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ARE FORMAL PLANNERS MORE LIKELY TO ACHIEVE NEW VENTURE VIABILITY? A COUNTERFACTUAL MODEL AND ANALYSIS

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Research summary: *This study develops and tests a counterfactual model of the relationship between formal written business plans and the achievement of new venture viability. This is important because extant theory remains oppositional, and there is a practical need to provide guidance to founders on the utility of formal plans. To test our model, we use propensity score matching to identify the impact that founder, venture, and environmental factors have on the decision to write a formal plan (selection effects). Having isolated these selection effects, we test whether or not these plans help founders achieve venture viability (performance effects). Our results, using data on 1,088 founders, identify two key results: (1) selection effects matter in the decision to plan; and (2) it pays to plan.*

Managerial summary: *This study assesses whether founders who write formal plans are more likely to achieve new venture viability. This is important because, despite its popularity, there is considerable debate about the value of plans. One root reason for this is that what prompts a founder to plan also impacts his/her chances of creating a viable new venture. The study's novelty is to separate out influences on the decision to plan from the plan-venture viability relationship. Our results show that better-educated founders, those wanting to grow and innovate, and those needing external finance are more likely to plan. Subsequently, having isolated what prompts planning, we assess if writing a plan actually promotes venture viability. We find that it pays to plan.*

INTRODUCTION

A long-standing debate in the strategy and entrepreneurship literatures is whether or not a formal written business plan helps the nascent founder achieve venture viability (Bhide, 2000; Delmar, 2015; Delmar and Shane, 2004; Honig and Samuelsson, 2014). Formal plans—here defined as written scripts that detail markets to be served, proposed products/services, required resources, and the anticipated growth and profitability of the new venture (Stevenson and Van Slyke, 1985)—are central to this debate. Some scholars argue that written plans provide a rational synopsis of the steps necessary to develop a viable venture (Delmar and Shane, 2004). Other scholars, however, argue that formal plans add little value and that founders are better off without a formal plan (Carter, Gartner, and Reynolds, 2014; Lange *et al.,* 2007; Mintzberg and Waters, 1985). Given that the extant literature remains oppositional, the empirical evidence on the efficacy of formal plans has also remained contradictory,

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making it difficult to substantiate whether plans help nascent founders achieve venture viability.

In this study, we argue that a principal reason for these gaps is that few studies have taken account of what prompts a founder to plan formally (selection effects). Selection effects are important because the founder's prior education and experience, the type of venture he/she is seeking to create, and differences in the environment he/she faces are likely to impact both on the likelihood of formal planning and on the chances of achieving venture viability. Indeed, conflating selection and performance effects lead to biased estimates of the plan-performance relationship (Burke, Fraser, and Greene, 2010).

This article's primary contribution is to develop and test a counterfactual model that explicitly isolates selection effects from the plan-viability relationship. To do so, we focus on key founder, venture, and environmental antecedents that affect the decision to formally plan. We focus on the founder's educational attainment and prior sectoral and entrepreneurial experience because they are important determinants of both plan and venture outcomes (Burke *et al.,* 2010; Dencker, Gruber, and Shah, 2009a). Similarly, we examine venture characteristics such as innovation, growth orientation, product complexity, the competitive nature of the external environment, and the need for external finance because, again, they are key determinants of the choice to plan (Honig and Karlsson, 2004; Kim, Longest, and Lippmann, 2015). Finally, we focus on venture viability because, as McMullen and Dimov (2013) suggest, it is the conclusion of the nascent phase of the "entrepreneurial journey."

To investigate our model, we use propensity score matching. This allows us to "net out" selection effects, thereby reducing "the problem of unfair comparison" (Li, 2013: 214). Subsequently, we isolate the impact of the plan on venture viability. This is a novel contribution because we estimate what would have happened if the planning founder had instead decided not to plan. Modelling this counterfactual state is important because, as Chwolka and Raith (2012) point out, key to understanding the value of a plan is to comprehend what is *not* chosen, rather than just measuring what turns out to be chosen.

Empirically, we use Panel Study of Entrepreneurial Dynamics (PSED II) data on 1,088 nascent founders. These data allow us to address issues of reverse causality and draw stronger causal inferences about the plan-viability relationship. In summary, the key advantage of our approach—for both plan advocates and skeptics—is that we take explicit account of selection biases, develop a counterfactual model that separates out plan selection from performance effects, and use large-scale longitudinal data to assess if founders who write plans are more likely to achieve new venture viability.

Our key results are twofold. First, selection effects matter: better-educated individuals, those seeking finance, innovators, and those with complex products/services are more likely to plan. Second, it pays to plan: founders who formally plan are more likely to achieve venture viability. These findings contribute to resolving the ongoing debate about the value of formal plans. Such findings are also of practical importance. Despite improvisational logics such as effectuation (Sarasvathy, 2001), bricolage (Baker and Nelson, 2005), and lean start up (Ries, 2011) being increasingly taught in our universities and being promoted as more reliable mechanisms for founders to achieve venture viability, our results suggest that the writing of formal plans is a useful way for actually helping founders and students orchestrate their fledgling business propositions. Moreover, our findings have importance to financiers, who use plans to help allocate start-up finance, and the millions of nascent founders who choose to write formal plans (Gumpert, 2002).

Next, we review the extant business plan literature. Subsequently, we develop our hypotheses, explain our methodology, and detail our results. We conclude by reflecting on the implications for both theory and practice.

LITERATURE REVIEW

We now examine the strategy and entrepreneurship literatures on formal written plans. The strategy literature from early conceptual and empirical studies (Thune and House, 1970) through more recent studies (Andersen, 2004; Greenley, 1994; Rudd *et al.,* 2008; Wolf and Floyd, forthcoming) has focused on whether plans aid performance of large firms. By comparison, relatively few entrepreneurship studies have examined the plan-performance relationship for emerging ventures (Dencker *et al.,* 2009a; Gruber,

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2007). Both research streams agree, however, that the experiences of the planner and the context in which they write a plan are important in shaping the plan-performance relationship (Brinckmann, Grichnik, and Kapsa, 2010; Wolf and Floyd, forthcoming).

Formal plans in strategy research

In the strategy literature, the impact of a plan on performance has been marked by a theoretical divide between those who champion an improvisational and emergent approach (Mintzberg and Waters, 1985) and those who see the merits of formal rational plans (Ansoff, 1991). The rationalist synoptic paradigm posits that plans are intrinsic to the development of systematic goals and concrete steps that allow the business to effectively coordinate and integrate activities (Locke and Latham, 1990, 2002; Miller and Cardinal, 1994; Wolf and Floyd, forthcoming). Plans aid the development of a framework for adaptive thinking (Andersen, 2004; Ansoff, 1991)—even when uncertainty is high (Armstrong, 1982)—and help anticipate the timing of resource flows and ease impediments in the matching of resource supply and demand. Further, plans help managers build confidence in their actions; communicate goals, strategies, and operational tasks; and build traction, both internally and externally, for their plans (Falshaw, Glaister, and Tatoglu, 2006). Finally, plans provide opportunities to improve decision making prior to investing resources, both in terms of identifying missing information and examining the implicit assumptions inherent in the business (Boyd, 1991).

In contrast, researchers from the improvisational paradigm have emphasized that plans introduce rigidities that can impede innovation and lead to excessive bureaucracy (Bresser and Bishop, 1983; Miller and Cardinal, 1994). Consequently, plans may retard the speed of decision making, bias decision making toward the status quo, and mistake strategic programming for strategic thinking (Mintzberg, 1994).

Successive empirical reviews of formal planning, however, have produced equivocal findings that, at best, show a weakly positive plan-performance relationship (Armstrong, 1982; Boyd, 1991; Brews and Hunt, 1999; Grant, 2003; Greenley, 1994; Miller and Cardinal, 1994; Pearce, Freeman, and Robinson, 1987; Rue and Ibrahim, 1998; Schwenk and Shrader, 1993).

Formal plans in entrepreneurship research

Although the theoretical debate evident above is also present in the entrepreneurship literature, what is axiomatically different about entrepreneurial ventures is that they are not scaled-down versions of large firms (Robinson and Pearce, 1983; Storey and Greene, 2010). Illustrative of this is that, on average, founders have greater latitude in how they translate the vision for their businesses into reality. Consequently, founders' education and experiences inform how they devise and execute the strategy for their businesses. However, in envisioning their new ventures, founders are also faced with a dynamic and uncertain task environment that can complicate decision making about, among other things, operations, competitive positioning, and venture financing.

