured by official statistics on the rate of start-ups) for more than 30 years. Building upon prior research which shows this (e.g. Storey, 1982; Storey and Strange, 1993), we wished to contrast this county with counties with either average entrepreneurship outcomes (Shropshire) or with counties with high rates of start up activity (Buckinghamshire)<sup>4</sup>. Interviews with entrepreneurs in each of these

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<sup>3</sup> Whilst the British Telecom White pages directories are not a census of business activity, they do have the advantages of being common (typically called the ‘phone book’ in the UK).

<sup>4</sup> A recent study by Burke, FitzRoy and Nolan (2008) find evidence that regions in the North of England with lower self-employment rates than the South of England perform better (create more jobs) than their southern counterparts. Again, indicating the importance of accounting for regional effects associated with varying start-up rates on employee growth among new ventures.

three counties took place in 2001 and attracted a response rate ranging from 45% in Cleveland to 75% in Shropshire (see Greene, Mole and Storey, 2004).

### 3.2 Econometric model

The empirical analysis uses a regression model with endogenous switching (Maddala and Nelson, 1975). In analytical terms, the model is a simultaneous system of equations that explicitly accounts for the decision to write a business plan and the correlation between the error terms (i.e., unobservable profiles) in the plans decision and performance equations. In this manner, the model yields an estimate of the total plans effect (see Figure 1) which is free from selection bias. This means that the total plans effect is unbiased by systematic variations in *unobservable* profiles, such as entrepreneurial capability and motivation, between planners and non-planners<sup>5</sup>. This total effect can then be decomposed into its constituent selection and impact effects for the purposes of testing the hypotheses (see Appendix 1 for an explanation of the maximum likelihood techniques used to estimate the model and derivation of the total plans, impact and selection effects).

### 3.3 Dependent variables

Performance is estimated simultaneously with a selection equation for the decision to write a business plan (to control for selection bias/differences in unobservable profiles) in the endogenous switching regression model described previously. Accordingly there are two dependent variables – the performance measure (growth) and a binary variable for whether or not the venture had a business plan prior to start-up (this latter variable is derived from a question which asks: ‘prior to the business starting, did you have a formal written business plan?’ (yes=1, no=0)).

Growth effects are estimated by regressing the natural log of employment in 2001 on the natural log of initial size and the other explanatory variables<sup>6</sup>. The derivation of the effects of plans on employment growth is described in detail in Appendix 1. We chose employment as a performance measure for two reasons. First, employment is an indicator of the likely resources available to the venture (e.g. Hanks, Watson,

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<sup>5</sup> Selection bias in estimates of the total plan effects would be caused by non-random *unobserved* differences, between planners and non-planners, which are correlated with performances. For example, (unobserved) entrepreneurial capability may affect both plans decisions and performances: failure to take this correlation into account will result in an estimate of the total plans effect which incorporates a spurious contribution from entrepreneurial capability. The simultaneous equation model deals with this problem by explicitly allowing for correlation between the unobservables (error terms) in the equations for plans decisions and performances. Indeed, the dummy variable approach can also be corrected for selection bias through the use of a Heckman selection model but, unlike the endogenous switching regression model, not for interaction effects as well.

<sup>6</sup> The number of employees includes the founder. This avoids problems with attempting to take the log of zero (i.e., minus infinity) in the log size model which would lead to a large number of observations (164) being dropped from the model. Nonetheless, this expedient does not affect the measurement of growth since clearly the founder is counted in both the initial and current size.



Jansen, and Chandler, 1993; Box, Watts, and Hisrich, 1994; Bruderl and Preisendorfer, 2000; Bruton and Rubanik, 2002). Second, employment is generally recognized as being less commercially sensitive than other measures such as sales (Cooper, Gimeno-Gascon, and Woo, 1994).

### **3.4 Explanatory variables**

Our model, as summarized in Figure 1, indicates that decisions to write business plans, and subsequent performance, depend on venture/entrepreneur profiles and the context for writing business plans. In this regard, the theory section has highlighted a number of specific factors. In this section, we set out in full the particular variables in our data-set that we include in profiles (i.e., internal factors) and contexts (i.e., external factors), and their expected relationship with decisions to write business plans and performance.

*Venture profiles:* The dominant element of these profiles relates to entrepreneurial capability. At the outset, we recognise that capability is largely an unobservable profile: indeed, a key feature of the model is that it is designed to control for selection on unobservable profiles. However, our data-set includes some variables which are related to capability and, more generally, to the human capital of the entrepreneur. One of these variables is whether the entrepreneur is a novice, serial, or portfolio entrepreneur (Westhead and Wright, 1998). We measure serial entrepreneurship by asking respondents: ‘Had you been in business before as an owner?’ (yes=1, no=0) and portfolio entrepreneurship by asking: ‘Is the Founder currently a Director or Owner of any business other than this one?’ (yes=1, no=0).

We expect that serial entrepreneurs may derive less benefit from business plans since they are able to draw from their previous experience. Conversely, a portfolio entrepreneur may feel that the presence of a written business plan is beneficial when shifting their input from one venture to the next. We would also expect that, to the extent that serial/portfolio entrepreneurs are more capable than novices, that both of these variables are positively related to venture performance.

Another more general measure of the human capital of the entrepreneur is previous unemployment (‘Were you unemployed immediately prior to establishing this business?’; yes=1, no=0) which, in keeping with Honig and Karlsson (2004) and Vivarelli (2004), is as an indicator of low human capital. Also, education is measured with a dummy variable for education to degree level: degree: yes=1, no=0 (Burke, FitzRoy, and Nolan, 2000). The arguments, put forward in the theory section, point to the greater benefits of writing business plans for entrepreneurs with low human capital (implying a positive (resp. negative) relationship between previous unemployment (resp. education) and decisions to write business plans). We also anticipate, following on from Cressy (1996), that the effects of human capital on venture performance are likely to be unambiguously positive.

We also included gender in the model. Cooper *et al.* (1994) suggest that males are more likely to start growth orientated ventures, indicating a positive relationship with growth. However, we have no prior expectation about the relationship (if any) between gender and the writing of business plans.

Two measures which are related specifically to the costs of writing business plans are whether the firm kept financial records electronically (e-records: yes=1; no=0) and if there was a bookkeeper/accountant (own accountant: yes=1; no=0). Therefore, these variables are included in the business plans equation but excluded *a priori* from the performance equation because we expect that such factors reduce the costs (and increase the likelihood) of writing business plans but have no direct effect on performance. In technical terms these exclusions help to identify the effects of business plans on performance (see Appendix 1).

In addition we control for sectors through a series of dummies (construction, distribution, manufacturing, non retail/professional services). These dummies capture variations in labour and capital intensity which may affect decisions to write business plans through the need to attract resources. Sectors may also have a role in measuring contexts of varying market uncertainty (see below). However, in this regard, we acknowledge that our available measures of sector lack sufficient granularity to capture variations in market uncertainty fully. We also control for the legal form of the venture (limited company, partnership and sole proprietorship).

