JENA ECONOMIC RESEARCH PAPERS

Building Winners? An Empirical Evaluation of Public Business Assistance in the Founding Process

by

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Abstract

This paper investigates economic and subjective effects of public business assistance delivered to nascent entrepreneurs in Germany. Employing cluster analysis, we explore the actual scope and intensity of business assistance used. Then we analyze predictors of take-up and perceived usefulness taking into account the different patterns of utilized assistance. Finally, we assess economic effects by studying subsequent business performance employing propensity score matching. We cannot reveal that business assistance translates into better start-up performance. However, we find that a lack of personal entrepreneurial resources predicts take-up of business assistance in general as well as perceived usefulness of comprehensive business assistance.

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1. Introduction

Publicly financed programs offering advice and training to nascent entrepreneurs are popular policy instruments across the globe. For example, the Global Entrepreneurship Monitor 2008 reports that 16% of the population in innovation-driven countries (aged 18-64) receives training in starting a business (Bosma et al., 2008). Support, in the form of specialized training and provision of information, advice, and various kinds of practical assistance, aims to assist "entrepreneurs to successfully develop their business activity and to respond effectively to the challenges of their business, social and physical environment" (European Commission, 2001, p. 7; Lundström & Stevenson, 2005). In short, the nearly universally employed human-capital-based approach to business assistance is designed to "build winners" rather than choose them. While the high volume of public expenditure for business assistance calls for rigorous evaluation of these assistance programs (European Commission, 2001; Gu et al., 2008), empirical evaluations are sparse to date (Storey, 2000).

In this paper, we evaluate business assistance schemes along two dimensions. First, from an economic perspective, publicly financed business assistance targeted at nascent entrepreneurs is justified by the *positive external effects* accruing from entrepreneurship (Audretsch et al., 2007; Storey, 2003).[1] Social benefits arise when start-ups introduce innovation, increase variety, and spur competition, thus leading to increased productivity and economic growth (Fritsch, 2008). However, many (potential) entrepreneurs lack the managerial and technical skills necessary for developing an organization (Shane, 2004; Chrisman et al., 2005). Since entrepreneurial competence can be acquired—at least partly—through training and mentoring (Markman & Baron, 2003), one goal of publicly financed business assistance is to teach nascent entrepreneurs how to successfully launch a competitive and innovative venture. Therefore, the success of such policy must be judged on the basis of the positive external effects created by the assistance.

Second, in addition to external effects, understanding how business assistance operates is a central aim of public-policy-related entrepreneurship research (Chrisman et al., 2005; Mole et al., 2009). Generally, business assistance is targeted at the individual nascent entrepreneur, who, in turn, should be able to transform this assistance into a tangible, or at least measurable, economic outcome. Understanding *why* one nascent entrepreneur perceives business assistance as

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[1] Additionally, a lack of recognition and asymmetric information are put forward as a rationale for publicly financed business assistance schemes (Storey, 2003). Founders ignore the private benefits of external advice and are thus usually averse to paying fees for any advice or training from outsiders. However, the argument of asymmetric information justifies only a one-off "taster" subsidy, and not general public provision of advisory services (Storey, 2003). Moreover, business assistance schemes sometimes are implemented for sociopolitical reasons and thus aim to promote the economic status of disadvantaged groups (Reynolds, 2007).

efficacious, whereas another does not, could provide new information on the person-specific impact of business assistance.

Studying both objective (economic) and subjective (personal) performance measures in entrepreneurial evaluation research is not a new idea (Storey, 2000), but a close look at the extant literature shows up several shortcomings of this work. First, previous studies employing subjective assessments of business assistance have been mainly restricted to monitoring policy delivery (Storey, 2000). Second, prior research focuses mainly on the assessment of one particular scheme (e.g., Chrisman et al., 2005; Chrisman & McMullan, 2000; Chrisman, 1999; Wren & Storey, 2002), which limits the generalizability of the results given the diverse range of real-world business support schemes. Hence, evidence as to the actual use of business assistance is needed to discover the unit of investigation, i.e., the effects of a particular kind of business assistance. Finally, most evaluations fail to account sufficiently for selection bias (Storey, 2003).

In view of these limitations of previous research, the aims of our study are the following. First, this study explores patterns of actual policy take-up. Our representative sample of start-ups allows us to take an aggregate view of business assistance schemes and characterize the scope and intensity of assistance along the founding process. Second, we analyze the predictors of policy take-up and perceived usefulness of business assistance and thus seek to provide insights into both policy targeting and the person-related effects on the assisted entrepreneurs. Finally, this study aims to assess the economic impact of business assistance on subsequent business performance employing propensity score matching, which allows us to correct for selection bias.

We find distinct patterns in the use of business assistance, which emphasizes the importance and necessity of our investigation into this topic. Our results suggest that a lack of entrepreneurial resources (as indicated by a lack of human and social capital and a less distinct entrepreneurial personality make-up) makes people select into comprehensive business assistance and perceive such assistance as more useful. However, propensity score matching cannot reveal that the use of business assistance results in better start-up performance in terms of amount of initial capital, long-run employment, and credit rating. The findings further emphasize the need for interdisciplinary evaluations: even though business assistance does not seem to have an impact on a start-up's long-run performance, it still might be useful to individual founders who lack personal entrepreneurial resources (such as entrepreneurial human and social capital or an entrepreneurial personality) in actually starting a business.

The paper is structured as follows. Section 2 reviews the range of business assistance schemes and previous evaluation studies. In Section 3, we set out our evaluation approach, which is designed to overcome the shortcomings of previous work. Empirical analyses are conducted in Section 4. Section 5 concludes the paper with a discussion of our results.

2. Public business assistance in the founding process

2.1 Range of business assistance schemes

Nearly every developed country provides subsidized business support to nascent and young entrepreneurs, as well as to small and medium-sized enterprises (Bosma et al., 2008). Large-scale initiatives of this type include the Small Business Development Center program in the United States (SBDC), the ALMI in Sweden (Hjalmarsson & Johansson, 2003; Storey, 2003), and the Business Links framework in the United Kingdom (Mole et al., 2008). Advisory services targeted at small and medium enterprises (SMEs) have been in existence since the 1980s (Storey, 2003), but it is only more recently that there has been a reorientation of these types of programs toward nascent and start-up entrepreneurs (Lundström & Stevenson, 2005). Moreover, business support schemes are increasingly targeted at very specific segments of entrepreneurship, for example, technology-oriented nascent entrepreneurs, the unemployed, women or minorities (Reynolds, 2007). This segmentation is accompanied by a great variety of public assistance services, which are mainly provided by (subsidized) private-sector consultants, colleges, and universities, as well as by chambers and industry associations (Storey, 2004; TMWTA, 2009).

2.2 Previous evaluation studies

To date, evidence regarding economic effects of assistance schemes has been ambiguous, leading Davidsson (2002) to conclude that many programs do not work. Various previous evaluation studies are summarized in Table 1, which also sets out several explanations for the equivocal results.[2] First, previous analyses of business assistance schemes differ in their evaluation designs. In his examination of evaluation designs, Storey (2003) raises the criticism that policy initiatives in OECD countries are mainly monitored and thus lack rigorous evaluation. Therefore, Table 1 summarizes evaluation studies by rigor of their analysis, with (a) experimental evidence ranking higher than (b) multivariate econometric studies that control for factors that affect the effectiveness of business assistance. This is not possible when conducting (c) mean comparisons or (d) monitoring business assistance merely by describing policy take-up. These methodological differences hamper the comparability across studies. Furthermore, less rigorous analyses cannot detect causal relationships. In particular, studies rarely control for self-selection (Storey, 2000,

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[2] Table 1 is based on a tabulation of studies on small business assistance programs in the United States done by Gu et al. (2008). For a more comprehensive overview of evaluations of U.S. schemes, the reader is directed to the original work.

2003), even though self-selection into consulting is highly plausible (Chrisman & McMullan, 2000). Without controlling for self-selection of founders with promising (less promising) ventures into assistance schemes, evaluations will overestimate (underestimate) their impact.