The presence of heightened uncertainty, though, has not lessened the debate about the efficacy of formal plans. Plan proponents such as Delmar and Shane (2004) argue that plans are a tool for delineating goals and actions necessary for launching a venture. A plan can also spur start-up motivations and promote self-efficacy (Bandura, 1997; Krueger and Brazeal, 1994), thereby reinforcing goal commitment and persistence (Liao and Gartner, 2006). Plans may also promote adaptive thinking and learning about how to achieve age-old questions such as: (1) "where is the business now?"; (2) "where does it want to be?;" and (3) "how is it going to get there?" (Ansoff, 1991; Miller and Cardinal, 1994). Indeed, as a boundary-spanning device, plans may help the founder select, evaluate, and fine-tune nascent activities and, in the process, reduce mistakes and help avoid hazards that derail the nascent venture (Delmar and Shane, 2004). Moreover, plans may play an important communicative role in convincing (potential) employees of the founder's strategic intent and building legitimacy with outside financiers. If so, plans may help overcome liabilities of newness (Stinchcombe and March, 1965) and aid in leveraging external finance (Honig and Karlsson, 2004).

In contrast, plan critics have provided a number of reasons why plans are not beneficial. Honig and Karlsson (2004) argue that outside of building legitimacy with external funders, plans offer little intrinsic value to founders in directing their activities: plans are ceremonial devices that divert founders away from significant organizational tasks

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(Kirsch, Goldfarb, and Gera, 2009). Echoing this are studies emphasizing that founders are better off enacting nascent activities than writing plans (Carter *et al.,* 2014; Lange *et al.,* 2007). This may be because some business concepts do not require a plan: they are either really simple to execute without a plan or, if they are more elaborate, the written plan may bear little relation to the actual progress of the venture (Carter *et al.,* 2014; Lange *et al.,* 2007), particularly when product/service adaptations are common, distribution channels opaque, and market needs ill defined (Andries and Debackere, 2007; Drucker, 1985). Plans also sit uneasily with Schumpeterian notions of the entrepreneur (Bhide, 2000). They may involve incremental adjustments and conformity, whereas some founders may seek to develop radical and innovative solutions to problems. Besides stifling improvisation and constraining flexibility, plans may further provide pseudo-exact estimates that enhance a false illusion of control (Dencker *et al.,* 2009a).

The identification of the potential benefits and costs of plans has not led, however, to the empirical resolution of whether writing a formal plan facilitates better performance. Prior results have reflected the oppositional nature of the extant debate: some studies find that formal plans lead to performance benefits (Delmar and Shane, 2004, 2004; Gibson and Cassar, 2005; Gruber, 2007; Lumpkin, Shrader, and Hills, 1998; Perry, 2001), while others point to the costs of such plans (Allinson, Chell, and Hayes, 2000; Bhide, 2000; Dencker *et al.,* 2009a; Honig and Karlsson, 2004; Karlsson and Honig, 2009; Lange *et al.,* 2007; Robinson and Pearce, 1983).

Preliminary conclusions and implications for this study

Our review reveals that the business plan literature and the consequent empirical evidence remain conflicting and oppositional. This reflects an assumption that the characteristics of planners and their emerging ventures differ little from those of entrepreneurs who elect not to plan. However, this neglects that founders are heterogeneous in their background experiences and education and that the characteristics of the fledgling venture are likely to shape the decision to plan. A central motivation for our study, therefore, is that this lack of focus on who writes a plan and under what circumstances it is written (selection effects) stymies the comprehension of plan effects on performance. Hence, prior to the assessment of plan-performance effects, it is important to isolate heterogeneity in the decision to plan. Accordingly, drawing on the extant evidence, we first develop arguments about how important founder, venture, and environmental antecedents affect the decision to write a plan. Subsequently, we examine the impact a plan has on the likelihood of achieving venture viability.

HYPOTHESES

The effects of founder characteristics on the decision to plan

Our first argument is that better-educated founders are more likely to write plans. This reflects that the better educated are more likely to recognize that a plan provides learning benefits (Dencker *et al.,* 2009a). Consequently, these founders may be more likely to perceive that a plan can detect and identify patterns and allow for meaningful conclusions to be drawn. They may also be more comfortable with scanning the external environment to identify external knowledge, have greater levels of absorptive capacity, and be better able to transform new knowledge into actions (Cohen and Levinthal, 1990; Zahra and George, 2002). Moreover, they may be socialized by higher levels of education into thinking that a plan is important and relevant (Honig, 2004). Hence, while the better educated may navigate the vicissitudes of nascent venturing without a plan (Burke *et al.,* 2010), our contention is that the better educated are more comfortable with collating, coordinating, and analyzing the information involved in writing a plan (Robinson and Pearce, 1983) and are more likely to envisage that a plan aids task comprehension and guides the identification of the customer/supplier requirements (Dencker *et al.,* 2009a). Hence, we argue that:

Hypotheses 1a (H1a): Better-educated founders are more likely to formally plan.

In general, studies show that prior sectoral and entrepreneurial experience provides tacit knowledge on markets and valuable start-up task comprehension (Davidsson and Honig, 2003; Haynie,

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Shepherd, and McMullen, 2009; Shane, 2004). We see that such experiences are likely to lower the propensity of such founders to write a plan. Prior repetition of nascent venturing aids tacit start-up and industry comprehension (Cassar, 2014; Dimov, 2010), increasing the prospect that those with repositories of pre-entry experience know what questions to ask and how to interpret the findings to derive appropriate actions without having to plan (Baron and Ensley, 2006). Further, although experienced founders may recognize that each business opportunity is idiosyncratic (Frankish *et al.,* 2012), they may believe that there are few upsides from writing a plan (Dencker *et al.,* 2009a), particularly as it is both difficult and costly to collect information for a plan (Cooper, Folta, and Woo, 1995). Hence, we argue that:

Hypotheses 1b (H1b): Founders with relevant sectoral experience are less likely to formally plan.

Hypotheses 1c (H1c): Entrepreneurially experienced founders are less likely to formally plan.

The effect of venture characteristics on the decision to plan

Other key determinants of the decision to plan are the internal task environment conditions (Ensley, Carland, and Carland, 2003). In settings in which the product/service is complex, there are heightened expectations of growth, and the venture provides innovation in the marketplace, we argue that founders are more likely to write formal plans. Armstrong (1982) finds that a plan is actually most likely to be beneficial when the challenges facing the venture are high. Plans help resolve organizational conflicts and provide a vision for how to review strategic options, thus reducing the chances of mistakes or wasteful activities (Brown and Eisenhardt, 1995). A plan may also distinguish between transient and intransient challenges (Glick, Miller, and Huber, 1993) and prompt a careful review of internal factors (Miller and Cardinal, 1994). Evaluating progress against key targets is particularly important when faced with crucial decisions such as the deployment of capital equipment (Grinyer, Al-Bazzaz, and Yasai-Ardekani, 1986) or the opportune time for employing staff (Dencker, Gruber, and Shah, 2009b). Miller and Cardinal (1994) suggest that these decisions should be planned rather than left to chance, particularly if the aspiration is to grow the venture. Indeed, Bhide (2000) suggests that if the estimated potential market is large, there may be a greater justification for a plan since it helps coordinate resource flows necessary for achieving growth and helps identify new directions and opportunities (Moorman and Miner, 1997). Consequently, although during growth and in innovative and complex task settings the assumption-to-knowledge ratio is higher (Gruber, 2007), we contend that plans clarify the opportunity, set out the means by which ends can be achieved, and help coordinate nascent activities. Hence, we suggest that:

Hypotheses 2a (H2a): Growth-oriented founders are more likely to formally plan.

Hypotheses 2b (H2b): Founders with more complex products/services are more likely to formally plan.

Hypotheses 2c (H2c): Innovative founders are more likely to formally plan.

The impact of environmental factors on the plan decision

Although competitor actions and motivations can be difficult to discern if information is costly and difficult to find (Fredrickson, 1984; Fredrickson and Iaquinto, 1989), we also argue that planning is more likely to occur when the competitive environment (i.e., the factors beyond the control of the founder (Shrader, Taylor, and Dalton, 1984)) is more rivalrous. In an environment where competition is intense, we see that writing a plan is more likely because it promotes a comprehension of the salience of competitive pressures, the importance of not being caught off guard by competitors and, crucially, plays a role in identifying the market entry strategy to compete effectively with existing incumbents. Hence, plans may provide competitor information that allows founders to predict competitor actions. Therefore, we suggest that:

Hypotheses 3a (H3a): Founders faced with heightened competitive environments are more likely to formally plan.

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Studies also indicate that founders seeking external finance often write plans because they recognize that outside financiers use plans to estimate and value their nascent venture. For example, Kuratko and Hodgetts (2004: 289) state "the business plan is the minimum document required by any financial source." This is supported by Honig and Karlsson (2004). Their research demonstrates that there is a shared expectation among both founders and external financiers that writing a formal plan is a prerequisite for gaining external funding. A formal plan is seen as likely to stimulate such funding because it serves as an legitimation device that demonstrates to external audiences that the nascent venture will overcome its liability of newness (Stinchcombe and March, 1965) and go on to achieve viability. Consequently, we argue that:

Hypotheses 3b (H3b): Founders seeking external finance are more likely to formally plan.