*Contexts:* An important context for writing a business plan is because the entrepreneur has external capital demands (which, empirically, are principally in the form of demands for bank finance). We therefore proxy external capital demands with the use of bank finance at start-up, expecting the use of bank finance/external capital demands to increase the likelihood of the venture writing a business plan. However, the use of bank finance at start up is clearly endogenous since business plans increase the likelihood of receiving bank finance. Accordingly we instrument this variable with the use of bank finance in the year before the survey (i.e., in 2000-2001); in fact, we find that this measure is highly correlated with the use of bank finance at start-up (see Table 1) but is uncorrelated with the error term in the business plans equation (suggesting the instrument is valid – see below for a more detailed discussion). The use of bank finance is also included in the performance equations since firms with access to capital are less likely to be undercapitalized and hence more likely to grow faster than those without such access.

We also examine contexts where the venture introduced new products and services. Regarding plans decisions, on the one hand the introduction of new products/services may be associated with greater market uncertainty which cannot be reduced by business plans (suggesting a negative relationship). On the other hand, plans may increase the agility of the venture in these contexts and so be beneficial (suggesting a positive relationship). The introduction of new products/services would also be expected to improve venture performance (see Freel and Robson, 2004).

Another important context is where the venture used external support at start-up. Chrisman and McMullen (2000) provide evidence that external support is a key asset so we measure this by asking respondents if they have used any external support prior to commencing their venture (yes=1, no=0). We would expect the use of external support to reduce the costs of writing business plans and hence increase the likelihood that the venture has a business plan. External support may also help to improve venture performance (Mole *et al.* 2008).

An important context in our data-set is the area in which the venture is located. Earlier on, we drew attention to the regional differences in start up rates in England. Our study examines three specimen regions using dummies: a 'high' entrepreneurship area (Buckinghamshire); an 'average' area (Shropshire); and a 'low' enterprise area (Cleveland). Although there is no specific research that has looked at how business plans are used at a regional level, our anticipation is that the isomorphic pressures to homogenize and legitimate the venture by using a business plan will be regionally invariant. However, there is plenty of evidence to suggest that venture performance is influenced by geographic location (Reynolds *et al.* 1994; Acs and Armington, 2004) so we would expect stronger employment growth in regions with higher start up rates. We also control for the macroeconomic context at venture creation through vintage (age) dummies.

In summary, the explanatory variables used in the models, following from the theory, relate to venture profiles and contexts for writing business plans. We have also set-out our expectations regarding the relationships between these variables, on the one hand, and decisions to write business plans and subsequent performance on the other. On *a priori* grounds the variables e-records and own accountant, relating to the costs of writing business plans, are included in the business plans equations but excluded from the performance equations for the purpose of identification.

Regarding estimation, starting with a general model, which included all the aforementioned variables in the business plans and performance equations (with the exception of the variables excluded from the performance equation for the purpose of identification) we tested down to derive a parsimonious model which is reported in Table 2 in the next section<sup>7</sup>. The testing down approach involved dropping variables from the general equations which were insignificant at the 10% level ( $p > 0.10$ ). The key benefit of parsimony in this context is that dropping irrelevant variables increases the precision/statistical significance of the estimated effects of the remaining variables and of the resulting plans effects.

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<sup>7</sup> This is known in econometrics as the 'general to specific' methodology or the Hendry/LSE approach (see e.g., Gilbert, 1986).

## 4. Results

The results section is organized in the following manner. We begin by providing summary statistics and simple bivariate correlations of the variables (Table 1). Then, in Table 2, estimates of the determinants of decisions to write business plans, and subsequent performance (log size in 2001 conditional on log initial size/growth), are presented. Finally, in Table 3, the estimates of the total plans effect (TPE) on employment growth and decompositions of the TPE into selection and impact effects, are reported for the average venture profile/contexts and for specific profiles/contexts. The results in Table 3 are therefore central to the testing of our two hypotheses.

[Table 1 about here]

Table 1 shows that 56% of the entrepreneurs wrote a formal business plan prior to starting their venture; that the average log size at start-up was 0.75 (with an average start-up size of 2.88 employees); that the average log size in 2001 was 1.27 (with an average size in 2001 of 6.07 employees); and that some 29% experienced financial problems in the first year. Table 1 also shows the bivariate correlations. The decision to write a business plan is uncorrelated (at the 5% level) with the other dependent variable. There is an expected high correlation (0.65) between log initial and current size/size in 2001. In terms of the explanatory variables, where significant, none of the correlations are above 0.25 indicating that, in relation to the econometric models, multicollinearity is unlikely to be a problem.

In Table 2 there are three columns. The first of these columns traces the marginal effects of a particular explanatory variable (e.g. prior entrepreneurial experience) on the likelihood of writing a business plan. The second (with plan) and third (without plan) columns, subsequently trace the determinants of performance in the presence and absence of written business plans.

The first column of Table 2 shows that ventures with electronic financial records (e-records) and new ventures with their own accountant are more likely to have written business plans (by 9.6% points and 8.7% points respectively). This suggests that being able to use financial spreadsheets and having access to internal financial advice may make it easier/less costly for entrepreneurs to write business plans. Also, previously unemployed entrepreneurs are more likely to write business plans, by 11.1% points, compared to those who were not unemployed. This is indicative of an inverse relationship between human capital and the likelihood of having a business plan. Access to external support at start-up appears to strongly reduce the costs of writing business plans; the likelihood of having written business plans is 37.5% points higher for ventures which used external support at start-up. Similarly, the positive effect (13.6% points) for those ventures that bring new products to market points to the greater benefits from having written business plans derived by those ventures (suggesting that plans may help to increase venture agility in more uncertain/innovative environments). Finally ventures located in Cleveland, an area of

low entrepreneurship, are 23.4% points more likely to have written business plans than those located in either Shropshire or Buckinghamshire.

[Table 2 about here]

Looking at other key results in Table 2, the main determinant of size in 2001 (columns 2 and 3) is initial size. A 1% increase in start-up size is associated with a 0.86% larger size in 2001, in the presence of a business plan, but the corresponding effect, in the absence of a business plan, is only 0.63%. This means that two similar ventures with the same number of employees at start-up (but one with a business plan and the other without) will diverge in scale after start-up: in particular, the venture with the business plan will grow faster.

Other important factors include the large negative effect of contact with a support agency at start-up on current size, controlling for initial size, in the *absence* of business plans (see column 3). This suggests that, amongst ventures which used external support at start-up, those with business plans grew faster than those without business plans. Another significant effect comes from bringing a new product/service to market which is associated with a 34% larger size in 2001 (controlling for initial size) when accompanied with a business plan. Interestingly, there is no corresponding effect in the absence of a business plan. Again, this points to higher growth amongst the ventures which wrote business plans (and suggests again the benefits of written plans for more innovative new ventures).

Table 3 reports the TPE on employment growth and decompositions of the TPE into impact and selection effects. These decompositions are reported for both the average entrepreneur/venture profile (as summarized in Table 1) and for specific profiles and business contexts (e.g., where the founder was previously unemployed and where bank finance was used at start-up).