Second, the analyzed assistance is very diverse in intensity and scope, covering everything from intense strategically-oriented counseling to less intensive operational advice. In addition, the various providers of business assistance, which also encompass a wide range, from university-based initiatives and venture capitalists to the Chambers of Industry and Commerce, do not only target nascent entrepreneurs but also young entrepreneurs and owner-managers of small enterprises. Third, the impact of assistance schemes in prior work is usually measured by various outcome variables ranging from subjective measures of recipients' satisfaction to objective measures of subsequent business performance such as sales, employment, or survival (McMullan et al., 2001). The use of different outcome measures can be partly attributed to policymakers, who usually do not specify measurable objectives of assistance schemes (Storey, 2003). Finally, institutional setting could be important, thus hampering the generalizability of findings from policy evaluations conducted in Europe, Latin America, and the United States.

Study	Analyzed scheme/unit of analysis	Data	Control for selection bias	Treatment variable	Performance measure/outcome	Covariates/controls	Findings
a) Experimental study							
Karlan & Valdivia (2006)	FINCA Peru—a "village banking" organization for poor, female microentrepreneurs in Lima and Ayacucho	Baseline survey few weeks prior to the training in 2002 and 2003; follow-up surveys 2 years later; N=4,591	Not needed, random assignment	- Random assignment into either mandatory or voluntary assistance or no treatment at all - Assistance included general business skills and strategy training, not client-specific problem-solving - Weekly to bi-weekly training	- Institutional outcomes (e.g., repayment rates of micro credits) - Business skills and practices - Business outcomes - Household outcomes, including empowerment in decision making and child labor	Subgroup analyses differentiating between - Location - Type of treatment (mandatory vs. voluntary) - Ex-ante attitude toward training - Education - Civil status - Business size	Both clients and microfinance institutions profit from concomitant business assistance: the microfinance institution benefits from increased retention and repayment, and the clients showed greater business knowledge and better business outcomes. Interestingly, the effect was strongest for those clients who expressed the least interest in the training at the very beginning.
b) Econometric analyses							
Barney et al. (1996)	Venture capital assistance to start-ups	Start-ups that received venture capital and that were identified in the *Venture Capital Journal*; mainly high-tech firms; N=205	No	- Business management advice (strategic) - Operational assistance	Venture teams' perceived usefulness	- Industry experience - Team tenure - Innovativeness - Engagement of venture capitalists - Year of first-round funding	Business management advice and operational assistance is assessed worse the more industry experience the new venture team has. Business management advice is more welcome when start-up teams' primary experience is from another industry. Current firm performance is not related to new venture teams' evaluation of VC assistance.
Chrisman et al. (2005)	Small Business Development Center (SBDC)—U.S. program offering counseling assistance to nascent entrepreneurs	Survey conducted in 2001; receipt of SBDC counseling was 5–9 years prior thereto, N=159	No	Varying degrees of time spent in direct contact with SBDC counselor within nascent phase	- Employment - Sales	- Founder's prior experience - Founder's education - Scope of target market - Firm age - Industry	Positive relationship between time spent in guided preparation and sales and employment 3 to 8 years after start-up.
Mole et al. (2008)	Business Link network (BL)—English network offering publicly supported advisory services to small and medium-sized enterprises	Telephone survey of 2,000 firms, around half of which had received intensive assistance from BL between April and October 2003	No	Intensive assistance by BL	- Employment growth - Sales growth	- Firm size - Firm age - Legal form - Market characteristics - Business strategy - Age of owner-manager - Previous self-employment	Intensive assistance from the Business Link network seems to have a positive effect on simultaneous employment growth (no significant effect on sales growth).

Study	Analyzed scheme/unit of analysis	Data	Control for selection bias	Treatment variable	Performance measure/outcome	Covariates/controls	Findings
Parker & Belghitar (2006)	Random sample of nascent entrepreneurs in the U.S.; different schemes of business assistance—either government sponsored or funded by universities/business associations	Panel Study on Entrepreneurial Dynamics (PSED); interviews in 1998/1999; follow-up interviews 12 months afterward; N=340	Control for ignorance about business assistance programs	- Dummy variable for general participation in business assistance schemes - Separate dummy variables for either government-sponsored programs or programs funded by university/business associations	Status of founding process: being still nascent entrepreneur vs. having started venture vs. having quit	- Durable good - High-tech start-ups - Marital status - Gender - Being homemaker - Industry	Participation in business assistance programs does not appear to significantly affect outcomes even when controlling for awareness of programs. However, separate analysis of different providers of assistance reveals impact of business assistance on turning nascent entrepreneurs into actual entrepreneurs (significant at 10% level).
Stubner et al. (2007)	Venture capital assistance to German start-ups	German start-ups that received venture capital in 2002; N=106	No	Management support by venture capitalists	- Absolute EBITDA (earnings before interest, taxes, depreciation, and amortization) - Earnings growth - Subjective assessment of goal achievement - Subjective attribution of management support on firm performance	- Subjective evaluation of quality of management support - Characteristics of founder team - Company age - Company size	Quality of management support is positively related to EBITDA and the subjective performance measures.
Wren & Storey (2002)	Marketing Initiative within the U.K. Enterprise Initiative that aimed to provide SMEs with a marketing strategy; the program ran from 1988 to 1994	All eligible small and medium-sized enterprises in the West and East Midland of England, the South West of England, and South Wales; survey in 1996; N=4,326	Yes: two-step adjustment procedure for addressing selection bias	Completion of consultancy	- Sales turnover - Employment - Survival of SMEs	- Prior turnover - Prior employment - Independency of firm - Export orientation - Industry - Region	Counseling impacts on sales turnover, employment, and survival. However, the program is most effective for medium-sized companies. No impact on survival measure could be found for smaller firms as a group.
c) Mean comparisons							
Chrisman & Leslie (1989)	Small Business Development Center (SBDC)—U.S. program offering counseling assistance to small businesses	Small business clients from SBDC in 1985/1986; N=76	No	Receipt of 12 or more hours of SBDC counseling in strategic, administrative, or operating issues; comprehensiveness of assistance	- Sales growth - Subjective assessment of financial performance	Control for potential moderating effect of the clients' type of business	In the short run, small business clients benefit more from administrative and operating assistance, suggesting a short-run impact on reducing costs.

Study	Analyzed scheme/unit of analysis	Data	Control for selection bias	Treatment variable	Performance measure/outcome	Covariates/controls	Findings
Chrisman (1999)	Small Business Development Center (SBDC)—U.S. program offering counseling assistance to nascent entrepreneurs	Clients from SBDC in 1992; mail questionnaire in 1994; N=2,025	No	Receipt of five or more hours of SBDC counseling	Start-up of venture one year after SBDC assistance measured by either - having become an organization, - having hired employees, or - having made sales	Analysis of subsamples in order to identify regional effects	Nascent entrepreneurs who take up SBDC program are more likely to actually start the business.
Chrisman & McMullan (2000)	Small Business Development Center (SBDC)—U.S. program offering counseling assistance to nascent entrepreneurs	Clients from SBDC in 1992 and 1994; follow-up surveys one year later; those founders were contacted in 1997 who responded to first follow-up survey and who had indicated that they had successfully started a firm; N=169	No	Receipt of five or more hours of SBDC counseling	- Survival - Employment growth - Sales growth - Innovativeness - Perceived usefulness	Not applicable	Start-ups that took up the SBDC program show higher rates of survival, growth, and innovation than what an average population of ventures would suggest. In retrospect, the vast majority perceives the counseling as beneficial.
d) Monitoring							
Chrisman (1989)	Small Business Development Center (SBDC)—U.S. program offering counseling assistance to nascent entrepreneurs	Clients from SBDC in 1985 and 1986; survey in 1987; 36.8% of respondents did not start business; N=123	No	Receipt of 12 or more hours of SBDC counseling in strategic, administrative, or operating issues	Clients' perception of the value of SBDC assistance	Analysis of subsamples in order to determine if the relationship between the perceived value and the kind of assistance was moderated by the consultant, the client, and the venture	Strategic assistance (but neither operating nor administrative assistance) is positively associated with the perceived value of its service.
Kulicke (2004)	Business assistance provided within EXIST, a federal German program that aims to boost academic spin-offs	Founders from EXIST-funded start-ups; telephone survey in 2002/2003; N = 196	No	Analysis of scope and intensity of actual business assistance	Perceived usefulness of business assistance	Not applicable	52.9% of respondents made use of some kind of business assistance in the firm formation process. Three different patterns of policy take-up can be observed, with assistance differing in scope and intensity. Overall perceived usefulness of business assistance is high (51% of respondents perceive its usefulness as high; only 16% indicate a low usefulness).