The impact of plans on achieving new venture viability

Central to our approach is that the principal reason why there is conflicting evidence about the efficacy of plans is that prior studies have conflated selection with performance effects. Burke *et al.* (2010) is one of the few studies to isolate the plan-performance relationship: they show that formal plans helped existing small firms grow. However, no prior studies disentangle plan selection and performance effects in a nascent venture setting. There are also conflicting theoretical accounts of the plan-performance relationship. Improvisationalist-based accounts of formal plans tend to argue that "setting oneself on a predetermined course in unknown waters is the perfect way to sail straight into an iceberg," (Mintzberg, 1987: 26) while plan proponents argue that the only way to avoid the iceberg is to have a map (Matthews and Scott, 1995; Zollo and Winter, 2002). Chandler *et al.* (2011: 376) have suggested that these differences have led to "a dichotomous war between the need to develop a full-blown business and marketing plan" and the need to "just get started." Faced with conflicting theoretical claims and divergent empirical evidence, for our final crucial argument, we consequently use a competing hypothesis approach. This is valuable since "testing competing hypotheses is an effective way to determine the relative merits of alternative theories" (Miller and Tsang, 2011: 114), particularly "where prior knowledge leads to two or more reasonable explanations" (Armstrong, Brodie, and Parsons, 2001: 4). Hence, we contrast rational and improvisational approaches. Improvisational-oriented approaches suggest that there are often no benefits to a plan, only costs (Lange *et al.,* 2007). By not formally planning, it allows founders to focus on leveraging their strategic resources to embrace contingencies (Bhide, 2000; Fisher, 2012; Sarasvathy, 2001) and, by enacting rather than evaluating the opportunity, it promotes the chances of achieving new venture viability. In contrast, rationalist purposive plan scholars appear to admit no costs to plans, only benefits. This reflects three key advantages: (1) that a plan is a boundary-spanning goal statement that equips founders with an understanding of required activities and resources (Delmar and Shane, 2004); (2) that plans promote goal attainment, particularly in "stretch" environments such as nascent venturing, because goal setting directs attention, energizes individuals, and promotes task persistence (Locke and Latham, 2002); and (3) plans enhance reflective and active learning (Chwolka and Raith, 2012). Hence, like other studies faced with two competing but viable alternatives (Ebben and Johnson, 2005; Goerzen, 2007), we suggest the following:

Hypotheses 4a (H4a) (Improvisationalist): There is a negative relationship between formal plans and achieving venture viability.

Hypotheses 4b (H4b) (Purposive planning): There is a positive relationship between formal plans and achieving venture viability.

METHODS

Data

Our data are from the Panel Study of Entrepreneurial Dynamics (PSED II). This is a representative survey of nascent entrepreneurial activities in the United States, covering founder characteristics, venture creation activities, venture characteristics, and venture outcomes (Reynolds and Curtin,

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2009). PSED II initially involved early-stage screening interviews with 31,845 individuals (late 2005/early 2006) to ensure the data were representative and potential survivorship biases were minimized. The initial 1,214 nascent founders who were identified (i.e., those intending to start a new venture, had previously carried out at least one start-up activity, expected to own part of the venture, and did not have an existing operational business) were followed over five subsequent annual waves (2007–2011). This longitudinal design—with monthly indications of activities started and finished—allows for inferences on the process of organizing activities and facilitates causal inferences among dependent and independent variables.

Subsequent to initial interviews with the 1,214 founders (Wave A), the number of respondents fell over successive waves: 972 for Wave B and 746, 526, 435, and 375 for Waves C to F, respectively. At Wave A, some founders may have already completed one or several gestation activities prior to their first interview. Hence, like Yang and Aldrich (2012), we truncated the sample to founders whose gestation activities began 10 years prior to Wave A, reasoning that those who spent more than 10 years on a new venture are unlikely to be serious about venture creation (Mueller, 2006). This reduced our sample from 1,214 to 1,106, for which we have missing data for 18 observations (i.e., the total sample is 1,088). Second, and similar again to Yang and Aldrich (2012), we controlled for the time that founders had spent on gestation activities prior to Wave A. Following on from the list of gestation activities identified by Reynolds (2011: 36), we took the earliest activity undertaken as the starting point of the organizing sequence and calculated the time span (in months) until the interview date (see Appendix for details of all variables used in this study).

Analysis

Aguinis and Edwards (2013) argue that three conditions need to be satisfied before appropriate causal inferences can be drawn from an analysis: (1) an association between cause and effect; (2) cause precedes effect; and (3) alternative explanations for the causal effect are ruled out. If cause differs from effect, this satisfies condition 1. Condition 2 can be controlled for by using longitudinal samples such as ours that avoid issues of reverse causality since the decision to plan, like our measures of founder, internal, and environmental factors, precede venture viability. Condition 3, however, is trickier: in order to arrive at the effect of a treatment (the business plan) on an outcome (venture viability), two groups must be created—one that gets the treatment and one that is the control group—that are as similar as possible.[1] For example, suppose genetically identical twins each seek to set up new businesses, with one deciding to plan (treatment group) and the other choosing not to plan (control group). Subsequently, we observe that the planning twin achieves new venture viability while the other twin disbands his/her venture. Since these twins are identical, it is plausible that viability is due to the treatment effect (the business plan). However, the challenge often, particularly in observational data such as ours, is to create "statistical twins" that are matched in terms of their observable characteristics. This is important because if the treatment and control groups do not resemble each other, it is likely that the relationship between a treatment and an outcome will be misspecified, since it is difficult to disentangle whether the impact on an outcome (venture viability) is due to the treatment effect (the plan) or selection effects.

One established way of creating a treatment group alongside a counterfactual control group using data such as ours is to use propensity score matching (Kaiser and Malchow-Møller, 2011; Li, 2013; Rosenbaum and Rubin, 1983). The logic of this approach is to match the characteristics of a treatment group (planners) with a control group (non-planners) so that their characteristics are observationally equivalent except for one crucial difference: one group decides to plan and the other group decides not to. Subsequently, if a planner achieves venture viability, this can be attributed to the treatment effect (the plan) rather than his/her characteristics (selection effects). In using propensity score matching, we follow Li (2013) and adopt his four-stage protocol.

The first stage involves an assessment of endogeneity. Hence, "before matching," we assess

[1] In more technical terms, the aim is that the treatment (business plan) is exogenous such that the difference in outcomes between the treatment and control groups corresponds to the effect of the treatment.

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whether there are systematic differences between the treatment and control groups in terms of differences in founder, venture, and external characteristics that may impact both on the decision to plan and, subsequently, on the chances of achieving venture viability (see Table 2). If endogeneity exists, unadjusted results will be biased and lead to facile inferences (Hamilton and Nickerson, 2003). This justifies using the estimation of the propensity score (i.e., the conditional probability of receiving the treatment (formal plan)). The second stage involves assessing the quality of this matching to identify unresolved sources of endogeneity. Hence, there is a need, "after matching," to see if differences in the mean values of individual and venture characteristics persist or are successfully removed through matching (Table 3). Conditional on the matching being balanced such that the treatment and control groups are "statistical twins," the third step is to analyze treatment effects by estimating the causality between the treatment effect (the plan) and the outcome (venture viability) (Leuven and Sianesi, 2014). These estimates, conditional on the propensity score, are the sample average treatment effects on the treated (ATTs). These ATTs are the average effects from the treatment (formal plans) for those who actually were treated (planners). The ATTs answer the question: what would have happened if the planner had decided not to write a formal plan?

The fourth and final stage is to conduct sensitivity analyses. These are vital because estimates of, in our case, plan effects on venture viability, are sensitive to the use of predictor variables and matching estimators. Li (2013) advocates calculating the sensitivity of the sample ATT estimates to the matching algorithms used and examining the existence of potential distortions by unobserved variables. This is what we do: we provide sample ATT estimates based on different distributional assumptions (Table 4), dependent variable characterizations (Table 5), matching techniques (Table 6), and control group compositions (Table 7) and use Rosenbaum bounds to test for potential unobserved heterogeneity (Table 8). We also provide population average treatment effects (ATEs) estimates (i.e., the expected effects from a randomly selected unit of the population). Population ATEs are important because there are those in the wider population who do not formally plan because, for example, they may be simply unaware of the option to plan. Examining population ATEs allows us to assess for the presence of unobservable heterogeneity and provides further wider external, population-based, validity for our sample ATTs. To achieve this, we compare our estimates for the ATT and ATE and test if there are material differences between the matched sample and the non-matched units.[2]

Overall, propensity score matching means we can estimate the probability of formally planning conditional on matched characteristics. Besides being robust, propensity score matching does not rely upon instruments that are difficult to find (i.e., a variable that is related to writing a plan but not performance) and explicitly allows for covariate imbalance adjustments between non-/formal planners. Matching is also advantageous because rather than focusing on one mediator, it controls for a set of variables at the same time. This is important because there are a number of factors that are likely to simultaneously influence the decision and utility of a plan. Hence, by focusing on the predicted probability of formal plans, we can derive the counterfactual based on several theoretical antecedents simultaneously (Kaiser and Malchow-Møller, 2011; Rosenbaum and Rubin, 1983).[3]

Dependent variable: venture viability

McMullen and Dimov (2013: 1496) theorize that "the entrepreneurial journey concludes for the firm once that venture definitively realizes a profit or loss from activities related to that product." Hence, as with Kim *et al.* (2015) and Yang and Aldrich (2012), we use: "when monthly revenues exceed monthly expenses for six out of 12 months; including salaries for the managers" (PSED II: A35) as our

[2] This is possible because the randomized sampling procedure of the PSED (in terms of participants, not planning) means that the sample ATTs from the PSED II data are also an estimate of the population ATEs.