[Table 3 about here]

The results in the first row of Table 3 show that, for the average venture profile, business plans are associated with higher annual average growth (TPE=23.4% points). The decomposition of this TPE into a selection and impact effect reveals the impact effect of business plans on growth is 33.4% points which provides strong support for Hypothesis 1 (i.e., written business plans have a positive impact effect on new venture growth). Interestingly, the corresponding selection effect, at -10% points, suggests that ventures with business plans have lower growth profiles than those without plans. This is consistent with less able entrepreneurs choosing to write business plans. However, the positive impact effect outweighs the negative selection effect (which is also true for all the other cases reported in Table 3) suggesting that business plans may help less able entrepreneurs to catch up and surpass their abler counterparts without plans.

The remainder of Table 3 shows impact and profile effects vary depending on the venture profile/context for writing business plans: impact effects range from 42% points for portfolio entrepreneurs to 21.6% points for users of bank finance; selection effects vary from -10% points for male and portfolio entrepreneurs and for ventures in manufacturing, construction and professional sectors, to -7.3% points for users of external support at start-up. Overall, these results support the contention set out in Hypothesis 2 that impact and selection effects vary depending on the context in which business plans were written.

Looking at some interesting specific instances, users of bank finance at start-up with plans have lower growth profiles than those without plans (selection effect=-9.7% points). This is consistent with banks choosing (with the aid of information in business plans) to lend to lower risk/lower growth profile ventures. Nonetheless plans have a positive impact effect (21.6% points) for this group suggesting that plans may also be beneficial for users of bank finance. It is also notable that, amongst previously unemployed entrepreneurs, despite those with plans having lower growth profiles (selection effect=-9.7% points) the growth benefits from having business plans are large and positive (impact effect=36.0% points). This would seem to suggest the benefits of encouraging/assisting disadvantaged entrepreneurs with writing business plans; a view which finds further support in the large and positive impact effect (34.1% points) for users of external support at start-up<sup>8</sup>.

## 5. Discussion

The central aim of this paper was to re-examine the relationships between business plans and new venture performance. We argued that this is an important endeavour because prior approaches fail to fully capture the multiple effects of business plans.

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<sup>8</sup> We also report a couple of robustness checks on the results. Firstly we checked the validity of the start-up bank finance instrument in the plans equation (i.e., use of bank finance in 2000-2001) by testing it for correlation with the disturbance term in the plans equation: for the instrument to be valid it should be uncorrelated with this disturbance term. This check was achieved by estimating a bivariate probit model for the bank finance instrument and business plans decisions and testing the correlation coefficient of the disturbances ( $\rho$ ). The test of  $\rho = 0$  had a  $p$ -value of 0.75 so we cannot reject the hypothesis that the correlation between the instrument and plans disturbance is zero. It is also possible that the results may be biased by the potential endogeneity of other explanatory variables in the model. Of particular concern here are the variables 'Used External Support at Start-up' and 'New Products/Services' (suspicions being raised not least, because they are both highly significant in the plans equation). We therefore re-estimated the models excluding 'Used External Support at Start-up' and 'New Products/Services' respectively and examined the impact this had on the estimated plans effects. Excluding 'Used External Support at Start-up' yielded estimates of 24.7% points, -7.3% points and 31.9% points for the TPE, Selection and Impact effects respectively; excluding 'New Products/Services' yielded corresponding estimates of 24.6% points, -9.8% points and 34.4% points respectively. Recalling that the original TPE, Selection and Impact effects, reported in Table 3, are 23.4% points, -10.0% points and 33.4% points respectively, it would seem that the results are robust to potential endogeneity from other explanatory variables.

Our contribution was to develop and test a model that controlled for business plan choice (selection effects) and highlighted that the impact of business plans on new venture performance is also affected by the profile of the venture and the contexts in which business plans are written. This is important because prior approaches do not jointly control for these endogeneity and interaction effects. Endogeneity (selection) is obviously important to control for because it reflects the choice of whether to write a business plan. This, in turn, is important because of the on-going theoretical debate about the value of business plans to the performance of new ventures. There are two sides to this debate. On one side, are those that argue that deliberative business plans lead to positive impacts on venture performance. On the other side are proponents who argue that following an improvisational strategy leads to positive performance outcomes.

One illustration of this debate is the influential paper by Sarasvathy (2001). She argues that whilst causal mechanisms (deliberative plans) are one route to setting up a new venture, the alternative is to use 'effectuation'. To illustrate her argument, she suggests that 'cooks' (entrepreneurs) often just go into their 'cupboard' to identify their available 'ingredients' (resources and capabilities) and proceed from these ingredients to imagine what a meal (new venture) will look like. This contrasts with using a 'recipe' (business plan) to cook a meal.

Zahra, Sapienza and Davidsson (2006) have also argued that improvisation is key and suggest "... that managers (both in new and established firms) do not, and probably should not, create 'once-and-for-all' solutions or routines for their operations but continually reconfigure or revise the capabilities they have developed" (p. 920-1).

Our results, however, starkly point to the value of business plans. The key result is that ventures with written business plans grew faster than those without written plans (by, on average, 33.4% points per annum), having controlled for selection effects. This supports Hypothesis 1 and suggests that business plans help raise entrepreneurial capabilities thereby enhancing performance.

Our interpretation of this finding is that it does not mean that 'trial by error' or 'improvisational' strategies are unimportant. As Bhide (2002) suggests entrepreneurs are not often faced by a 'plan' versus 'tacit learning' choice. Bhide (2000), (like Mintzberg and Waters 1985, Mintzberg 1991 and Mintzberg 1994), sees the value of informal learning or a reliance on an emergent strategy as beneficial, particularly in entrepreneurial contexts. However, what our evidence suggests is that writing a business plan does not preclude learning: instead business plans offer a key referential resource to assess and support the performance of the venture (Block and MacMillan, 1992).

The second impetus behind the paper was to investigate interaction effects. We suggested that prior approaches failed to appropriately capture the nuances of these

interaction effects. We now discuss these findings and reflect upon the implications for our understanding of the role of deliberative and improvisational approaches.

Two of the profiles considered in Table 3 were serial and portfolio entrepreneurs. The results show that there were, perhaps, initial benefits to not writing a plan for these two types of entrepreneur in that they had intrinsically higher growth profiles than their counterparts with written plans (selection effects -9% points (serial) and -10% points (portfolios)). However, business plan impacts effects (27.8% points (serials) and 42% points (portfolio)) outweigh these profile effects. In other words, whilst serial and portfolio entrepreneurs that do not write a business plan may experience an initial growth advantage (based on their higher growth profiles) those with plans not only make up for deficiencies in their profile but even surpass the employment growth of non-planners.

This has implications for our understanding of how entrepreneurs learn. Entrepreneurial learning theorists such as Mezirow (1991) and Harvey and Evans (1995) suggest that entrepreneurship is path dependent whilst Cope (2005) has argued that aspiring entrepreneurs need to consider the stock of their accumulated knowledge. Minniti and Bygrave (2001) also suggest that “knowledge is cumulative. What is learned in one period builds upon what was learned in an earlier period” (p.7). Finally, Carter *et al* (1996) have argued that improvisational learning is pivotal to new venture creation.

Our interpretation, however, is that there are, indeed, initial advantages in having prior experience to guide the growth of the venture. Nonetheless, the value of ‘emergent’ strategies (Mintzberg and Waters, 1985) are soon outweighed by the value of writing a plan. In other words, relying upon tacit knowledge may be useful but it is no substitute for the direction provided by a written plan.