Table 1: Previous evaluation studies of (partly publicly financed) business assistance given to (nascent) entrepreneurs as well as owner-managers of SMEs

3. Evaluation approach

Our evaluation is designed to overcome the shortcomings of previous research by, first, exploring patterns of actual policy take-up (Section 3.1), second, investigating predictors of take-up and perceived usefulness (Section 3.2) and, third, examining the assistance's impact on subsequent business performance (Section 3.3).

3.1 Exploring actual policy take-up

As shown in Table 1, previous evaluation studies either employed a program-oriented approach (by focusing on one particular policy scheme) or modeled the treatment as a binary variable (business assistance yes/no). These strategies, however, hardly reflect the "real" world, where a great many programs exist simultaneously (see, e.g., Gu et al. (2008) for an overview of US programs or Bundesministerium für Wirtschaft und Technologie (2008) for services in Germany).

Independent of particular schemes, business assistance can be categorized as either operational or strategic support (Hjalmarsson & Johansson, 2003; Barney et al., 1996; Chrisman & Leslie, 1989). Operational services are objective and encompass known knowledge among experts; strategic advice is more individually oriented and is developed interactively between consultants and clients (Hjalmarsson & Johansson, 2003). Then, information previously unthought-of emerges whose communicability is limited. Strategic assistance can be thus expected to be more time-intensive (Chrisman & Leslie, 1989). Although most advisory services are designed for particular groups, the scope and intensity of assistance actually provided can be expected to be strongly determined by self-selection of founders. In particular, Hjalmarsson and Johansson (2003) argue that strategic services are developed in a symmetric relation between clients and consultants. The use of strategic services implies a strong commitment on the part of the founder, considering that a certain amount of effort (and time) will be needed to choose the appropriate advisor and convey enough information to make the service selected worthwhile.

Given the different and partly complimentary services, nascent founders may take up a mix of different schemes and even utilize different patterns of business assistance within single assistance schemes (Kulicke, 2004).[3] We thus argue that an exploration of the kinds of treatment delivered to a person as a whole is necessary to discover the real unit of evaluation. Following earlier research on characteristics of public business assistance (Kulicke, 2004), we explore patterns in scope and intensity of a person's utilized business assistance (irrespective

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[3] Unfortunately, we lack information about the take-up of individual schemes which change a lot over time.

of the use of particular schemes). These patterns of actual policy take-up then serve as reference points for the effect assessment.

3.2 Take-up and perceived usefulness of business assistance

Having explored the actual unit of investigation, we are interested in the determinants of individual policy take-up and founder's perceived usefulness of business assistance. This information will provide deeper insights into the effects of business assistance (McMullan et al., 2001) since it is comprised of the personal judgment of the most central actor in both the business assistance process and the firm formation process, that is, the entrepreneur. Nascent entrepreneurs self-select into business assistance schemes and make decisions about the scope and intensity of services they use (Chrisman & McMullan, 2000), whereas program selection effects should be considered to be relatively weak when policymakers pursue a strategy of "building winners" (Kösters, 2009). In the following, we argue that a founder's personal entrepreneurial resources as well as characteristics of the start-up project are crucial in explaining both patterns of take-up of particular business assistance and the perceived usefulness of same.[4]

Personal entrepreneurial resources

It is expected that differences in business assistance take-up, as well as in perceived usefulness, are a function of founders' personal entrepreneurial resources. Those nascent founders who *lack* the necessary resources needed for entrepreneurship should thus select themselves into (specific) business assistance and should perceive this as more useful. This situation can be described as the *"weakness hypothesis"* and is based on Markman and Baron's (2003) person-entrepreneurship-fit framework and psychological control theory (e.g., Heckhausen & Schulz, 1995).

Markman and Baron (2003) argue that entrepreneurs who lack important resources (e.g., human and social capital, entrepreneurial skills and ability, self-efficacy) have a poor person-entrepreneurship fit and are thus more likely to be unsuccessful in their entrepreneurial activity. In our case, nascent entrepreneurs with low resources might not only exhibit a poor fit, but might also *perceive* their weakness, motivating them to seek help and value this help. It seems plausible to assume that the combination of entrepreneurial tasks (which are in general demanding, complex, and stressful (Schindehutte et al., 2006)) and low personal

entrepreneurial resources might lead to excessive demand and a sense of loss of control among these founders. According to control theory, however, individuals seek to exert control over their environment (e.g., Heckhausen & Schulz, 1995), and thus we posit that "weak founders" might expend a certain amount of effort to restore their sense of control, for example, by taking up business assistance.[5]

Specifically, we argue that those founders who lack human and social capital as well as an entrepreneurial personality structure will utilize business assistance more often than other founders and perceive the same to be more useful. First, a high level of *human capital* has been shown to be related to firm survival and growth (Brüderl et al., 1992) and thus can be viewed as an entrepreneurial resource (Markman & Baron, 2003). Brüderl et al. (1992) argue that knowledge gained in prior self-employment indicates entrepreneur-specific human capital as it might be the best preparation for the entrepreneurial role. Entrepreneurial experience (i.e., previous self-employment) might thus enable entrepreneurs to draw upon routines that have worked well in the past and thus lower their need for external business assistance (see Cooper et al., 1995).[6] Furthermore, novice entrepreneurs might benefit most from business assistance since the acquisition of entrepreneurial and managerial skills might compensate for a lack of experience (Ucbasaran et al., 2009). *Parental self-employment* can be considered as another measure of entrepreneur-specific human capital (Brüderl et al., 1992) as self-employed parents have been shown to serve as both role models and resource providers (Parker & Belghitar, 2006; Davidsson & Honig, 2003).

According to Markman and Baron (2003), *social capital* is also an entrepreneurial resource since it proxies other resources that can be made available through social networks and contacts. For example, higher entrepreneurial performance might be achieved through better access to entrepreneurial finance, and since social ties provide a mechanism by which investors obtain information, social ties may facilitate venture capital funding (Shane & Cable, 2002). Consequently, a person's social capital is positively associated with both discovery of entrepreneurial opportunities and the ability to actually take advantage of them (Davidsson & Honig, 2003; Jack & Anderson, 2002). Since nascent entrepreneurs with a rich

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[4] Perceived usefulness is a central evaluation outcome in past evaluation research (McMullan et al., 2001; Storey, 2000).

[5] Such a challenge-response perspective on human cognition and behavior figures prominently in psychology and sociology (e.g., in coping theories such as the transactional stress theory (Lazarus & Folkman, 1984) or Elder's concept of control cycles (Elder & Caspi, 1990)) and it has been applied to various fields of human behavior in critical transitions or context-situations such as rapid social change (Pinquart & Silbereisen, 2004) or critical life transitions (Heckhausen et al., 2001).

[6] However, Cooper et al. (1995) find that the greater search activity of novice entrepreneurs includes only personal sources, not professional sources.

endowment of social capital have been shown to access resources through their personal network, endowments of social capital might lower the need for public business assistance.

Finally, *personality traits* should also predict take-up and perceived usefulness as past research makes clear that entrepreneurial activity and success are related to an individual's personality (see Rauch & Frese (2007) for a recent meta-analysis). In other words, an entrepreneurial personality is itself an entrepreneurial resource. This should hold true for both specific traits (e.g., need for achievement, self-efficacy, and risk-taking) and broad traits (e.g., the Big Five; Costa & McCrae, 1992). Although broad traits reflect only a person's very basic personality, they have been shown to be relevant predictors within the study of entrepreneurship (Rauch & Frese, 2007; Zhao & Seibert, 2006). Schmitt-Rodermund (2004,2007) could show that the individual similarity to a reference type of an entrepreneurial personality profile (i.e., high in extraversion, conscientiousness, and openness and low in agreeableness and neuroticism) relates to entrepreneurship (individual entrepreneurial characteristics, activity, and success) (see also Obschonka et al., in press). Such an operationalization of personality is based on the so-called person-oriented approach (Magnusson, 1998), which has received widespread attention in psychology, but has to date been neglected by entrepreneurship researchers. A person's entrepreneurial personality may not be adequately characterized by single traits alone, but by their configuration. Applying Schmitt-Rodermund's definition of an entrepreneurial personality, we thus expect that founders *without* an entrepreneurial personality profile, which is characterized by high scores in extraversion, conscientiousness, and openness and low scores in agreeableness and neuroticism, utilize business assistance more often and, furthermore, perceive this assistance as more useful than do founders having a more entrepreneurial set of personality traits.