[3] Matching is also arguably superior to that of a moderation approach. Moderation implies that a predictor variable has a differential effect on an outcome variable conditional on the base level of another variable. Hence, moderation analyses typically involve a multiplicative interaction of two variables so that what is tested is whether the slope coefficient of an X-Y relationship differs for varying values of a moderator Z. Moderation, therefore, derives the non-planning effect directly from the control group. Hence, it does not estimate the counterfactual, obfuscates the direct effect of business planning on venture creation by omitting the counterfactual argument, and may bias the results in favor of antecedents causing the decision to plan in the first place.

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dependent variable (1 = if the monthly revenues exceed monthly expenses for six out of 12 months; including salaries for the managers; 0 = otherwise). In our main analysis, we report ongoing activities as per Wave F and compare founders that achieved venture viability (A35) against those who disbanded their venture (A42, E51: 1 = founders stop their venture activities and no one else is working on the venture; 0 = otherwise) and those who are "still trying" to prosecute their ventures (Davidsson and Gordon, 2012; Dimov, 2010). To complement this binary variable (venture viability versus disbandment/still trying), in our robustness tests, we use three alternative dependent variables: (1) the founder's self-reported assessment of achieving venture viability (A41: 1 = self-report venture viability; 0 = otherwise); (2) sustained viability (A35 and no venture disbandment (A42) until Wave F); and (3) achieved first sale (E14: 1 = first revenue has been received from the sale of goods or services for this new business; 0 = otherwise). We also extend this binary dependent variable by testing multinomial models (Table 4, row 4; Table 5, rows 3 and 6) which, following on from Davidsson and Gordon (2012), assess the relationship between formal plans and three outcomes—viability (A35), disbandment (A42, E51), and "still trying."

Formal planners

As with other studies, our focus is on formal written plans (Delmar and Shane, 2004; Lange *et al.,* 2007). To identify formal planners, we used two PSED II questions (D1 and D2: 1 = formal planners; 0 = otherwise).[4] Table 1 show that the treatment group consists of 269 (24%) founders.[5] The control group is made up of the remaining 819 founders.[6] To test whether the composition of the control group makes any difference to the plan-performance relationship, Table 7 provides robustness tests of alternative control group compositions.

Predictor covariates: individual founder, venture characteristics, and environmental factors

In terms of founder characteristics, we follow Davidsson and Honig (2003) and Iacus, King, and Porro (2011) and measure educational attainment in terms of years of schooling (H6); number of years of sectoral experience in the same industry as the venture (H11); and entrepreneurial experience with other ventures (H13). To assess the innovativeness of the venture, we follow Dahlqvist and Wiklund (2012) and assess innovation by using a three-point scale (S1: 3 = all, 2 = some, 1 = no customers…are unfamiliar with the new product/service). We follow Kim *et al.* (2015) to assess the expectations about venture growth (T1:1 = "I want this new business to be as large as possible"; 0 = otherwise) and to examine product/service complexity through a composite measure of the level of novelty and technical expertise required to compete successfully (F4, F5, F8–10; scales inverted; Cronbach's alpha of 0.72). To measure the need for external finance, we use a binary measure—if founders were actually seeking financial capital (E2: 1 = yes; 0 = otherwise) (Reynolds, 2011)—and assess competitive pressures by using S2 (3 = there are many; 2 = there are some; 1 = there are no…other businesses offering the same product/service).

Control variables

We control for a wide range of other variables that may influence the decision to plan: to complement the need for external finance, we assess the amount of personal resources used in the venture (Q4–10:

[4] The corresponding PSED question defines the business plan for the respondents as "A business plan usually outlines the markets to be served, the products or services to be provided, the resources required—including money—and the expected growth and profit for the new business." Given the inherent difficulties in assessing the quality of the plan with this measure, we corroborated whether or not nascents had completed other activities usually related to business planning, such as financial planning (Burke *et al.,* 2010), marketing (Gruber, 2007), or general prediction activities (Sarasvathy, 2001). Those who formally plan are also more likely to do financial projections ($ß = 0.27$, $p < 0.01$), engage in marketing activities ($ß = 0.12$, $p < 0.05$), define their market opportunity ($ß = 0.114$, $p < 0.05$), and collect information about competitors ($ß = 0.088$, $p < 0.1$).

[5] Studies by Pearce *et al.* (1987), Bhide (2000), Sarasvathy (2001), and Burke *et al.* (2010) also show that formal planners are in the minority.

[6] In particular, the group consist of different types of non-formal planners based on the planning status reported up to and including Wave F: 385 "informal" planners; 159 "unwritten" and "in their head" planners; 224 who consider a plan irrelevant; and 51 who consider a plan relevant but never complete any plan activities up to and including Wave F. See Appendix for further information.

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total dollar amount invested of personal savings and other sources); time spent on the nascent venture (H16:1 = 35 hours or greater; 0 = otherwise); team size (AG2: number of founders: Colombo and Grilli, 2005); the founder's ability expectations (Q. AY4–AY8; scales inverted so that higher values indicate higher levels of ability expectations; Cronbach's alpha: 0.68; Townsend, Busenitz, and Arthurs, 2010); and their start-up commitment (AY9 and AY10; inverted scales; Cronbach's alpha: 0.71; Dimov, 2010). We also control for work experience (H20: years), the time elapsed between the first gestation activity and Wave A (Yang and Aldrich, 2012), and sector (B1: dummies of service, retail, and other industries (base category)).

RESULTS

We organize our results in eight tables. Table 1 presents summary statistics and correlations. Table 2 presents our "before" propensity score matching results. Table 3 presents our "after" matching results. Table 4 presents the sample ATT results, while Tables 5–8 present robustness checks for these ATTs. The notes in Tables 4–7 report the population ATEs.

Table 1 shows that 22 percent of founders had created a viable venture (237 observations), with 38 percent "still trying" and 40 percent having disbanded their attempt (418 and 433 observations, respectively). These outcomes are similar to other new venture studies (Reynolds, 2011; Spletzer *et al.,* 2004). Table 1 also shows that founders typically have at least a high school qualification, that the average sectoral experience is eight years, and that one-in-three have prior entrepreneurial experience. About a quarter of founders indicate high growth aspirations, while Table 1 also shows that levels of product complexity, competition, and innovation were modest. Finally, about one-third of founders were seeking external finance.

Table 2 reports our "before matching" results. Although the tests for mean differences (t-tests) and the distributions of variables (Kolmogorov-Smirnov test) reported in columns 1 and 2 of Table 2 provide useful information, we focus our tests of H1a–H3b on the probit regression results (dependent variable: non-/formal planners) reported in column 3. The additional probit regression reported in column 4 is used to ascertain if founder and venture antecedents also impact venture viability. In sum, the aim of Table 2 is to assess if there are selection effects in the decision to plan (column 3) and if these are endogenous to the achievement of venture viability (column 4).

Column 3 of Table 2 shows support for H1a: an additional two years of education increases the chances of formal planning by five percentage points ($ß = 0.026$, $p < 0.01$). We do not find support for H1b (sectoral experience) or H1c (entrepreneurial experience). Column 4 does, however, show that an extra year of education ($ß = 0.012$, $p < 0.1$) and sectoral experience ($ß = 0.030$, $p < 0.05$) increase the chances of achieving venture viability by one and three percentage points, respectively. This shows that founder characteristics are likely to bias, if not controlled for, the plan-performance relationship.

In terms of venture characteristics, we find support for H2a ($ß = 0.072$, $p < 0.1$) (growth orientation) and H2c ($ß = 0.046$, $p < 0.05$) (innovation). We do not find support for H2b (product/service complexity) or for H3a (competitive pressures). However, we find strong support for H3b ($ß = 0.194$; $p < 0.01$) (external finance). This is the largest coefficient in Table 2, indicating that founders seeking finance are 19 percentage points more likely to plan. The need for external finance is also related positively to venture viability (column 4).

Table 2 also identifies that founders with greater levels of private savings are less likely to plan, but those who have bigger teams and spend more time on their ventures are more likely to plan. In summary, in terms of our hypothesized relationships, Column 3 shows that the better educated, innovators, and those seeking finance and growth were more likely to formally plan. In contrast, sectoral and entrepreneurial experience, competition, and product complexity all appear to have no discernible impact on plan propensity. Column 4 shows that education, sectoral experience, and the need for external finance influence the venture viability prospects, indicating clear evidence of a strong and severe endogeneity problem obfuscating the causal effect of plans on venture viability.