An important context we considered was where the venture was introducing new product/services. This is important because new products/services may be seen as a proxy for uncertainty. The argument here is that those introducing new products/services are doing something novel. This requires them to learn and introduce new routines into the venture. In such situations, ‘learning by doing’ may be seen as being more conducive to growth because there is no ready guide to introducing such products/services. Again, however, the results show that whilst those without plans in this context may have an initial advantage (selection effect -9.5% points), this was outweighed by the impact effect of business plans (35.1% points). Our results are in line with Delmar and Shane (2003) who argued that written business plans have benefits in terms of improving the managerial capabilities to learn and introduce new routines.

Writing a business plan (impact effects) seems also to have positive impacts for those with low human capital (the previously unemployed). Table 3 also points to similar results for a ‘low’ enterprise area like Cleveland. Arguably, from a ‘learning by



doing' or emergent approach, there is little advantage in the previously unemployed writing business plans because they will do little or nothing to raise their entrepreneurial capabilities. Consistent with this, is a view that in low enterprise areas, little can be done to enhance entrepreneurial capacities. Our results do not support these theoretical promptings. Instead, writing a business plan appears to guide individuals with low human capital, particularly in low enterprise areas, to grow their venture.

Reinforcing such an interpretation is the role played by external support. Again, this shows the same pattern: those that write business plans and use external support are more likely to see their venture grow. This result supports the Chrisman and McMullan (2000) who argue that external support is a key resource for the new venture. It is also suggestive of an interpretation that sees business plans as a positive isomorphic pressure on ventures. At the start of this paper, we identified that Honig and Karlsson (2004) had queried the value of business plans. Their argument was that, in order to conform and homogenize with particular institutional arrangements (to 'act as if'), new ventures were coerced into writing a business plan. One obvious interpretation of this is that writing a business plan exerts a negative influence on the performance of the new venture, perhaps because it 'shoehorns' the new venture into a prescribed format. This may be suitable for enhancing the legitimation of the venture, but may not be necessarily best for the venture itself.

Another context in which we identified that this may be particularly germane is in terms of bank finance. Earlier on, we outlined the view that banks prefer low risk ventures and, therefore, may use a business plan to screen ventures to distinguish high and low risk borrowers. The suggestion here was that business plans perform an important function of helping banks to select less risky ventures and that this will lead to differences in performance.

Whilst we find that, amongst users of bank finance, those with written plans have lower growth profiles (supporting a screening/selection argument) business plans continue to have a positive impact in this context. Equally users of external support also experience positive impacts from having written business plans. In other words, whilst business plans appear to play a mimetic role, this discipline leads to our finding of a positive rather than negative outcome. Indeed, our results suggest attempts by support providers to enhance the quality of new ventures through business plans - particularly for the previously unemployed and those in low enterprise areas - are efficacious. The implication, therefore, is that this support should be enhanced by policy makers if the aim is to see increased employment growth.

Overall, our results are uniform. They all point - regardless of the context - to situations in which business plans improve the employment growth of the venture. Because our results disentangle selection from impact effects, our interpretation is that more deliberative approaches to new venture growth are more likely to be fruitful than a reliance on learning by doing.

## 5.1 Limitations and further research directions

This study provides an initial but important step in investigating the multi-channel effect of business plans on venture performance. Further research could usefully consider differing types of ventures (and at different stages of development), other geographical locations and different external sources of finance. This may be particularly important because we have limited measures of uncertainty. Our two proxies – new products/services and sector dummies – may be judged to inadequately capture the different forms of uncertainty and risk which can challenge a growing venture. As Bhide (2000) argues the ability of business plans to reduce uncertainty depends on what type of uncertainty a venture is facing. Further research using our approach should, therefore, examine in greater granularity other measures of innovation and more precise measures of sector than those available in our data; especially as the methodology itself is designed to deal with differences in venture profiles and contexts.

Similarly, the advantages of our approach can serve to open up again to renewed scrutiny the ways in which *inter alia*, environmental munificence and dynamism influence the importance of business plans (Fredrickson, and Mitchell, 1984; Fredrickson and Iaquinto, 1989; Brews and Hunt, 1999). Obviously, this suggests that the approach should be applied not just to new ventures but also to existing ventures. This may provide qualitatively different results to ours in terms of the scale and direction of the importance of business plans but, nevertheless signals a more careful disentangling of the relationship between business plans and venture performance.

Indeed, we call for further replication and verification of our findings using differing individual performance outcome measures (e.g. sales, profitability) as well as more multi-dimensional approaches to performance (Nicholls-Nixon *et al.* 2000). This may also apply to survival, particularly given that all of our ventures are survivors, but we note that Delmar and Shane (2003) have looked specifically at the relationship between business plans and venture survival. They conclude, as we do, that business plans have positive performance benefits.

There is also a greater need to continue to untangle the process of planning from that of writing a business plan. This is important because, if the interest is in how entrepreneurs learn, there is a need to further understand the stimulus, development and use of written business plans. For example, there may be differences in the quality of business plans. Unfortunately, we are unable to fully trace the relationships between means (planning processes) and ends (business plans) (Sarasvathy, 2001). Furthermore, our data does not consider cognitive biases. de Meza (2002), for example, argues that what typifies entrepreneurs is their optimism (see also Fraser and Greene, 2006). If business plans are efficacious, then what role do they have in altering cognitive biases such as optimism? Fundamentally, what our approach and evidence points to is the need for more qualitative research: research that not only

acknowledges the multi-channel reasons for writing business plans but explores how - both theoretically and empirically - this is connected to business planning, the cognitive biases of the entrepreneur and the audience for such plans.

## 6. Conclusions

In this paper we address the claim that business plans have multiple effects on new venture performance. We show that the theoretical literature indicates that business plans can have an *impact* on new venture performance by helping ventures to enhance their managerial ability and to secure resources for the venture. We also note that different types of ventures are more likely to choose to write business plans and therefore a *selection* effect can result where the profiles of ventures who write business plans can systematically differ from those that do not. We also show the theoretical literature also indicates that both impact and selection effects are likely to differ depending on the type of profile of the venture and the context in which business plans are written.

We highlight that existing empirical methodologies used to estimate the impact of business plans on venture performance do not account for these multiple causation paths. At worst, through the use of dummy variables denoting the use of business plans or not, they succeed in only accounting for a semi-merger of the combined effect. We show that such a procedure leads to biased and inconsistent estimates of the total effect by in effect ignoring the selection effect and only partially accounting for impact effects. Not surprisingly, we note that this attempt to generate a tautological and fully general conclusion about whether business plans promote or hinder venture performance has led to contradictory and inconclusive findings.

We offer an alternative econometric methodology which is capable of isolating selection from impact effects as well as accounting for their variation across observable differences in the profile of ventures and the business contexts in which they write business plans. We apply this to UK data on *de novo* ventures and find negative (-10% points) *selection* effects and stronger positive *impact* effects (+33% points) for the overall sample. The significance and signs on these effects are consistent with theory and the positive value on the impact effect indicates that for this sample at least business plans promote growth. Again consistent with theory we find that impact and selection effects differ across different types of venture profiles and their business contexts. Notably, we find that business plans are particularly helpful at increasing the growth performance of apparently lesser able entrepreneurs i.e. those who were previously unemployed. We also find them to be particularly useful in the entrepreneurial context where the venture is launching a new product or service. Our results are of course limited to a sample of 3 regions in the UK but their clarity and consistency with the deeper theoretical literature call for the need of further empirical analysis in other regions and economies (or industry specific data) as well as using more varied performance measures than our singular use of firm growth.