Characteristics of the start-up

In addition to the personal characteristics of the nascent entrepreneur, characteristics of the start-up may also affect the take-up and perceived usefulness of business assistance. On the one hand, *team start-ups* should be less in need of business assistance because their internal resources are more substantial to begin with, consisting of an accumulation of all team members' human and social capital (Kamm et al., 1990; Lechler, 2001). On the other hand, having more than one person involved in the founding process has the potential to lead to conflict and advice, in the form of a business assistance program, might be sought due to a "need for decision legitimation" (Cooper et al., 1995, p. 113).

Furthermore, Cooper et al. (1995) find that the need for preparation and legitimacy leads to an increased search for information and increased use of professional assistance. For example, start-up ventures having a high degree of *novelty* are generally more complex due to, e.g., uncertain markets and regulatory requirements and thus innovative ventures are expected to be accompanied by intensive search activities. Highly educated founders of innovative start-ups or academic spin-offs face high opportunity costs in the form of either foregone earnings in wage employment or time that could have been spent advancing their academic reputation (Goldfarb & Henrekson, 2003). Business assistance might then be helpful in allowing these nascent entrepreneurs to rationalize their entrepreneurial engagement (Holland, 1997).

Supply-side factors also shape the pattern of policy take-up. The increased policy focus on entrepreneurship led to an increased availability of subsidized business assistance over time. Particularly, there is an extensive range of business support for academic spin-offs, beginning with the EXIST initiative in 1998 (Audretsch & Beckmann, 2007). Moreover, there may be some evidence of policy induced selectivity toward the "weak" founders (i.e., those with few entrepreneurial resources), visible, for example, in schemes targeted at women, minorities, the young, and the unemployed (Lundström & Stevenson, 2005).

Table 2 summarizes our hypothesized directions of how founders' personal characteristics and the properties of the start-up will affect the take-up and perceived usefulness of business assistance. The table makes clear why we focus on entrepreneurship-specific human capital, such as self-employed parents, since other human capital variables can be expected to be highly correlated with the novelty of the business idea or being an academic spin-off.

			Take-up and perceived usefulness of business assistance
Characteristics of the founder	**Human capital**	Previous self-employment	—
		Parents self-employed	
	Social capital		—
	Entrepreneurial personality profile		—
Characteristics of the start-up	**Team start-up**		**?**
	Novelty / Academic spin-off		**+**

Table 2: Hypothesized directions of how characteristics of the person and the start-up affect take-up and perceived usefulness of business assistance

3.3 Economic effectiveness

Public provision or subsidization of business assistance is mainly justified by the expectation of positive external effects accruing from better start-up performance of assisted founders or by sociopolitical reasons like the advancement of certain groups, e.g., women, minorities or immigrants (Reynolds, 2007). Following the rationale of positive external effects, public advisory services are effective if they improve start-ups' economic viability so that assisted start-ups do, indeed, result in positive external effects in the long-run. Assistance provided during the nascent phase has the potential to create long-term benefits (Chrisman & McMullan, 2000) because initial founding conditions and decisions at the pre-start-up stage have been found to leave a long-term impact on subsequent structure (Stinchcombe, 1965) and performance (Bamford et al., 2000; Cooper et al., 1994). However, external effects accruing from individual entrepreneurial activity are very difficult to measure since they include fuzzy indirect effects such as introduction of innovations and securing market efficiency through competition (Fritsch, 2008). Furthermore, positive external effects only become apparent in the long run, with estimated time lags between entrepreneurial activity and subsequent economic performance of up to 10 years (Fritsch & Mueller, 2004; Thurik et al., 2008; van Stel & Suddle, 2007).

Therefore, a venture's capital base, its employment, and long-term survival are often used as proxies for positive external effects in empirical studies (e.g., Chrisman & McMullan, 2000; Chrisman et al., 2005). These measures of success indicate start-ups' economic viability, their knowledge base, and resource strength, which are seen as —necessary prerequisites for subsequent positive external effects (Fritsch & Schroeter, 2009).[7]

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[7] However, success measures such as survival or growth can only roughly indicate social returns because even failed start-ups may give rise to positive externalities. A failed start-up may have challenged incumbents and

4. Empirical analysis

4.1 The data

This paper draws from rich new data collected within the Thuringian Founder Study (*Thüringer Gründer Studie*), a project that examines technology-oriented and knowledge based entrepreneurship in the Federal State of Thuringia, Germany. For the time of our analysis (1994-2006) business assistance schemes targeted at nascent entrepreneurs have been under the responsibility of both the federal level and *Länder* authorities in Germany.[8] A nation-wide analysis would thus have to cope with different institutional backgrounds. However, the range of business assistance schemes across Germany can be considered as similar, since regional initiatives have been often sponsored within federal programs. For instance, within the national EXIST program, a network of universities, business incubators, and the Chambers of Industry and Commerce (*Get-up / Thüringer Gründer Netzwerk*) was established in 1998, which concentrates its business assistance on founders of technology-oriented and knowledge-based start-ups (TMWAI, 2003). Moreover, the focus on one German state made it possible to conduct face-to-face interviews raising data quality.

Sample

The database draws from the commercial register for commercial and private companies (*Handelsregister, Abteilung A/B*) in Thuringia and includes 2,971 start-ups in innovative industries registered between 1994 and 2006. Innovative industries, according to ZEW classification (Grupp & Legler, 2000), comprise "advanced technology" and "technology-oriented services".

The survey population consists of 4,215 founders (first registered owner-managers) who registered a new entry in the *Handelsregister* between 1994 and 2006. This design made it possible not only to interview founders of active companies but also founders of ventures that failed. From the survey population we selected a random sample of 3,671 founders to contact. Due to team start-ups, this corresponds to 2,604 start-ups in innovative industries. Between January and October 2008, we conducted 639 face-to-face interviews with solo entrepreneurs or with one member of a start-up team (a response rate of about 25%). Due to a

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given rise to knowledge externalities, e.g., when the ideas and experiences of their former employees become an integral part of products made by successful firms (Audretsch et al., 2007; Fritsch, 2008).

[8] The wide range of initiatives with diverse funding institutions has led to a shift in policy. Beginning in 2007, the federal level is solely responsible for business assistance to start-ups that are younger than five business years. Business assistance targeted at nascent entrepreneurs is now the responsibility of the *Länder* authorities

number of exclusions,[9] the present analysis includes 445 start-ups, all founded later than 1993 so as to preclude any effects of German Reunification[10]. The structured interviews were conducted by members of the research project as well as by student research assistants who were trained in several sessions during December 2007. On average, an interview took one and a half hours. The interviews covered a broad set of questions regarding sociodemographic and psychological data of the founder. Moreover, we asked for founder's activities along the founding process. Retrospective data relating to events in the founder's life and business history were collected using guided recall. Specifically, we utilized mnemonic techniques drawn from the Life History Calendar method (Caspi et al., 1996). This method has been shown to collect more valid and reliable retrospective information than traditional questionnaires (Belli et al., 2004) and has been successfully employed in retrospective studies of different kinds (Elder, 1994).[11]

Measures

43.6% of founders took-up business assistance along the founding process, which has been defined as the time between the first steps in the start-up project and the first business year. Founders were asked to specify whether they made use of business assistance in regard to formalities, the business plan, financing, a market analysis, or management support. Furthermore, inquiry was made as to the intensity of business assistance used. Definitions of the variables can be found in Table 3.

(Bundesregierung, 2008). However, this new structure of funding business assistance schemes is not the subject of this paper.

[9] Seventy-three start-ups that turned out not to be genuinely new (e.g., they were a new branch or new business area of an existing company) were removed. A further 18 interviews were deleted due to concerns over interview quality. One-hundred start-ups were founded before 1994. Because of refusals for several variables, the number of observations changes across the analyses.

[10] We defined the first business year as the time when accounting started either because of legal obligations or because of first revenue. This does not necessarily correspond to the date of registration in *Handelsregister*.

[11] We employed a study-specific version of the Life History Calendar, which is a data-collection tool developed by psychologists and sociologists. It is based on the principles of autobiographic memory. This means that—in a first step—we asked interviewees to fill in the timing of well-known life events, sequences, and transitions (e.g., marriage, birth of children, education, and career structure) as well as milestones of the founding process in question. In a second step, these events served as anchors for the recall of our retrospective study variables.