Because of this endogeneity, we conducted propensity score matching to level out differences between the treatment and control groups. Table 3 reports the subsequent "after matching" results in terms of mean (t-test results) (column 1) and

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Table 1. Summary statistics and correlation matrix

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Venture viability	0.22	0.41																					
2 Disbandment	0.40	0.49	−0.43																				
3 Still trying	0.38	0.49	−0.42	−0.64																			
4 Formal planners	0.25	0.43	0.15	−0.12	−0.01																		
5 Education	14.48	2.11	0.08	0.00	−0.07	0.13																	
6 Sectoral experience	8.37	9.09	0.12	−0.16	0.05	0.03	0.09																
7 Entrepreneurial experience	0.33	0.71	0.01	−0.03	0.02	0.08	0.15	0.00															
8 Innovative product/services	1.64	0.74	−0.07	0.02	0.03	0.11	0.05	−0.10	0.07														
9 Growth aspirations	0.26	0.44	−0.03	−0.12	0.14	0.13	0.03	−0.05	0.11	0.12													
10 Product complexity	3.84	0.96	−0.02	−0.04	0.05	0.09	0.01	0.08	0.01	0.15	0.14												
11 Competitive pressures	1.32	0.77	0.03	0.01	−0.04	−0.06	0.00	0.01	−0.05	−0.27	−0.13	−0.11											
12 Seeking external finance (d)	0.28	0.45	0.12	−0.10	0.00	0.23	0.07	0.05	0.07	−0.02	0.12	−0.04	0.06										
13 Private savings	4.42	4.27	0.06	−0.08	0.03	−0.09	0.03	0.01	−0.01	−0.08	−0.07	−0.05	0.13	0.00									
14 35 hours on venture (d)	0.30	0.46	0.15	−0.16	0.04	0.13	−0.04	0.07	−0.01	−0.01	0.05	0.01	0.01	0.10	0.07								
15 Team size	1.81	1.55	0.01	−0.02	0.01	0.10	0.08	0.01	0.15	0.01	0.09	0.00	−0.05	0.16	−0.05	0.00							
16 Ability expectation	4.35	0.51	0.07	−0.09	0.04	0.11	−0.03	0.21	0.00	0.03	0.07	0.19	−0.05	0.06	0.00	0.14	−0.06						
17 Start-up commitment	4.10	0.86	0.02	−0.07	0.06	0.10	−0.19	0.08	−0.08	0.03	0.12	0.17	−0.01	0.05	0.02	0.13	−0.06	0.46					
18 Work experience	20.55	11.33	0.02	0.00	−0.03	0.02	0.18	0.23	0.12	−0.03	−0.05	0.02	0.02	0.01	0.02	0.02	0.04	0.01	0.00				
19 Time elapsed	21.07	23.51	0.06	−0.10	0.05	0.06	0.06	0.18	0.04	0.01	0.04	0.05	0.00	0.04	0.03	0.06	0.02	0.04	0.04	0.02			
20 Retail (d)	0.19	0.39	−0.05	0.05	−0.01	0.03	−0.06	−0.11	0.02	0.06	0.05	0.05	−0.06	−0.02	−0.09	0.00	−0.02	−0.02	0.02	0.01	−0.07		
21 Services (d)	0.64	0.48	0.07	−0.02	−0.04	0.02	0.10	0.00	−0.04	0.01	0.00	0.01	0.03	−0.03	0.04	−0.02	−0.04	0.02	−0.04	−0.05	0.03	−0.64	
22 Other industries (d)	0.16	0.37	−0.01	0.00	0.00	0.02	−0.05	0.01	0.03	−0.03	−0.01	0.00	0.04	0.08	0.00	0.01	0.04	−0.05	0.02	0.01	0.00	0.18	−0.22

Summary statistics and correlation matrix are based on 1,088 observations. All correlations above 0.1 are significant at least at the 10% level. Variables denoted with (d) are dummy variables.

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Table 2. Probit regression antecedents of business planning and test for differences in distributions—before matching

	(1) Differences in mean: T-test	(2) Differences in distribution: Kolmogorov-Smirnov (p-values)	(3) Binary regression: DV - (1 = formal planner; 0 = non-formal planners (informal, non-, and unwritten planners))	(4) Binary regression: DV - (1 = venture viability; 0 = nonviable ventures (disbanded/still trying))
Founder characteristics				
Education	–0.636***	0.00***	0.026***	0.012*
	(0.000)		(0.001)	(0.087)
Sectoral experience	–0.0651	0.35	–0.010	0.030**
	(0.405)		(0.534)	(0.037)
Entrepreneurial experience	–0.0639**	0.54	0.016	–0.012
	(0.011)		(0.723)	(0.775)
Venture characteristics				
Growth aspirations (d)	–0.131***	0.000***	0.072*	–0.062**
	(0.000)		(0.071)	(0.044)
Product complexity	–0.208***	0.06*	0.027	–0.002
	(0.002)		(0.115)	(0.900)
Innovative product/services	–0.189***	0.01**	0.046**	–0.030
	(0.000)		(0.043)	(0.170)
External environment				
Competitive pressures	0.106*	0.35	0.001	–0.019
	(0.051)		(0.967)	(0.304)
Seeking external finance (d)	–0.244***	0.00***	0.194***	0.082**
	(0.000)		(0.000)	(0.012)
Controls				
Private savings	0.846***	0.00***	–0.009**	0.006*
	(0.005)		(0.025)	(0.078)
35 hours on venture (d)	–0.141***	0.00***	0.097**	0.110***
	(0.000)		(0.013)	(0.001)
Team size	–0.367***	0.07*	0.023**	–0.002
	(0.001)		(0.047)	(0.798)
Ability expectation	–0.127***	0.04*	0.028	0.005
	(0.000)		(0.453)	(0.881)
Start-up commitment	–0.191***	0.01**	0.012	0.004
	(0.001)		(0.627)	(0.812)
Work experience	–0.0283	0.47	0.009	–0.015
	(0.603)		(0.710)	(0.464)
Time elapsed	–3.452**	0.04*	0.001	0.000
	(0.037)		(0.212)	(0.405)
Retail (d)	–0.0312	0.99	0.135**	0.057
	(0.257)		(0.034)	(0.312)
Services (d)	–0.0231	1.00	0.077*	0.070*
	(0.494)		(0.082)	(0.065)
Chi-square			90.34	45.77
P > chi-square			0.000	0.000
Treatment group - planners	269	269	269	269
Control group	819	819	819	819

*p < 0.1; **p < 0.05; ***p < 0.01.

Column 1 reports differences in mean values between the control group and the formal planners, p-values are reported in parentheses. Column 2 reports p-values from Kolmogorov-Smirnov tests. Coefficients in column 3 and 4 correspond to the marginal effects from a logit regression for the independent variables calculated at the mean levels of the remaining variables. Variables denoted with (d) are dummy variables. P-values for columns 3 and 4 are shown in parentheses. The number of observations is equal to 1,088 in all four columns. T-tests are carried out only for observations included in the binary regressions to allow for comparability.

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Table 3. Test for differences in distributions—after matching

	(1) Differences in mean: t-test	(2) Differences in distribution: Kolmogorov-Smirnov (p-values)
Dependent variable		
Venture viability (d)	–0.161	0.02**
	(0.000)	
Founder characteristics		
Education	0.0543	0.99
	(0.790)	
Sectoral experience	–0.0111	0.92
	(0.924)	
Entrepreneurial experience	0.0309	0.77
	(0.447)	
Venture characteristics		
Growth aspirations (d)	–0.0211	1.00
	(0.668)	
Product complexity	–0.0279	0.29
	(0.779)	
Innovative product/services	–0.0504	1.00
	(0.535)	
External environment		
Competitive pressures	–0.0134	0.99
	(0.878)	
Seeking external finance (d)	0.0187	1.00
	(0.718)	
Controls		
Private savings	–0.132	0.81
	(0.776)	
35 h on venture (d)	–0.0125	1.00
	(0.805)	
Team size	0.0806	0.99
	(0.716)	
Ability expectation	0.0125	1.00
	(0.792)	
Start-up commitment	0.0181	0.95
	(0.824)	
Work experience	0.0402	0.50
	(0.595)	
Time elapsed	1.569	0.31
	(0.566)	
Retail (d)	0.0351	0.95
	(0.434)	
Services (d)	–0.00102	1.00
	(0.984)	
Treatment group - planners	184	184
Control group	170	170

*p < 0.1; **p < 0.05; ***p < 0.01.
Column 1 reports differences in mean values between the control group and the formal planners, p-values are reported in parentheses. Variables denoted with (d) are dummy variables. Column 2 reports p-values from Kolmogorov-Smirnov tests.