The paper offers a methodology capable of facilitating this research. The aim for this research trajectory is for the management literature to be able to inform different types (profiles) of entrepreneurs how worthwhile writing a business plan will be in promoting the performance of their particular venture and in what particular contexts will writing a business plan be most beneficial.

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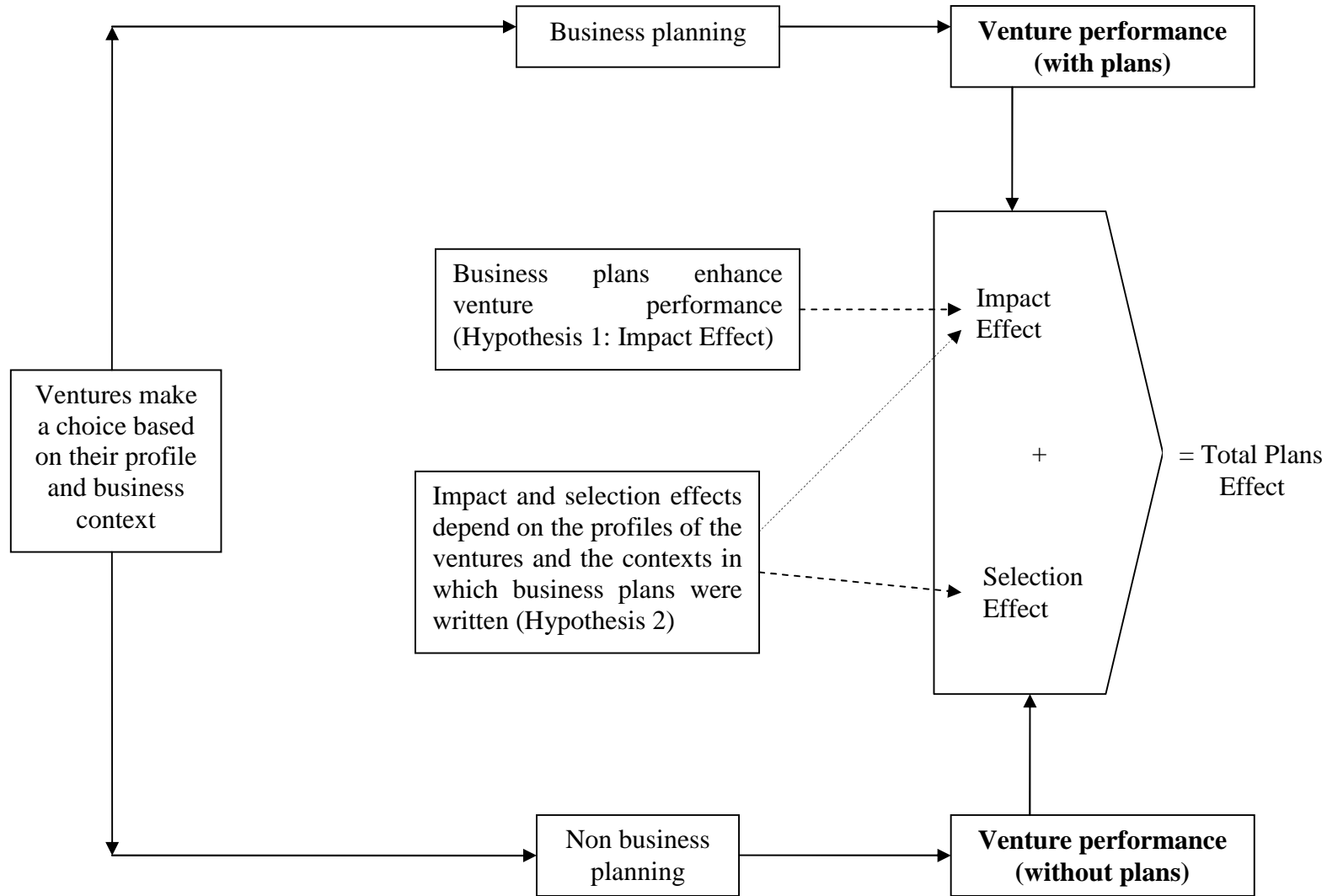
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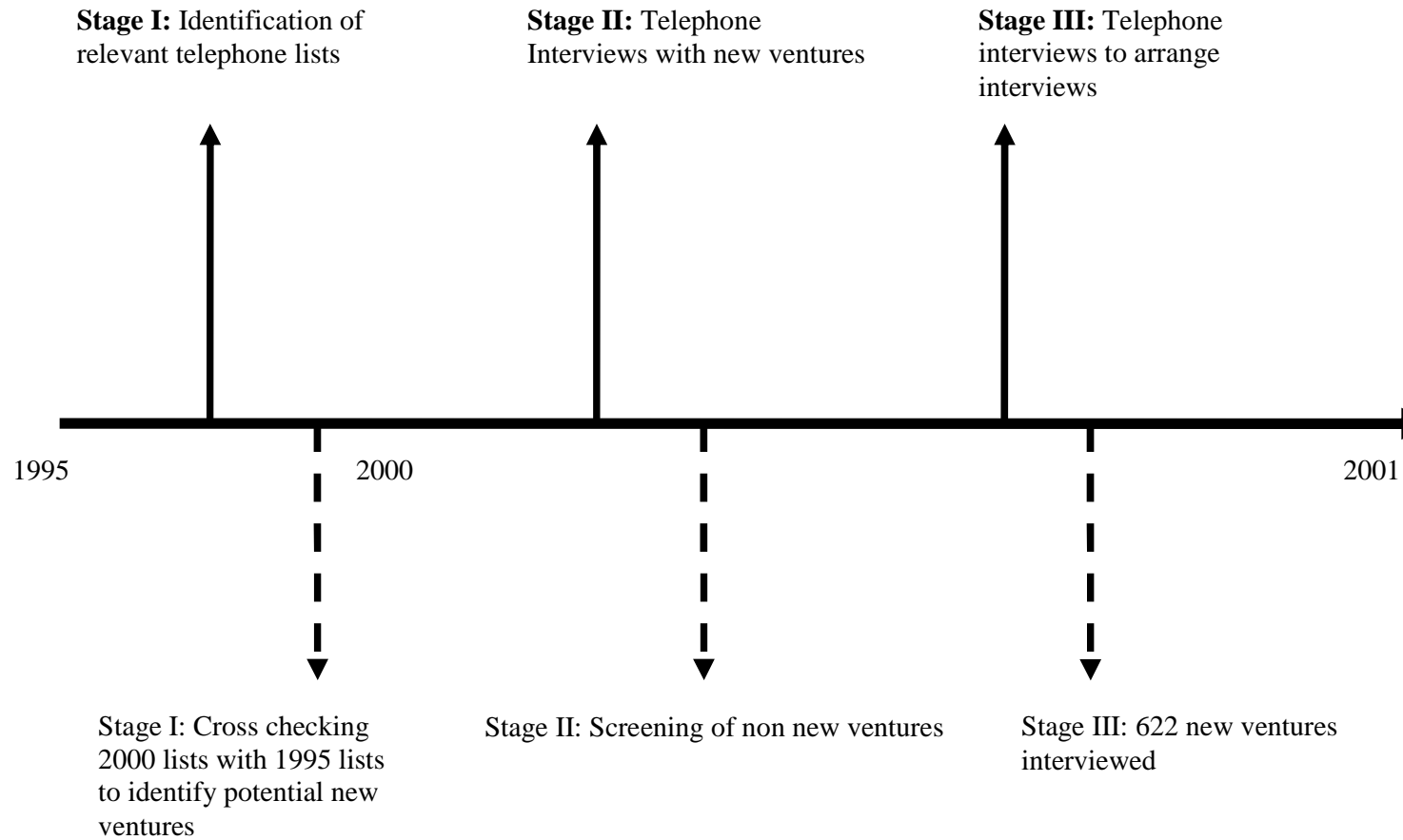
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**Figure 1: The Relationship between Business Plans and New Venture Performance**