	Variable	Description
Opera-tional	**Formalities**	This dummy variable indicates whether the interviewed founder received business assistance with regard to formalities concerning the venture set-up.
	Business plan	This dummy variable indicates whether the interviewed founder received practical support for writing a business plan.
	Financing	This dummy variable indicates whether the interviewed founder received business assistance with regard to financing the start-up.
Strategic	**Market**	This dummy variable indicates whether the interviewed founder received business assistance with regard to a market and competitor analysis.
	Management	This dummy variable indicates whether the interviewed founder received business assistance with regard to management issues.
	Intensity	This dummy variable indicates intensity of the interviewed founder's take-up of business assistance along the founding process (in contrast to one-time assistance) – irrespective of the kind of support made use of.

Table 3: Variables describing kind and intensity of public business assistance

Table 4 sets out the definitions of all other variables and their descriptive statistics.

		mean	sd
Independent variables			
Previous self-employment	This dummy variable indicates whether the interviewed founder was self-employed at any time before the first steps in the founding process.	0.38	0.49
Parents self-employed	This dummy variable captures whether the founder's parents were self-employed.	0.17	0.38
Social capital (strong)	Founders were asked whether they were encouraged by and received emotional support from either close friends and/or relatives *(strong)* or acquaintances *(weak)*, which is denoted by 1 (0 otherwise).	0.37	0.48
Social capital (weak)		0.28	0.45
Entrepreneurial personality	We used the German 45-item questionnaire by Ostendorf (1990) to measure Big Five personality traits (extraversion, conscientiousness, openness, agreeable-ness, and neuroticism). Participants had to rate perceived personality attributes using 9 bipolar adjective pairs with Likert scales ranging from 0 to 5 for each trait:		
	Conscientiousness (α=.82), e.g., "Lazy vs. Diligent"	3.65	0.59
	Extraversion (α=.72), e.g., "Uncommunicative vs. Talkative"	3.21	0.61
	Agreeableness (α=.73), e.g., "Good natured vs. Cranky"	3.09	0.57
	Openness (α=.59), e.g., "Conventional vs. Inventive"	3.18	0.55
	Neuroticism (α=.77), e.g., "Vulnerable vs. Robust"	1.37	0.50
Entrepreneurial personality profile	As noted earlier, we used Schmitt-Rodermund's (2004, 2007) entrepreneurial reference type to estimate a person's *entrepreneurial personality profile*. Following Obschonka et al. (in press) we estimated the "goodness of fit" of each person's Big Five profile regarding this reference type (which scores highest (value of 5) in extraversion, conscientiousness, and openness, and lowest (value of 0) in agreeableness and neuroticism). First, we calculated each person's squared differences between the reference values and the personal values on each of the five scales. For instance, the squared difference for neuroticism is 9 when a person scored a 3 (because the reference value is 0). Second, the five squared differences were added up for each person and, third, this sum was reversed. The resulting values then form the final variable *entrepreneurial personality profile*.[12] Higher values of this variable (meaning values closer to 0) describe a better fit between the individual's Big Five personality profile and the defined reference type of an entrepreneurial personality.	-21.4	5.74

[12] In contrast to all the retrospective data concerning the firm formation process (which refer to events up to 14 years prior to the time of the interview), the Big Five traits are measured as respondents' current traits. However, due to their high degree of stability, we deem these trait-measures as useful for the present study (Caspi et al., 2005).

Team start-up	Team start-ups were defined as ventures where more than one person was actively involved in the founding process and was intended to become an owner of the company. This dummy variable is coded 0 in the case of a single founder, and 1 in the case of a team start-up.	0.68	0.47
Novelty	The novelty of the business idea refers to the degree of its newness. Five categories were given: novelty (0), regional or local (1), supra-regional but national (2), European (3), and global novelty (4).	1.31	1.57
Current life satisfaction	Founders' *current life satisfaction* at the time of the interview was measured using a Likert scale from 1 (=lowest satisfaction) to 5 (=highest satisfaction) ("How satisfied are you with your life right now?").	4.02	0.73
Year 1994–1997	Dummy variables that capture the time of business start, i.e., the first business year of the company when accounting started either because of legal obligations or because of first revenue.	0.40	0.49
Year 1998–2001		0.35	0.48
Year 2002–2006		0.24	0.43
Nace 2	Industry dummies: *C*hemical industry, metalworking industry, engineering	0.23	0.42
Nace 3	Electrical engineering, fine mechanics, and optics	0.24	0.43
Nace 7	Information and communication technology, R&D, services	0.36	0.48
Nace x	Miscellaneous industries	0.18	0.38
Dependent variables			
Usefulness	Founders' perceived *usefulness* of business assistance was measured for each kind of assistance used (e.g., assistance concerning formalities or financial assistance) using a 5-point Likert scale with 5 (1) denoting the highest (lowest) perceived usefulness of business assistance. The mean of these ratings reflects an overall subjective evaluation of actual business assistance.	3.48	1.17
Initial capital	The start-up's *initial capital* (i.e., at the beginning of the first business year) was asked for with the help of the following categories: 1,000 EUR or less (1), more than 1,000 to 10,000 EUR (2), more than 10,000 to 50,000 EUR (3), more than 50,000 to 100,000 EUR (4), more than 100,000 to 250,000 EUR (5), more than 250,000 to 500,000 EUR (6), more than 500,000 EUR (7).	3.34	1.32
Employment	*Employment* in the third business year was defined as number of positions staffed by founders, active partners, conventional employees, hired labor, and trainees. The measure is normalized on full-time positions, thereby considering part-time jobs.	9.16	11.99
Credit rating	We obtained a start-up's *credit rating* three years after founding from Creditreform, the leading rating agency in Germany. The variable *credit rating* thus contains Creditreform's rating index, which ranges from 100 (best) to 600 (worst). Creditreform uses several sources of information in making its ratings, for example, financial and structural risks such as industry, firm size, and productivity, as well as payment history, quantity of orders, firm development, and management quality.[13] The credit rating aims to proxy the start-up's default risk and, indeed, credit rating and survival are highly correlated in the present sample (r: -0.20, p = 0.000). The credit rating thus serves as a continuous variable for the highly skewed dichotomous variable survival.[14]	287.93	75.72
Note. α refers to Cronbach's alpha, which is an indicator of reliability			

Table 4: Definition of variables and descriptive statistics

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[13] For more information on Creditreform's credit rating system, see Czarnitzki and Kraft (2007).

[14] Creditreform does not routinely generate credit ratings for each new start-up, but only when there is an external request from other firms. Because of missing credit ratings, we have to exclude 77 observations when analyzing the outcome variable *Credit rating*. These nonrated start-ups turn out to have significantly less initial capital and to be less often team start-ups than the rated start-ups. Hence, it should be borne in mind that the

4.2 Empirical clusters of policy take-up

We investigate whether there are groups of founders who take up business assistance in a similar pattern regarding scope and intensity. Therefore, we perform an explorative cluster analysis to sort start-ups based on similarities in their take-up of policy support along the founding process (thereby employing all dummy variables set out in Table 3). Cluster analysis is a multivariate technique that sorts different objects into groups by maximizing within-group similarities and between-group differences. The identification of clusters is thus empirically based instead of guided by theory.

We perform a cluster analysis using the "matching" similarity measure and employing Ward's algorithm. The similarity measure "matching" displays values ranging from 0 (no concurrence) to 1 (complete concurrence) with regard to all dummy variables describing take-up of business assistance (as given in Table 3). Having calculated the initial matrix of similarities between observations, the hierarchical Ward's method groups the original observations (stage by stage) in more aggregated groups in order to minimize the internal variance (within each group) and to maximize the intergroup variance (StataCorp, 2003). Ward's method has been shown to provide generally good results compared to other clustering methods (Milligan & Cooper, 1987). The results are presented in the dendrogram in Figure 1, which shows at which levels of similarity observations are grouped. Starting from the bottom with 194 observations, more and more observations are grouped together when lower levels of similarity are accepted (StataCorp, 2003). Figure 1 displays only the top 15 branches of the dendrogram, since the lower levels of the tree become too crowded. A visual inspection of the dendrogram suggests two different groups of policy take-up. The observations within these two groups have at least a similarity level of -6.9. However, due to the properties of Ward's linkage clustering algorithm the similarity values are no longer interpretable (StataCorp, 2003).