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distributional (Kolmogorov-Smirnov test) (column 2) differences. These reveal that there are no differences in the core mean values for either planners or non-planners (i.e., differences have been levelled out).[7] Moreover, the p-values in column 2 ($p > 0.1$) show that the distributional overlap has been achieved through matching. Crucially, however, the differences in venture viability/disbandment probabilities are still significant (ß = 0.161, $p < 0.01$).[8]

We now turn to the impact of formal plans on new venture viability. Table 4 presents the sample ATT results. We present four variants of these results. First, we present results from the propensity score (Psmatch2): formal planners are more likely to achieve viability (ß = 0.160, $p < 0.01$). To check whether this result is biased by model uncertainty (due to differential distributions in our propensity score matching), we also report a linear probability model (row 2) and a probit model (row 3) allowing for nonlinear effects in the distribution of variables: coefficients for these models are slightly higher, but remain significant (ß = 0.193, $p < 0.01$ and ß = 0.194, $p < 0.01$, respectively). Finally, row 4 shows the results for a multinomial probit comparing three outcomes (venture viability/disbandment/still trying): these again are significant (ß = 0.206, $p < 0.01$). These results support H4b.

Table 4. Average treatment effect on the treated (ATTs)

Estimation model	Outcome: venture viability	
	ATTs	
	Coefficient	S.E.
Propensity score (Psmatch2)	0.160***	0.045
Linear probability model	0.193***	0.034
Probit model	0.194***	0.031
Multinomial probit	0.206***	0.035

*p < 0.1; **p < 0.05; ***p < 0.01.
The corresponding population average treatment effects (ATEs) are (ß = 0.173, SE = 0.048), (ß = 0.167, SE = 0.034), (ß = 0.162, SE = 0.043), and (ß = 0.192, SE = 0.060). Sample size is equal to 354 (184 treatment group; 170 control group).

Robustness checks

To check the robustness of these results, Table 5 provides ATT results for three alternative dependent variables: self-reported venture viability (rows 1–3); sustained viability (rows 4–6); and achievement of first sale (rows 7–9). Again, as with Table 4, we report Psmatch2, probit and multinomial model results. Although the plan-achieving first sale relationship is much weaker, Table 5 confirms that formal planners are more likely to achieve both self-assessed (Psmatch2: ß = 0.144, $p < 0.01$; probit ß = 0.158, $p < 0.01$; and multinomial ß = 0.169, $p < 0.01$) and sustained viability (Psmatch2: ß = 0.135, $p < 0.01$; probit ß = 0.103, $p < 0.01$; and multinomial ß = 0.112, $p < 0.01$). Table 5 also examines right censoring issues. These may be an issue because some founders who report they had a viable venture may subsequently disband their venture. To assess this, we examined Wave F information. This revealed that out the 237 viable ventures in Wave E, only 186 reported venture viability in Wave F. To see if this impacted on our ATT results, we reclassified and reestimated our results to take account of these issues (Table 5, rows 4–6). This made little difference in terms of the Psmatch2 model (ß = 0.135, $p < 0.01$), but had smaller effects for both the probit and multinomial models (ß = 0.103, and ß = 0.112).[9]

Another source of potential bias may be due to the matching method employed. Following Li (2013), Table 6 provides estimates from nearest neighbor, kernel, and radius matching. For nearest neighbor, we compute the ATTs using only one single neighbor to provide a more conservative

[7] Whenever differences in mean values existed after propensity score matching, the CEM procedure suggested in Iacus *et al.* (2011) has been applied to this variable to level out differences.

[8] This is not due to differences in the general distribution of predictor variables. The p-values from the Kolmogorov-Smirnov test are insignificant after matching for any predictor variable. However, the distributional difference remains for venture viability. This is important, as it represents our dependent variable. We also conducted a subsample analysis according to the propensity blocks (psmatch procedure). Only two variables are significant at the five percent level (i.e., two out of 68 models (3%), which is expected at the 5 % level), and only one variable was significant at the one percent level (i.e., one out of 68 models (1.4%), which again is expected at the 1% level).

[9] We also tested whether the proportional odds/parallel lines assumption in the multinomial model is met. The insignificant test statistic indicates that the final model does not violate this assumption and that the findings from the multinomial model are robust.

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Table 5. ATTs for alternative dependent variables

Matching estimator name	Outcome: variants of venture viability	
	ATTs	
	Coefficient	S.E.
Self-assessed viability (Psmatch2)	0.144***	0.044
Self-assessed viability (probit)	0.158***	0.030
Self-assessed viability (multinomial)	0.169***	0.034
Sustained viability (Psmatch2)	0.135***	0.040
Sustained viability (probit)	0.103***	0.026
Sustained viability (multinomial)	0.112***	0.031
Achieved first sale (Psmatch2)	0.053	0.051
Achieved first sale (probit)	0.063*	0.035
Achieved first sale (logit)	0.063*	0.034

*p < 0.1; ** p < 0.05; ***p < 0.01.
The corresponding population ATEs are (ß = 0.15, SE = 0.049), (ß = 0.106, SE = 0.034), (ß = 0.133, SE = 0.047) for the self-assessed viability measures; (ß = 0.091, SE = 0.043), (ß = 0.071, SE = 0.031), (ß = 0.099, SE = 0.047) for the sustained viability measures; and (ß = 0.071, SE = 0.044), ß = (0.048, SE = 0.036), (ß = 0.046, SE = 0.036) for the achieved first sale measures.

estimate (more matching partners increase a potential bias: Abadie *et al.,* 2004). For radius matching, controls are matched to treated units when the propensity score falls into a predefined range of the treated unit (Huber, Lechner, and Steinmayr, 2015). Finally, to provide non-parametric ATTs, we use kernel matching (all treated units are matched with a weighted average of the controls: Becker and Ichino, 2002). Table 6 shows that all ATTs are positive and significant (nearest neighbor: ß = 0.108, p < 0.05; radius: ß = 0.110, p < 0.05; and kernel: ß = 0.117, p < 0.01).[10]

We also analyzed whether control group composition affects our results. Table 7 shows that formal planners are more likely to achieve venture viability than either non-planners (ß = 0.130, p < 0.01) or informal planners (ß = 0.167, p < 0.01), although the comparison between planners and those who see planning as irrelevant is somewhat

Table 6. ATTs for matching variants

Matching estimator name	Outcome: venture viability	
	ATTs	
	Coefficient	S.E.
Nearest neighbor matching	0.108***	0.041
Radius matching	0.110**	0.048
Kernel matching	0.117***	0.035

*p < 0.1; **p < 0.05; ***p < 0.01.
The corresponding population ATEs are (ß = 0.104, SE = 0.038), (ß = 0.099, SE = 0.039), (ß = 0.123, SE = 0.036).

weaker (ß = 0.082, p < 0.1). All in all, the results are invariant to the composition of the control group: formal planners are more likely to achieve venture viability. Finally, to assess the robustness of these ATTs to unobserved heterogeneity, we calculated Rosenbaum bounds to check the sensitivity of our estimates. Table 8 shows that the results were insensitive to deviations from the unconfoundedness assumption, as large deviations (increasing the odds of formal planning and venture viability at the same time by more than 90%) would render the results insignificant.[11]

Finally, we consider potential differences between sample ATTs and population ATEs.[12] In Table 4, the ATEs (expected mean difference in viability for an individual selected randomly from the sample) are similar to the baseline coefficients, with ATEs remaining significant (and economically sizeable), albeit one to three percentage points

[10] One consequence of matching is that it reduces sample size (Dehejia and Wahba, 2002; Guo and Fraser, 2014). Hence, although we found matches for 70 percent of the initial formal planners, we also tested how the relaxation of the matching assumption affects the results, and we allow for five neighbors in the matching. This resulted in 243 planning and 657 non-planning observations. The ATT is smaller (ß = 0.099, p < 0.01) but within the bounds reported previously.

[11] The bounds indicate that the confidence interval for the estimated treatment effects would widen (and include zero) if there are unobserved variables that can cause the odds ratio of treatment assignment to differ between the treatment and comparison groups by the calculated values of the test statistic.

[12] To estimate the ATEs, we used the same estimation strategy as was used for our core ATT results (Table 4). Hence, we began by examining if there were differences in mean values and distributions between the matched and non-matched. There were slight differences in terms of mean values for seeking external financing (ß = 0.14, KS p-value < 0.01), start-up motivations (ß = 0.26, KS p-value < 0.01), and ability expectations (ß = 0.18, KS p-value < 0.01). However, no other variables differed in means, and there were no differences between planners and non-planners upon being matched. Distributional differences were also slight (full results available on request from authors), indicating that the wider population ATEs are reflected in the sample ATTs. Hence, we generally find that our sample is reflective of a random draw from the population and are subsequently confident that our sample average treatment effect also represents evidence on the population average treatment effect.