Note: The TPE is the difference in average venture performances between businesses with plans and those without plans. This TPE can be decomposed into profile and impact effects as shown in Appendix 1

**Figure 2: Interview pipeline**



**Table 1: Summary Statistics and Bivariate Correlations**

Variable	Obs	Mean	Std.Dev	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.		
training	613	0.56	0.50	1																											
size	190	0.15	0.10	0.0515	1																										
z problems	622	0.29	0.15	-0.0222	-0.0053	1																									
ilsize	622	1.21	0.93	-0.0025	0.6153*	0.0353	1																								
reneur	618	0.35	0.18	-0.0968*	0.0516	0.0165	0.0465	1																							
repreneur	591	0.21	0.10	-0.0103	0.0208	0.0312	0.0595	0.2219*	1																						
	622	0.11	0.12	-0.015	0.0328	0.0112	0.0896*	0.0228	0.0111	1																					
l	611	0.23	0.12	0.1113*	-0.1591*	0.0109	-0.1135*	-0.0599	0.0568	0.0513	1																				
	620	0.18	0.09	0.01	-0.0396	-0.02	-0.0102	-0.0283	0.0421*	0.0511	0.0155	1																			
ountant	622	0.24	0.13	0.056	0.1139*	0.0838*	0.1169*	0.0105	-0.0122	0.1328*	-0.0516	0.0793*	1																		
	622	0.10	0.16	0.0308*	0.1683*	0.0103	0.1950*	0.0215	0.1328*	0.0815*	0.0062	0.1511*	0.0916*	1																	
nal support	622	0.88	0.32	0.2151*	0.0091	0.0898*	0.0122	-0.1298*	-0.0218	0.0398	0.0619	0.0835*	0.0911*	0.1021*	1																
onal Savings at start	622	0.18	0.11	-0.0389	-0.0163	-0.0056	-0.0118	0.0029	-0.0265	0.0079	0.0298	0.0003	0.012	0.0619	-0.1080*	1															
inance at start up	622	0.21	0.11	0.2129*	0.1152*	0.0221	0.0961*	-0.0685	-0.0311	-0.0015	0.0636	-0.025	0.0358	0.0123	0.0633	-0.1103*	1														
onal Savings in last y	622	0.11	0.31	-0.0008	0.0291	0.0155	-0.0123	-0.0288	0.0853*	0.0313	-0.0102	-0.0108	0.0269	0.0118	0.033	0.1213*	-0.0211	1													
inance in last year	622	0.34	0.11	0.0621	0.0151	0.1198*	0.1161*	-0.029	-0.0018	0.0308*	-0.0081	0.0288	0.0126	0.0199*	0.0308*	-0.0311	0.2561*	-0.0858*	1												
Services	622	0.60	0.19	0.1030*	0.08	0.1120*	0.1151*	-0.0111	0.0189	-0.0181	-0.0335	0.1131*	0.1638*	0.1162*	0.1090*	-0.008	0.0392	0.0836*	0.0908*	1											
iq	622	0.11	0.38	0.0119	0.1088*	0.0125	0.0286	0.0258	-0.0011	0.0293	0.0206	0.0151	0.0111	0.0163	0.0111	-0.0012	0.0169	0.011	-0.0091	0.011	-0.0091	1									
l	622	0.09	0.29	0.0166	0.0322	0.0121	0.0880*	0.063	-0.0151	0.023*	0.06	-0.0156	0.0159	0.0121	-0.0059	0.0009	-0.0191	-0.0368	0.0367	-0.0098	-0.1128*	1									
nuices	622	0.24	0.13	-0.0262	-0.0518	-0.0319	-0.0013	-0.029	0.022	0.1018*	0.0335	0.1918*	0.0753	0.1158*	0.0515	-0.0131	-0.0315	0.0251	-0.0236	0.0899*	-0.2568*	-0.1181*	1								
	622	0.24	0.13	-0.1111*	-0.0681	-0.0121	-0.0605	-0.0181	-0.0121	0.0311	0.0085	-0.1111*	-0.1368*	-0.1612*	-0.1118*	-0.0111	0.0112	0.0031	-0.0263	-0.0988*	-0.2518*	-0.1189*	-0.3220*	1							
ness	622	1.28	2.11	-0.1069*	-0.1030*	-0.0351	0.0615	-0.0151	-0.0011	0.0315	-0.0361	0.0325	0.0611	-0.0039	0.0213	-0.0336	0.0125	-0.1010*	0.016	0.0989*	-0.0602	0.015	0.0313	0.0199	1						
	621	0.36	0.18	0.0001	0.1868*	0.0192*	0.3031*	0.0251	0.0331	0.1988*	-0.0513	0.1211*	0.1221*	0.2212*	0.0865*	0.0302	0.0111	0.0236	0.0303	0.1015*	0.0201	0.0830*	0.2195*	-0.1885*	0.0306	1					
	622	0.11	0.38	-0.0113	0.1268*	-0.0119	0.0133	0.0215	0.0108	-0.0518	0.0056	0.0165	-0.0101	-0.0109	-0.0511	-0.0695	-0.0351	0.0081	-0.0131	-0.0025	0.0519	0.0011	-0.0811*	0.0159	0.0112	-0.3111*	1				
	622	0.15	0.50	0.0288	-0.2168*	-0.0811*	-0.3333*	-0.0103	-0.0111	-0.1251*	0.0382	-0.1198*	-0.1155*	-0.2195*	-0.038	0.0101	0.0219	-0.0351	-0.0013	-0.1101*	-0.0135	-0.0691	-0.1189*	0.1192*	-0.0153	-0.6111*	-0.1131*	1			
	622	0.51	0.50	0.1892*	-0.0281	-0.1618*	-0.0123	-0.1086*	-0.1038*	-0.0691	-0.001	-0.1130*	-0.1368*	-0.1152*	-0.2119*	0.0831*	0.1028*	-0.0088	0.0201	-0.1315*	-0.0559	-0.0316	-0.2002*	0.1108*	-0.0601	-0.2518*	0.0201	0.2291*	1		
	622	0.24	0.13	-0.0133	0.0321*	0.1891*	0.0118	0.1005*	0.0513	0.0118	-0.0315	0.0151	0.0928*	0.0613	0.1308*	-0.0131	-0.0511	-0.055	-0.0316	0.0592	0.0125	-0.0018	0.0992*	-0.0111	-0.0335	0.1902*	-0.0121	-0.1638*	-0.5828*	1	
chine	622	0.24	0.13	-0.1139*	-0.0568	0.0085	-0.0335	0.0263	0.0899	0.0621	0.0356	0.1263*	0.0865	0.1050*	0.1151*	-0.0953*	-0.0681	0.0852	0.0081	0.0915*	-0.0013	0.0116	0.1312*	-0.0515	0.1035*	0.1010*	-0.0121	-0.1035*	-0.5828*	1	