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credit rating might imply a systematic bias in favor of the larger start-ups. Due to data availability there are also significantly fewer rated start-ups founded between 1994 and 1997.
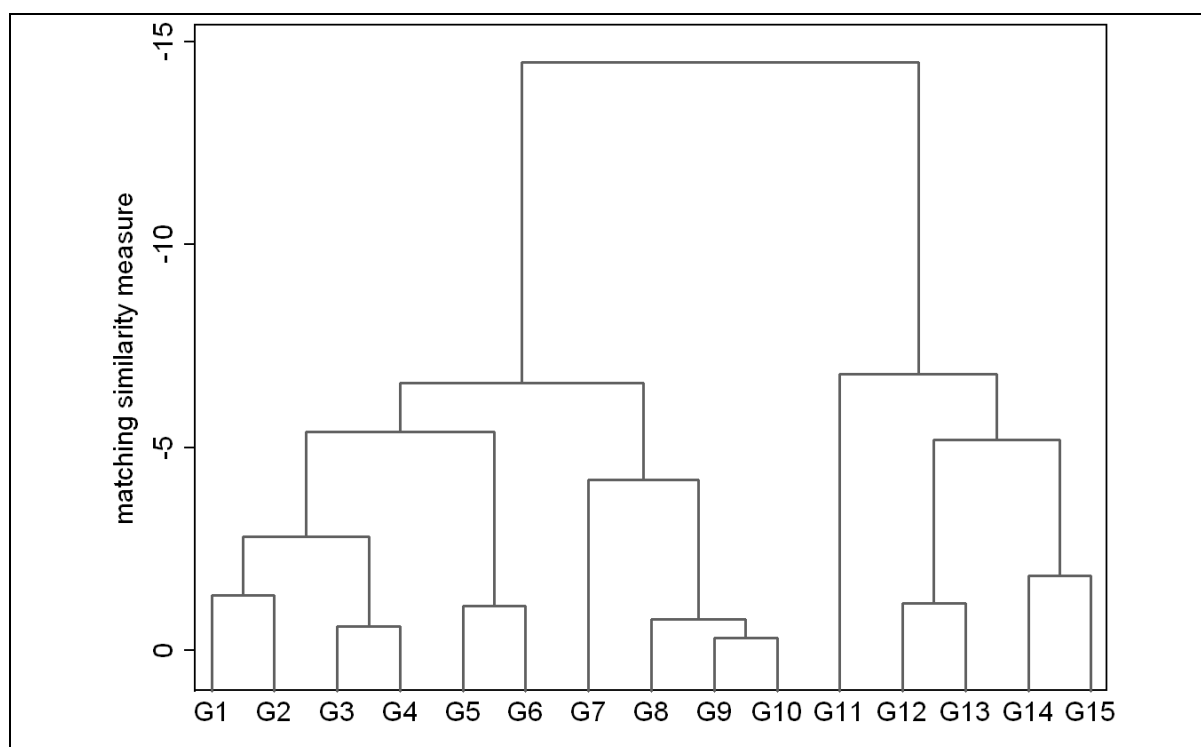
Figure 1: Dendrogram using Ward's method

Table 5 provides descriptive statistics on overall policy take-up and for each of the identified clusters. The clusters are compared using chi-square-tests which exhibit group differences in the take-up of assistance concerning formalities (Pearson's Chi2(1)=2.98, p=0.084), business plan (Pearson's Chi2(1)=109.32, p=0.000), market analysis (Pearson's Chi2(1)=51.44, p=0.00), management (Pearson's Chi2(1)=54.72, p=0.000) as well as the intensity of assistance (Pearson's Chi2(1)=11.98, p=0.001). There are no significant differences in the take-up of business assistance concerning financing (Pearson's Chi2(1)=0.73, p=0.394).

		Variables						N
		Formali-ties	Business-plan	Financing	Market	Manage-ment	Intensity	
Business assistance in general	mean	0.742	0.367	0.461	0.207	0.218	0.428	194
	sd	0.439	0.483	0.500	0.406	0.414	0.496	
Cluster 1	mean	0.688	0.726	0.490	0.417	0.438	0.552	96
	sd	0.466	0.448	0.503	0.496	0.499	0.500	
Cluster 2	mean	0.796	0	0.433	0	0	0.306	98
	sd	0.405	0	0.498	0	0	0.463	

Table 5: Descriptive statistics on take-up of business assistance—overall and separately for each cluster

The pattern of policy support can be thus characterized as follows:

Cluster 1. Intense assistance across all areas.

Cluster 2. Less intensive assistance in operational issues (formalities and financing).

Apart from assistance concerning formalities significant chi-square tests indicate that the intensity of assistance is positively related to all other areas of business assistance. Unfortunately, we lack data about the intensity of assistance in each area separately. However, preliminary cluster analyses without *Intensity* result in a 4-cluster-solution, whose clusters differ significantly in intensities.[15] We consider this as a favorable robustness check for the cluster analysis at hand, so that the later analyses base on the clustering partition which includes the variable *Intensity*.

Self-reported reasons for non-take-up confirm our conjecture of strong self-selection into these clusters of policy take-up: "no interest/need" is the overwhelming reason for non-take-up of business assistance, given in 70.5% of the non-take-up cases.[16] In 18.8% of non-take-up cases, business assistance schemes were "not available/known" to founders. Reasons related to policy-induced selectivity play virtually no role.

4.3 Predictors of policy take-up and perceived usefulness

Having identified empirical clusters of policy take-up, we now analyze which characteristics of founders and their start-ups explain the use of business assistance in general as well as separately for each particular pattern of business assistance, that is, for Cluster 1 and Cluster 2. We then examine the predictors of perceived usefulness, again first for business assistance in general and then for each cluster (Section 4.3.2).

4.3.1 Policy take-up

To predict the type of policy take-up, we employ logistic regression and multinomial logistic regression analysis estimating odds ratios (OR). This procedure allows estimating the sample-specific likelihood of being in the assistance groups, instead of the nonassistance group, as a function of the independent variables. Significant ORs that are higher than 1 indicate a positive effect and significant ORs lower than 1 indicate a negative effect. Note that each regression is conducted in two steps (denoted by Roman numerals): the first step considers founders' *Entrepreneurial personality profile*, the second step, as an additional analysis, considers the single Big Five traits instead of the profile.

The independent variables are control variables (*Year 1994–1997, Year 1998–2001*), our hypothesized predictors, namely, variables tapping nascent founders' human and social capital as well as personality, and, finally, variables referring to the type of start-up. The

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[15] The resulting 4 clusters cannot be further analyzed due to small sample sizes.

results are set forth in Table 6. The results from logistic regression analysis reveal that *Previous self-employment* is a relevant predictor of the overall assistance group (OR=0.48). Founders who had prior experience at the time they founded the venture in question are less likely to be in the overall assistance group than in the nonassistance group.

The multinomial logistic regression analysis (which predicts use of assistance in Clusters 1 and 2) further reveals that *Previous self-employment* and *Novelty* are relevant predictors of assistance for both clusters. Specifically, *Previous self-employment* predicts both clusters. Founders with prior experience are less likely to be in either cluster than in the nonassistance group. In contrast, the *Novelty* of the business idea solely predicts inclusion in Cluster 1. Founders who start a business based on a novelty are more likely to be in Cluster 1 than in the nonassistance group.

In sum, these findings provide some support for our expectations. Consistent with our "weakness hypothesis", founders who had low personal entrepreneurial resources (i.e., no entrepreneurial experience at the time they began founding the venture in question) utilized public business assistance more often than those with some experience. However, all other variables tapping personal entrepreneurial resources appear to be irrelevant predictors. Regarding variables that cover the type of start-up, we find no evidence that being a team start-up rather than a sole founder has any effect on the take-up of business assistance. However, the variable might be insignificant because of two conflicting underlying mechanisms, which were discussed in Section 3.2. Unfortunately, we cannot empirically distinguish between team start-ups' potentially lower need of business assistance and their higher need for legitimizing decision making, which would tend to increase take-up of business assistance.

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[16] The reasons for non-take-up were asked for each kind of business assistance separately. The percentages were calculated by adding the respective responses across the five subject matters.