DOI: 10.1002/sej

Table 7. ATTs for alternative control groups

Control group variations	Outcome: venture viability	
	ATTs	
	Coefficient	S.E.
Formal planners vs. non-formal planners (unwritten, informal plan and planning irrelevant)	0.130***	0.031
Formal planners vs. informal planners (unwritten and informal plan only)	0.167***	0.033
Formal planners vs. non-planners (consider planning irrelevant)	0.082*	0.043

*p < 0.1; **p < 0.05; ***p < 0.01.
The control group in row 1 comprises all non-formal planners except for 51 observations that considered a plan as relevant (D1 = 2, "No, not yet; will in the future") but never complete any planning activities up to and including Wave F. The control group in row 2 comprises 385 "informal" planners (coded as 1 if D1 = 1, and D2 = 2; 0 = otherwise) and 159 "unwritten" and "in their head" planners (coded as 1 if D1 = 1 and D 2 = 1; 0 = otherwise. The control group in row 3 comprises 224 observations that consider planning irrelevant (D1 = 5, "No, not relevant." Population ATEs are (ß = 0.133, SE = 0.036), (ß = 0.151, SE = 0.042) and (ß = 0.106, SE = 0.068).

lower. In Table 5, ATEs again are highly significant, but again, some three percentage points lower on average for self-assessed viability, sustained viability, and first sales. Each of these ATEs, however, remains significant. The ATEs in Table 6 show similar positive effects for the differing matching estimators, while Table 7 shows for the different control group compositions slightly higher ATEs. Taken together, these corroborating ATEs provide further support for the ATT results.

In summary, our core ATT results (Table 4)—confirmed in subsequent robustness tests that examined an alternative dependent variable specification, controlled for right censoring biases, matching variants, the robustness of our treatment effects, and in ATE estimates—show support for the plan-venture viability relationship (H4b).

Table 8. Rosenbaum bounds of ATTs (see Li, 2013)

Gamma	Formal plan p-critical
1.1	**0.001**
1.2	**0.002**
1.3	**0.005**
1.4	**0.011**
1.5	**0.022**
1.6	**0.037**
1.7	**0.058**
1.8	**0.086**
1.9	0.121
2	0.162

Gamma = The odds ratio that individuals will receive treatment. P-values in bold highlight significant net business planning effects in the presence of unobservable variables causing higher treatment probabilities.

DISCUSSION

As the literature review highlighted, there persist divergent and contradictory interpretations of the role formal plans play in achieving venture viability. The aim of this study was to offer fresh insights by developing and testing a counterfactual model of the plan-performance relationship. Our findings have important implications for scholars, educators, and aspiring founders interested in better understanding what shapes the decision to formally plan and the consequences of writing a formal plan.

Implications

For strategy and entrepreneurship scholars, our key finding is that it pays to plan. Our ATT results show a positive impact of planning on venture viability for those who actually planned, that ranges from a lower bound of 10 to an upper bound of 15 percentage points. Similarly, our ATE estimates show that also a randomly chosen individual would have benefited from planning, though the effect is slightly (3% points) smaller. This is similar to other studies that examine plan-viability outcomes but do not adjust for endogeneity (0.11 marginal effect of plans on survival: Honig and Karlsson (2004); 0.09 marginal effect of plans on marketing objectives: Gruber (2007); and 0.11 correlational coefficient between plans and survival: Shane and Delmar (2004)). These effects sizes are also in line with Brinckmann *et al.* (2010), whose meta-analysis of planning studies found a 13 percentage point effect size for growing new ventures that planned. They, however, are lower than that of Burke *et al.* (2010) who found, after controlling for endogeneity, a

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23 percentage point effect of plans on sales growth for existing small ventures.

Overall, we see that the reason why plans promote venture viability is that they help to pierce the "fog of futurity" (Kirzner, 2009) by identifying, orchestrating, and promoting goal attainment (Locke and Latham, 1990, 2002). We also see that formal plans are advantageous because they appear to promote better entrepreneurial decision making about the allocation and coordination of resources.

Such findings may offset the anti-planning bias in parts of the normative business plan literature which draws on emergent, improvisational logics to argue that founders are better off using trial-and-error learning to achieve viability. Theoretical approaches such as effectuation or bricolage have come to the fore because they suggest that emergent improvisational logics better support nascent venture outcomes. These logics have led to practitioner-based approaches that suggest nascent founders should eschew formal plans and focus on experimental learning (Ries, 2011; Schlesinger and Kiefer, 2012). We recognize that these experimental logics are appealing because a central issue in nascent venturing is envisioning "what is unknown, uncertain, and not yet obvious to the competition" (McGrath and MacMillan, 2000: 44). While our study does not explicitly test these particular logics, we do note, however, that we separate out selection and performance effects, use appropriate longitudinal data, and conduct an extensive battery of tests. Counterfactual approaches such as ours, however, are largely absent from much of the improvisational business plan literature. This is surprising because logics such as effectuation and bricolage are predicated on how individual founders are able to leverage their personal resources for achieving venture outcomes. This endogeneity, however, is rarely examined in these studies. This presents a challenge to plan skeptics: before the efficacy of an emergent approach to creating a viable venture can be readily assessed, there is a need to disentangle the improvisational activities from the (experienced) improvisational actor.

Our current results, however, do not offer much succor to plan skeptics. Despite providing three variants of venture viability (self-assessed viability, sustained viability, and achieved first sale), three different control group variations, and population-based ATEs, our results all point to the value of formal plans. By implication, they also suggest that contingency-based leveraging actions and experimentation appear to be more likely to lead to suboptimal "groping along" attempts to achieve venture viability (Dimov, 2010). Therefore, while our findings tacitly question the utility of effectuation, bricolage, and particular plan methodologies (e.g., lean start up or the business model canvas), we, however, stress that our results should not be overinterpreted. One reason for this is that founders rarely start with the simple stark question of: to plan or not to plan. Rather, as Baum, Locke, and Kirkpatrick (1998) suggest, they begin with a goal or a vision. One expression of this vision may be a formal business plan, but, as Hmieleski and Corbett (2008) point out, this vision is likely to have to adapt to changing circumstances. Consequently, a formal plan may be valuable because it helps orchestrate improvisational activities and, thereby, improves entrepreneurial decision making (Chwolka and Raith, 2012).

One further contribution of this study is that we show that the founding environment plays an important role in specifying the boundary conditions around the decision to plan. In particular, by examining founder, venture, and external characteristics, we join with Gruber (2007), Dencker *et al.* (2009a), and Burke *et al.* (2010), who all argue for a more nuanced interpretation of plan contexts and effects than is provided by guides that advocate that *all* ventures should either always plan or, alternatively, espouse the view that formal plans should be avoided at *all* costs. Illustrative of this is the impact of finance. Our findings show that founders with private savings are less likely to plan, bolstering Bhide's (2000) suggestion that there is little impetus to plan when there are few outside downside risks to venture creation. Our results also support Honig and Karlsson (2004): the decision to plan is responsive to the need for external finance, indicating that plans are devices that help externally legitimate the nascent venture. However, our findings also show that formal plans are not just ceremonial cues because once the need for external finance is controlled for, a formal written plan still has a positive impact on achieving venture viability.

Our study also has important implications for strategy scholars. It confirms that formal plans are valuable, even in innovative and growth-oriented contexts. It also shows the importance of developing an understanding of contextual environments that

DOI: 10.1002/sej

shape subsequent outcomes. Better understanding contexts is valuable because counterfactual models such as ours can help stimulate better theorizing about phenomena and improve the practical validity of results (Johns, 2006). In seeking to discover context-free regularities, we see implications for other middle-range situation-specific theorizing about entrepreneurial and managerial phenomena. In particular, our study resonates with other strategy-based research that demonstrates that a failure to account for endogeneity leads to biased estimates (Shaver, 1998; Villas-Boas and Winer, 1999). It also has implications for entrepreneurship research. For example, taking account of endogeneity may provide new insights into how founders draw on their social capital to leverage venture outcomes. While some researchers highlights the generic benefits of social capital (Davidsson and Honig, 2003), others point out that founders' social capital and their ability to form network ties are specifically shaped by their skills and occupational backgrounds (Kim and Longest, 2014; Mosey and Wright, 2007; Stam, 2010). Similar selection effects are also likely to influence how founders use finance (Parker and Van Praag, 2006), hire staff (Hayton, 2003), or conduct innovative activity (Redding, 1996). Consequently, developing and testing counterfactual models can help develop a more contextualized perspective on entrepreneurial, managerial, and organizational behaviors (Langley *et al.,* 2013).

This study has further practical implications for educators, financiers, support providers, and aspiring founders. In specific, both the sample ATTs and the wider population ATEs results show that it pays to plan. This gives validation to the teaching of entrepreneurship through vehicles such as a formal business plan. It further gives support to the use of plans by start-up programs and competitions and external financiers to judge start-ups. For aspiring founders, our results clearly show that business plans help achieve venture viability, but also that they have to carefully reflect on factors in their founding environment that impact their decision to plan (Gruber, 2007).