**Table 2: Log number of employees in 2001**

	<b>Business plans decision (Selection)</b>	<b>(Log) Size in 2001 (with plan)</b>	<b>(Log) Size in 2001 (without plan)</b>
<i>Venture/entrepreneur profile</i>			
Serial Entrepreneur	-0.069 (0.214)	-0.029 (0.748)	0.222* (0.086)
Portfolio Entrepreneur		0.141 (0.158)	-0.198 (0.102)
e-records	0.096** (0.037)		
Own accountant	0.087* (0.073)		
Male	-0.033 (0.597)	0.042 (0.668)	0.099 (0.502)
Previously Unemployed	0.111* (0.061)	-0.082 (0.399)	-0.184 (0.236)
(Log) size at start-up		0.860*** (0.000)	0.630*** (0.000)
Manufacturing	0.001 (0.988)	-0.153 (0.279)	-0.074 (0.723)
Construction	0.039 (0.697)	-0.070 (0.657)	0.092 (0.715)
Professional	-0.134* (0.082)	-0.111 (0.407)	0.061 (0.733)
Distribution	-0.080 (0.290)	0.025 (0.840)	0.317* (0.069)
Limited Company		0.404 (0.110)	-0.213 (0.496)
Sole trader		-0.003 (0.991)	-0.578* (0.054)
Partnership		0.207 (0.416)	-0.598** (0.049)
<i>Context</i>			
Used External support at start-up	0.375*** (0.000)	0.058 (0.815)	-0.619*** (0.001)
Use of bank start-up finance	0.363 (0.219)	-0.088 (0.904)	0.330 (0.785)
Bank finance used in the last year		-0.155 (0.163)	-0.067 (0.710)
Savings used in the last year		-0.176 (0.055)	0.068 (0.536)
New Product/Services	0.136** (0.048)	0.337*** (0.009)	-0.130 (0.406)
Cleveland	0.234***	0.100	-0.302**

	(0.000)	(0.400)	(0.039)
Vintage dummies ( <i>p</i> -value)	0.126	0.012**	0.017**
Constant	-0.289** (0.025)	-0.209 (0.683)	0.466 (0.471)
		$\rho_{1\varepsilon} =$ 0.209 (0.625)	$\rho_{0\varepsilon} =$ 0.955*** (0.000)
<i>N</i> =422		$\sigma_1^2 = 0.556$ (0.000)	$\sigma_0^2 = 0.934$ (0.000)
Log-likelihood= -610.403			
$\chi^2(p - value) = 0.000$			

Notes:

1. *p*-values in parentheses; ‘\*\*\*’, ‘\*\*’ and ‘\*’ denote significance at the 1%, 5% and 10% levels respectively.
2. Bank finance used *at start-up* is instrumented with a dummy variable for bank finance used as the main source of finance *in the last year* (2000-2001).



**Table 3: Decompositions of total plans effects into impact and selection effects**

	Impact Effect	Selection Effect	TPE
<b>Average annual growth between start-up and 2001</b>	33.4% points (0.000)	-10.0% points (0.000)	23.4% points (0.000)
<i>Used bank start-up finance</i>	21.6% points (0.000)	-9.7% points (0.000)	11.9 % points (0.000)
<i>New Products/Services</i>	35.1% points (0.000)	-9.5% points (0.000)	25.6% points (0.000)
<i>Previously unemployed</i>	36.0% points (0.000)	-9.7% points (0.000)	26.3% points (0.000)
<i>Male</i>	33.0% points (0.000)	-10.0% points (0.000)	22.9% points (0.000)
<i>Serial Entrepreneur</i>	27.8% points (0.000)	-9.0% points (0.000)	18.8% points (0.000)
<i>Portfolio Entrepreneur</i>	42.0% points (0.000)	-10.0% points (0.000)	32.0% points (0.000)
<i>Used external support at start-up</i>	34.1% points (0.000)	-7.3% points (0.002)	26.8% points (0.000)
<i>Cleveland</i>	39.1% points (0.000)	-8.5% points (0.001)	30.6% points (0.000)
<i>Manufacturing</i>	31.2% points (0.000)	-10.0% points (0.000)	21.2% points (0.000)
<i>Construction</i>	28.6% points (0.000)	-10.0% points (0.000)	18.6% points (0.000)
<i>Professional</i>	29.3% points (0.000)	-10.0% points (0.000)	19.4% points (0.000)
<i>Distribution</i>	25.7% points (0.000)	-9.0% points (0.000)	16.7% points (0.000)

Notes: *p*-values in parenthesis.

## Appendix 1: Business plans model

The endogenous switching regression model for business plans has the following analytical form:

$$\begin{aligned}
 bp_i^* &= Z_i\gamma - \varepsilon_i \\
 y_{1i}^* &= X_{1i}\beta_1 + u_{1i} \Leftrightarrow bp_i^* > 0 \\
 y_{0i}^* &= X_{0i}\beta_0 + u_{0i} \Leftrightarrow bp_i^* \leq 0, \\
 (\varepsilon, u_1, u_0)' &\sim N(0, \Sigma),
 \end{aligned}$$

where:  $bp^*$  represents the firm's latent utility from business plans (only those businesses with a positive latent utility – i.e., those for whom the benefits of plans exceed the costs – write business plans);  $y_1^*$  represents performance with a business plan and  $y_0^*$  represents performance without a business plan, corresponding to the upper and lower performance paths in Figure 1; and  $Z$  (resp.  $X$ ) is a row vector of determinants of business plans (resp. performance). The residual terms  $(\varepsilon \ u_1 \ u_0)$  capture the effects of unobserved variables e.g., entrepreneurial capability and motivation, on plans decisions and performances. The residual variance-covariance matrix is given by:

$$\Sigma = \begin{bmatrix} 1 & \rho_{1\varepsilon}\sigma_1 & \rho_{0\varepsilon}\sigma_1 \\ \rho_{1\varepsilon}\sigma_1 & \sigma_1 & \rho_{10}\sigma_1\sigma_0 \\ \rho_{0\varepsilon}\sigma_1 & \rho_{10}\sigma_1\sigma_0 & \sigma_0 \end{bmatrix}$$

The parameters  $\rho_{1\varepsilon}$  (resp.  $\rho_{0\varepsilon}$ ) measure the correlation between unobserved effects in the equations for plans decisions and performance with (resp. without) a business plan. These correlations capture the endogeneity of decisions to write/not write business plans on subsequent performance. In the instance of exogenous switching these correlations are zero (in which case plans decisions and performances could be estimated by single equation methods). The variables in  $Z$  and  $X$  may overlap but typically the selection equation will include variables, which do not appear in performances, for purposes of identifying the performance equations.