		Logistic regressions		Multinominal regressions			
		(I)	**(II)**	**(I)**		**(II)**	
		Assistance in general	Assistance in general	Cluster 1 – assistance vs. no assistance	Cluster 2 – assistance vs. no assistance	Cluster 1 – assistance vs. no assistance	Cluster 2 – assistance vs. no assistance
		OR	OR	OR	OR	OR	OR
Controls	Year 1994–1997	0.42*** (0.25-0.72)	0.43*** (0.25-0.74)	0.31*** (0.16-0.61)	0.56* (0.29-1.07)	0.31*** (0.15-0.61)	0.57* (0.30-1.11)
	Year 1998–2001	0.72 (0.42-1.21)	0.73 (0.43-1.24)	0.70 (0.37-1.31)	0.74 (0.38-1.44)	0.69 (0.36-1.31)	0.78 (0.40-1.52)
Human and social capital	Previous self-employment	0.48*** (0.31-0.73)	0.48*** (0.31-0.73)	0.42*** (0.24-0.73)	0.54** (0.32-0.92)	0.41*** (0.23-0.73)	0.54** (0.32-0.92)
	Parents self-employed	0.81 (0.47-1.40)	0.82 (0.47-1.41)	0.87 (0.43-1.76)	0.77 (0.39-1.51)	0.89 (0.43-1.82)	0.75 (0.38-1.50)
	Social capital (weak ties)	1.31 (0.83-2.06)	1.32 (0.84-2.08)	1.55 (0.88-2.74)	1.14 (0.65-1.99)	1.61 (0.91-2.86)	1.14 (0.65-1.99)
	Social capital (strong ties)	1.12 (0.73-1.72)	1.12 (0.73-1.72)	1.04 (0.60-1.80)	1.19 (0.71-1.99)	1.03 (0.59-1.80)	1.17 (0.70-1.97)
Personality traits	Conscientious-ness		0.85 (0.58-1.24)			0.74 (0.45-1.21)	0.93 (0.59-1.48)
	Extraversion		1.00 (0.69-1.44)			0.88 (0.55-1.42)	1.12 (0.72-1.75)
	Agreeableness		1.05 (0.73-1.52)			0.91 (0.56-1.45)	1.21 (0.77-1.91)
	Openness		1.07 (0.71-1.60)			1.16 (0.69-1.93)	1.00 (0.61-1.64)
	Neuroticism		1.09 (0.69-1.72)			1.17 (0.64-2.14)	1.03 (0.60-1.79)
	Entr. personality profile	0.99 (0.95-1.02)		0.98 (0.93-1.03)	0.99 (0.95-1.04)		
Type of start-up	Novelty	1.08 (0.95-1.23)	1.07 (0.94-1.22)	1.31*** (1.12-1.54)	0.87 (0.73-1.03)	1.30*** (1.11-1.52)	0.86 (0.72-1.03)
	Team start-up	0.83 (0.54-1.27)	0.83 (0.54-1.28)	0.78 (0.45-1.36)	0.86 (0.51-1.44)	0.76 (0.44-1.32)	0.86 (0.52-1.45)
N		425	425	425		425	
LR chi2		29.21***	29.74***	52.65***		56.81***	
Pseudo R2		0.050	0.051	0.063		0.145	

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.
OR = odd ratios (odds of belonging to Cluster 1 (Cluster 2) as compared to having no business assistance).
95% confidence intervals are given within parentheses.
Reference group in the multinomial logistic regression: No business assistance.
Refusals for several variables reduce the number of observations to 425.

Table 6: Logistic and multinomial logistic regression describing selection into business assistance in general and into particular clusters of business assistance

4.3.2 Perceived usefulness

We now turn to investigating predictors of founders' perceived usefulness of the business assistance utilized. In a preliminary analysis, we test whether this usefulness differs between the two clusters. It does: perceived usefulness is significantly higher in Cluster 1 (mean: 3.69, sd: 0.95) than in Cluster 2 (mean: 3.28, sd: 1.32).[17] The lower perceived usefulness of less intensive assistance (as described by Cluster 2) might be partly explained by founders' dissatisfaction about their first use of business assistance which will most likely result in no further take-up.

In a next step, we conduct three single regression analyses (again via two steps denoted by Roman numerals) to examine the influence of founders' human and social capital, their personality, and the type of the start-up on the perceived usefulness of their utilized business assistance. The first regression analysis refers to the overall sample, i.e., to all founders who made use of any kind of business assistance; the second refers to founders in Cluster 1; and the third to founders in Cluster 2. This procedure allows to explore effects within the overall sample as well as cluster-specific effects. Independent variables are control variables and the same set of predictors that were used to predict type of take-up (Section 4.3.1). Note that we additionally consider founders' *Current life satisfaction* as a control variable in order to adjust our results for a possible recall bias. As the dependent variable represents retrospective data, namely, founders' current evaluations of business assistance they had utilized months or even years ago, this information could be biased by founders' current state of mind, e.g., current life satisfaction (Rutter et al., 1998).

Table 7 summarizes the results of the three regressions (overall sample and the subgroup analyses for Clusters 1 and 2). Founders' *Current life satisfaction* positively predicts usefulness in Cluster 1. Thus, those founders in Cluster 1 who felt happy with their current life perceived the utilized business assistance as more useful. Among the study variables, previous self-employment, self-employed parents, social capital (weak), and personality (an entrepreneurial personality profile and openness, respectively) are relevant predictors in at least one of the groups. Specifically, *Previous self-employment* negatively predicts usefulness in the overall sample; *Parents' self-employment, Social capital (weak)*, and an *Entrepreneurial personality profile* negatively predict usefulness in Cluster 1.[18]

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[17] A two-sided t-test reveals significance at the 5 % level.

[18] Interestingly, we find that a lack of support from *weak* ties is correlated with higher perceived usefulness in Cluster 1, whereas a lack of support from *strong* ties seems to have no effect. This fits nicely to the social capital literature, which particularly emphasizes the importance of weak ties for entrepreneurship (Davidsson & Honig, 2003). Founders' fairly remote but larger networks within the venture creation process may serve as bridges to various types of information and help, making more formal business assistance less useful (Granovetter, 1973).

Furthermore, *Openness* negatively predicts usefulness in the overall sample and in Cluster 1. Taken together, these results are in line with our expectations. Founders with low personal entrepreneurial resources perceived their utilized business assistance as more useful. This was particularly true within Cluster 1. Insignificant coefficients in the analysis of Cluster 2 indicate that the usefulness of less intensive operational assistance does not depend on any of the personal entrepreneurial resources (apart from *Previous self-employment*) or the start-up characteristics we analyze.

Interestingly, among the single broad personality traits studied, openness turned out to be relevant. Founders who lack creativity and openness to the new appear to have benefited from business assistance, particularly from intense assistance. As suggested by past research, higher levels of openness should be understood as a personal entrepreneurial resource (Zhao & Seibert, 2006). Openness could be a particularly valuable resource in the venture-founding process, which often demands high levels of creativity and openness to the new (Ardichvili et al., 2003). Moreover, as we already showed that founders who utilized business assistance were very often novice entrepreneurs without previous entrepreneurial experience, openness could have been particularly crucial for them, as they had to adapt to a new and complex occupational field—the entrepreneurial arena. While the novelty of the business idea has been shown to be a strong predictor of whether business assistance is taken up at all, insignificant coefficients indicate that start-ups' innovativeness does not have an impact on the perceived usefulness of the assistance.

		Business assistance in general			Subgroup analysis for each cluster		
		Overall (N=194)			Cluster 1 (N=96)		Cluster 2 (N=98)
		(I)	**(II)**		**(I)**	**(II)**	**(I)**	**(II)**
	Cons.	2.70 ***	4.12 ***		1.99 ***	2.75 **	3.10 **	4.27 *
Controls	Current life satisfaction	0.19	0.16		0.40 ***	0.33 **	0.18	0.19
	Year 1994–1997	-0.02	-0.07		-0.28	-0.19	0.10	-0.14
	Year 1998–2001	0.06	0.08		-0.02	0.16	0.20	0.01
Human and social capital	Prev. self-employment	-0.37 *	-0.38 *		-0.40	-0.38	-0.34	-0.42
	Parents self-employed	-0.08	-0.15		-0.47	-0.60 *	0.35	0.38
	Social capital (weak ties)	-0.07	-0.07		-0.53 **	-0.57 **	0.30	0.29
	Social capital (strong ties)	0.13	0.11		-0.13	-0.13	0.39	0.36
Personality traits	Conscientiousness		0.02			0.05		0.06
	Extraversion		0.09			0.13		0.17
	Agreeableness		-0.08			0.23		-0.27
	Openness		-0.30 *			-0.37 **		-0.33
	Neuroticism		-0.27			-0.06		-0.37
	Entr. personality profile	-0.00			-0.03 *		0.03	
Type of start-up	Novelty	0.01	0.02		-0.02	0.01	-0.12	-0.12
	Team start-up	0.03	0.03		0.15	0.19	-0.17	-0.22
	R2	0.045	0.070		0.255	0.291	0.107	0.136
	Adjusted R2	-0.013	-0.010		0.155	0.150	-0.003	-0.021