Limitations and future directions

Although our findings are robust to different versions of our main dependent variable, control groups, and sensitivity analyses (including the appraisal of Rosenbaum bounds and population based ATEs), we cannot fully discount that our results are impacted by unobserved heterogeneity. Another limitation is that the PSED II measure of formal planning is crude. In this study, we have, as with the wider strategic and entrepreneurship literature, focused on plan formality. One downside of this is that it does not allow researchers, for example, to distinguish between a comprehensive plan that fully details the opportunity and a simple two-page document that provides an overview of the opportunity. Founders may recognize both of these as business plans. The PSED II plan measures also do not allow us to focus on other dimensions of a plan, such as its flexibility (Capon, Farley, and Hulbert, 1994; Rudd *et al.,* 2008). Hence, there is a need for follow-up PSED II style studies to consider the comprehensiveness, quality, and sophistication of the plans produced by nascent founders. One way of achieving this is to complement such data by collecting and independently analyzing the planning materials of founders (including any associated activity and planning diaries) and by conducting in-depth periodic and regular interviews with founders. Equally, although the PSED II data allows us to control for differences between formal planners and other groups of planners, these more mixed methods approaches could allow researchers to examine how a plan is used to reflect, rehearse, and provide feedback on reaching venture viability as well as investigating how founders draw together formal plans and use plans to counter cognitive biases such as overoptimism or an unwarranted escalation of commitment. One further extension of this research agenda could be to consider dimensions of plan participation either by those around the founder or from external stakeholders. For example, although we find that business plans reflect finance requirements, we are unable to distinguish if this is due to external pressures from financiers seeking to distinguish between good and bad business propositions or if it reflects isomorphic pressures felt by the nascent founders to legitimate their ventures (Honig and Karlsson, 2004).

DOI: 10.1002/sej

Conclusions

Understanding the context and outcomes of formal plans is clearly an important topic for scholars interested in offering insights and guidance to nascent founders on achieving venture viability. Much of the previous research has led to divergent appraisals of the value of formal plans because they have conflated selection with performance effects. Our contribution has been to develop and test a counterfactual model that explicitly disentangles what prompts the plan from its impact on new venture viability. This provides fresh insights into the contextual nature of the decision to plan. Notably, we found that founders were more likely to plan if they were seeking external finance, better educated, more innovative, and growth oriented. The key advantage of our counterfactual approach, however, is that it uncovers, after a range of robustness checks, that founders are more likely to achieve viability if they formally plan. Finding that it pays to plan is valuable because it helps resolve the extant debate about the value of business plans and provides practical guidance on the utility of formal plans to nascent founders.

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APPENDIX

LIST OF VARIABLES

A.1. New venture viability (binary dependent variable)

A 35: What was the first month and year in which monthly revenue was greater than all monthly expenses, including salaries for the owners active in managing the business? Coded as 1 if revenues were greater than all monthly expenses (including salaries for the owners active in managing the business); 0 otherwise.

A.2. Alternative dependent variable coding (used for robustness check)

Self-reported assessment of achieving venture viability (A41): It would appear that you are managing an operating business—one with sales and revenue greater than the ongoing expenses including salaries. Coded as 1 if respondent agreed to the statement; 0 otherwise.

Sustained viability (A35): Coded as 1 if revenues were greater than all monthly expenses (including salaries for the owners active in managing the business) and no venture disbandment (A42) up to and including Wave F was reported; 0 otherwise. In contrast to the coding of new venture viability based on A 35, if venture viability and disbandment were reported, the dependent variable is coded as 0.

Achieved first sale (E14): Coded as 1 if first revenue has been received from the sale of goods or services for this new business; 0 otherwise.

Multinomial outcome variable: Coded as 1 if revenues were greater than all monthly expenses (including salaries for the owners active in managing the business); coded as 2 if disbandment has been reported up to and including Wave F; 3 otherwise.

A.3. Formal business plan

D1: Have you already begun preparation of a business plan for this new business, will you prepare one in the future, or is a business plan not relevant for this new business? AD2: What is the current form of your business plan—is it unwritten or in your head, informally written, or formally prepared? Coded as 1 (AD1 = Yes); D2 = 3 (formally prepared); 0 otherwise.

Control Group: (1) "informal" planners (coded as 1 if D1 = 1, and D2 = 2); (2) "unwritten" and "in their head" planners (coded as 1 if D1 = 1 and D 2 = 1); (3) planning is irrelevant (D1 = 5, "No, not relevant"); (4) plan is relevant (D1 = 2, "No, not yet; will in the future") but has not been completed up to and including Wave F.

A.4. Education

H6: What is the highest level of education you have completed? Coded: 8 (up to eighth grade), 10 (some high school), 12 (high school degree), 14 (some college), 16 (bachelor degree), 18 (Master's degree), 20 (PhD degree).

A.5. Sectoral experience

H 11: How many years of work experience have you had in the industry where this new business will compete? Coded as number of years.

A.6. Entrepreneurial experience

H 13: Besides the new business discussed in this interview, how many other businesses do you own? Coded as number of other businesses.

A.7. Growth aspirations

T1: Which of the following two statements best describes your preference for the future size of this new business: I want this new business to be as large as possible or I want a size I can manage myself or with a few key employees? Coded 1 (want to be as large as possible), 0 (want a size to manage by self or with key employees).

A.8. Product complexity (Cronbach's alpha 0.72)

F4: Being first to market a new product or service (is important for this new business to be an

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effective competitor). F 5: Doing a better job of marketing and promotion (is important for this new business to be an effective competitor). F 8: The technical and scientific expertise of the start-up team (is important for this new business to be an effective competitor). F 9: Developing new or advanced product technology or process technology for creating goods and services (is important for this new business to be an effective competitor). F 10: Development of intellectual property such as a patent, copyright, or trademark (is important for this new business to be an effective competitor). Likert scale 1 (strongly agree), 2 (agree), 3 (neither), 4 (disagree), 5 (strongly disagree). Reverse coded for sake of easier interpretation. Previously employed, Kim *et al.* (2015).

A.9. Innovative product/services

S1: Will all, some, or none of your potential customers consider this product or service new and unfamiliar?

Coded: 1 (all), 2 (some), 3 (none).

A.10. Competitive pressures

S 2: Right now, are there many, few, or no other businesses offering the same products or services to your potential customers? Coded: 1 (many), 2 (few), 3 (no other).

A.11. Seeking external finance

E 1: Have financial institutions or other people been asked for funds for this new business, do you expect to ask for funds in the future, or is outside financial support not relevant for this new business (before your involvement ended)? Coded 1 (yes), 0 (no, not yet; expect to ask; no, not relevant).

A.12. Private savings

What is the total dollar amount provided by you that came from personal savings and other personal sources (Q4), personal loans received by you from your family members or relatives (Q5), personal loans received by you from your friends, employers, or work colleagues (Q6), from credit card loans (Q7), personal loans from a bank or some other type of financial institution (Q8), from an asset-backed loan like a second mortgage or car loan (Q9), from other sources (Q10). Coded as the total sum of question Q4-Q10. Enters regression as the natural logarithm.

A.13. 35 hours on venture

H 17: Have you begun to work 35 hours or more per week on this new business?

Coded 1 (yes), 0 (no).

A.14. Team size

G 2: How many total people or other businesses or financial institutions will share ownership of the new business? Coded as number of owners.

A.15. Ability expectation (Cronbach's alpha: 0.68)

Y4 Starting this new business is much more desirable than other career opportunities I have. Y5: If I start this new business, it will help me achieve other important goals in my life. AY6: Overall, my skills and abilities will help me start this new business. AY7: My past experience will be very valuable in starting this new business.

AY8: I am confident I can put in the effort needed to start a business. Likert scale 1 (strongly agree), 2 (agree), 3 (neither), 4 (disagree), 5 (strongly disagree). Reverse coded for sake of easier interpretation. Previously employed in Dimov (2010).

A.16. Start-up commitment (Cronbach's alpha: 0.71)

AY9: There is no limit as to how long I would give maximum effort to establish this new business. AY10: My personal philosophy is to "do whatever it takes" to establish my own business. Likert scale 1 (strongly agree), 2 (agree), 3 (neither), 4 (disagree), 5 (strongly disagree). Reverse coded for sake of easier interpretation. Previously employed in Townsend *et al.* (2010).

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A.17. Work experience

H 20: How many years of full-time, paid work experience have you had? Coded as number of years (enters regression as natural logarithm).

A.18. Time elapsed

Difference in months between very first activity and date when first interview takes place. First activity based on Reynolds (2011: 36), Kim *et al.* (2015), and previously employed in Yang and Aldrich (2012).

A.19. Industry

B 1: Which of the following best describes this new business? Would you say it is a retail store, a restaurant, tavern, bar, or nightclub, customer or consumer service, health, education or social service, manufacturing, construction, agriculture, mining, wholesale distribution, transportation, utilities, communications, finance, insurance, real estate, some type of business consulting or service, or something else? Retail coded as 1 if B1 = 1/19, services coded as 1 if B1 = 2/3/4/13/14/15/16; 0 otherwise. Previously employed in Renko (2013).

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