The assumption of normality is made to facilitate estimation of the model by maximum likelihood. For a continuous performance measure this likelihood is given by:

$$L = \prod_{bp_i=1} \frac{1}{\sigma_1} \phi\left(\frac{y_{1i} - X_{1i}\beta_1}{\sigma_1}\right) \Phi\left[\frac{Z_i\gamma + (y_{1i} - X_{1i}\beta_1)\rho_{1\varepsilon}/\sigma_1}{\sqrt{1 - \rho_{1\varepsilon}^2}}\right] \\ \times \prod_{bp_i=0} \frac{1}{\sigma_0} \phi\left(\frac{y_{0i} - X_{0i}\beta_0}{\sigma_0}\right) \Phi\left[\frac{-Z_i\gamma - (y_{0i} - X_{0i}\beta_0)\rho_{0\varepsilon}/\sigma_0}{\sqrt{1 - \rho_{0\varepsilon}^2}}\right]$$

where  $\phi$  and  $\Phi$  are the standard normal density and cumulative distribution functions respectively.

#### *Total plans effects (TPE), impact effects and selection effects*

The total plans effect (TPE) (referred to in the treatment effects literature as the average treatment effect) for firm  $i$  is given by  $TPE(X_i) = X_{1i}\beta_1 - X_{0i}\beta_0$ . The TPE may be decomposed as:

$$TPE(X_i) = \underbrace{X_1(\beta_1 - \beta_0)}_{\text{Impact effect}} + \underbrace{(X_1 - X_0)\beta_0}_{\text{Selection effect}}$$

The first term on the right hand side represents the performance response to business plans ( $\beta_1 - \beta_0$ ) for businesses with the observed profile of a planner ( $X_1$ ). This is the ‘impact effect’ which is the part of the TPE caused by business plans itself. The second term on the right hand side is the ‘selection effect’ which is the portion of the TPE caused solely by differences between the observed profiles of planners and non-planners as given by ( $X_1 - X_0$ ). In this case the performance coefficients (which measure the response of performance to changes in the explanatory variables) are held at their non-plans levels ( $\beta_0$ ).

#### *Effects of plans on growth*

The total plans, impact and selection effects on growth may be calculated directly from the estimates of the log size in 2001 (conditional on log start-up size) model. To see this, firstly write the equations for log size as follows

$$\ln y_{1,2001} = \gamma_1 \ln y_{1,s} + X_1^* \beta_1^* + u_1 \\ \ln y_{0,2001} = \gamma_0 \ln y_{0,s} + X_0^* \beta_0^* + u_0$$

where:  $\ln y_{1,2001}$  ( $\ln y_{0,2001}$ ) is the natural log of size in 2001 amongst planners (resp. non-planners);  $\ln y_{1,s}$  ( $\ln y_{0,s}$ ) is the natural log of size in the start-up year

( $t = s$ ) amongst planners (resp. non-planners); and  $X_1^*(X_0^*)$  is a row vector of the other explanatory variables in the performance equation for planners (resp. non-planners). Simply re-writing these equations, to make changes in log size between start-up and 2001 the dependent variable (which approximates relative changes in size over these periods), gives

$$\begin{aligned}\Delta \ln y_{1,2001} &= (\gamma_1 - 1)\ln y_{1,s} + X_1^* \beta_1^* + u_1 \\ \Delta \ln y_{0,2001} &= (\gamma_0 - 1)\ln y_{0,s} + X_0^* \beta_0^* + u_0\end{aligned}$$

where  $\Delta \ln y_{j,2001} = \ln y_{j,2001} - \ln y_{j,s} \cong (y_{j,2001} - y_{j,s})/y_{j,s}$ ,  $j = 0,1$ . The total plans, impact and selection effects, on relative changes in size, can then be calculated, using the decomposition of the TPE reported in the previous section, with

$$X_j \equiv \begin{pmatrix} \ln y_{j,s} & X_j^* \end{pmatrix}, \beta_j \equiv \begin{pmatrix} \gamma_j - 1 \\ \beta_j^* \end{pmatrix}, j = 0,1.$$

Note that only estimates of the parameters from the log size in 2001 (conditional on log start-up size) model are required for the growth effects calculations. The effects of plans on growth rates are simply the effects on relative size changes  $\times 100$  (the growth rates are measured on a percentage scale so the effects on growth are measured in percentage points). Finally, dividing the (firm level) growth effects, by the business age (in 2001) in years, yields estimates of the average annual effects.

#### *Relationship between the switching regression model and dummy variable estimates of the TPE*

The relationship between the switching regression and dummy variable estimates of the TPE may be seen by expanding the TPE as follows

$$\begin{aligned}TPE(X) &= X_1(\beta_1 - \beta_0) + (X_1 - X_0)\beta_0 \\ &= (1 \quad x_1') \left[ \begin{pmatrix} \beta_1^0 \\ \tilde{\beta}_1 \end{pmatrix} - \begin{pmatrix} \beta_0^0 \\ \tilde{\beta}_0 \end{pmatrix} \right] + [(1 \quad x_1') - (1 \quad x_0')] \begin{pmatrix} \beta_0^0 \\ \tilde{\beta}_0 \end{pmatrix} \\ &= \underbrace{\beta_1^0 - \beta_0^0}_{\text{Dummy variable estimate of the TPE}} + \underbrace{x_1'(\tilde{\beta}_1 - \tilde{\beta}_0) + (x_1' - x_0')\tilde{\beta}_0}_{\text{Switching regression model estimate of the TPE}},\end{aligned}$$

where we have partitioned the  $(1 \times k)$  vector  $X_1$  (resp.  $X_0$ ) into the constant term (1) and a  $1 \times (k-1)$  vector of variable characteristics  $x_1'$  (resp.  $x_0'$ ); and we have conformably partitioned  $\beta_1$  (resp.  $\beta_0$ ) into the (scalar) intercept coefficient

$\beta_1^0$  (resp.  $\beta_0^0$ ) and a  $(k-1) \times 1$  vector of coefficients  $\tilde{\beta}_1$  (resp.  $\tilde{\beta}_0$ ) for the variable characteristics.

The dummy variable approach estimates the impact of plans by a differential intercept between those with and without plans. In the above formulation this is measured by the first term:  $\beta_1^0 - \beta_0^0$ . In general therefore it can be seen that the dummy variable approach is a biased and inconsistent estimator of the TPE because it provides an incomplete description of the TPE. Indeed, the switching regression and dummy variable estimates of the TPE only coincide where the response to plans (impact effect) does *not* depend on the characteristics of the planner and the contexts for plans (i.e.,  $x_1'(\tilde{\beta}_1 - \tilde{\beta}_0) = 0$ ) and where there is *no* selection effect (i.e.,  $(x_1' - x_0')\tilde{\beta}_0 = 0$ ). So, in summary, the dummy variable approach is an unsuitable framework for analyzing the multiple effects of business plans because it *totally* ignores selection effects and provides only a *partial* description of the impact effect.