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

Table 7: Prediction of perceived usefulness of business assistance

Additionally, we test for interaction effects between each (independent) study variable and belonging to either Cluster 1 or Cluster 2. In other words, we test cluster membership as a moderator (Baron & Kenny, 1986). This procedure allows examining whether the effect of each independent study variable significantly differs between the two clusters. Employing moderated multiple regression analysis (for continuous independent variables) and ANOVA (for dichotomous independent variables), we find two significant interaction effects (p<0.10). The effect of *Novelty* and *Social capital (weak)* on perceived usefulness differs significantly depending on being in Cluster 1 or Cluster 2.[19] These significant interactions thus support our initial conjecture that distinct differences in policy take-up, as depicted by our two clusters, deserve separate attention. Finally, we should note that none of the predictors achieved significance in Cluster 2, which can be explained by the various reasons given for having had only less intensive assistance, again suggesting diverse predictors of perceived usefulness.

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[19] The analyses including interaction terms are not shown here but can be obtained from the authors.

4.4 Economic effects

The previous section highlighted a person-focused view of actual take-up of business assistance and its perceived usefulness. From an economic perspective (and abstracting away from policy efforts to promote the economic status of disadvantaged groups), business assistance is mainly justified by positive external effects accruing from superior business performance and thus must be evaluated accordingly.[20] We approximate positive external effects by a start-up's initial capital, its employment, and survival. First, business assistance might provide founders with the necessary commitments and signals to overcome alleged credit rationing (Blumberg & Letterie, 2008) and, therefore, business assistance might help founders to attract external finance. Initial firm size is consistently found to be associated with firm survival (Geroski, 1995; Sutton, 1997). Proxied by the amount of initial capital, it can thus be seen as an indicator for positive external effects. Cooper et al. (1994) argue that financial resources allow start-ups to pursue more capital-intensive strategies (which might be more efficient and better protected from imitation) and to realize growth. Furthermore, financial resources constitute a buffer against random shocks. Start-ups with high endowments of financial capital are thus able to mount a greater challenge to incumbents and, in this way, will ensure efficiency and stimulate productivity (Fritsch, 2008). Second, business assistance should enable founders to manage and grow their enterprises. Employment growth is a prominent indicator of firm growth and prosperity and, moreover, constitutes an important policy goal itself. Third, the long-run survival of a start-up indicates a sustainable policy intervention.[21]

Matching approach

Since the weaker founders seem more likely to make use of business assistance, the performance of assisted and nonassisted start-ups cannot be compared directly to identify the causal effect of business assistance. Therefore, the counterfactual outcome must be discovered, that is, the outcome of a nonassisted start-up if it took up business assistance.

Nonparametric matching methods produce unbiased estimates of a treatment's impact, for example, when estimating the effect of a particular policy intervention. The basic idea is to compare the mean outcome of assisted firms with those of nonassisted start-ups that are similar in terms of a predefined set of ex-ante variables but that have not taken up any business assistance. Given that the selection into business assistance is completely based on

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[20] As already discussed in footnote 1 a lack of recognition and asymmetric information are also put forward as a rationale for the public provision of business assistance (Storey, 2003).
[21] However, as already pointed out by footnote 7 positive external effects can also emanate from failed start-ups.

observable exogenous characteristics (i.e., not affected by the treatment), potential outcomes are independent of the treatment assignment (Smith & Todd, 2005). This assumption is known as the conditional independence assumption (CIA). Implicit in this matching approach is the stable unit treatment value assumption (SUTVA), which states that business assistance does not impact any start-ups other than those explicitly treated (Rubin, 1991). In the present context, this implies that business assistance does not impact nonassisted start-ups via market effects or knowledge spillovers.

In principle, one can match on all covariates. However, this may be difficult to implement when the set of covariates is large. To reduce the size of the matching problem, Rosenbaum and Rubin (1983) propose using propensity score matching. The basic idea is not to match on covariates directly, but to match on a function of the covariates that describes the propensity to take-up assistance. As actual propensity scores are not known, the first step in a propensity score analysis is to estimate the individual scores, which is usually done by logistic regression.

In a second step, a matching algorithm must be chosen that contrasts the outcome of an assisted start-up with a weighted average of the outcome of (some) nonassisted observations. There are various matching algorithms that, asymptotically, should all yield the same results (Smith, 2000). In the present analysis, we apply kernel matching. This method matches every assisted start-up with the weighted average of all nonassisted start-ups. Thereby, the weights are inversely proportional to the distance between the propensity scores of the assisted and nonassisted start-ups. When implementing kernel matching, a kernel function and a bandwidth parameter need to be chosen. The choice of the latter is of most importance in practice (DiNardo & Tobias, 2001) since the bandwidth parameter determines a tradeoff between a "few but good matches" (yielding higher variance) and "many but potentially bad matches" (leading to biased estimates). Here, Silverman's (1986) rule of thumb is used to determine the bandwidth parameter and thus to balance bias and variance. The exact matching protocol is set out in Table 8. Estimations are made with the psmatch2 Stata ado package by Leuven and Sianesi (2003).

Step 1. A logit model for all three outcome variables (initial capital, employment, and credit rating) is specified and estimated. In this way, the propensity scores for each observation are obtained. The choice of variables and the estimation of the propensity score are explained in Appendix B.
Step 2. The sample is restricted to the region of common support. The common support condition ensures that any set of characteristics of assisted start-ups (as captured by the propensity score) can also be observed for nonassisted ones. A minimum-maximum comparison of the distribution of the propensity score determines the region of common support. Its imposition requires dropping 3 (8, 7) observations from the analysis of business assistance overall (Cluster 1, Cluster 2).
Step 3. The average treatment effect on the treated (ATT) is the difference between the mean outcome of assisted start-ups and matched nonassisted start-ups. The average treatment effect for the treated (ATT) can be stated as

$ATT = \frac{1}{N_1} \sum_{i \in I_1} [Y_i^1 - \sum_{j \in I_0} W_{N_0}(i,j) Y_j^0]$, with Y_i^1 denoting the outcome of the assisted start-up i and Y_j^0 the outcome of nonassisted start-ups j.[22] N_1 (N_0) is the number of observations in the assisted group I_1 (control group I_0). The outcome of i is thus contrasted with a weighted average outcome of the control group. Weights are given by $W_{N_0}(i,j) = \frac{G_{ij}}{\sum_{k \in I_0} G_{ik}}$, with G_{ik} denoting a Gaussian kernel $G[(P_i - P_k)/h]$ and P_i (P_k) standing for the propensity score of assisted (nonassisted) start-ups. Silverman (1986) developed the following rule of thumb for the choice of the bandwidth parameter: $h : h = 0.9 \cdot A \cdot n^{-0.2}$, in which n denotes the number of observations and the term $A = \min(standard\ deviation, \frac{interquart\ ile\ range}{1.34})$ accounts for the distribution of the propensity score.

Step 4. The standard error of the matching estimators is calculated using bootstrapping (200 replications).[23] The estimates for the average treatment effect (ATT) as well as their bootstrapped standard errors and p-values are set out in Table 9.

Step 5. The quality of the matching is assessed by analyzing the mean differences between nonassisted and assisted matched start-ups. After matching, there should be no significant differences regarding any characteristics that are assumed to have an impact on both the take-up of assistance and the respective outcome variable. Appendix C shows mean comparisons between assisted and nonassisted start-ups.

Step 6. Steps 1 to 5 are conducted for the following treatments: "business assistance in general" and, more specifically, the effectiveness of business assistance as characterized by Cluster 1 as well as by Cluster 2 is examined.

Table 8: Matching protocol

Results

The matching results with respect to the four outcome variables for each sample (overall, Cluster 1, Cluster 2) are set out in Table 9. Looking first at the analysis of business assistance in general, we find that start-ups taking up business assistance have, on average, initial capital amounting to 3.28. Their matched nonassisted counterparts, however, have even higher initial capital (3.30). This difference is not significant. Similarly, employment in the first business year (third business year) of assisted start-ups exhibits an ATT of -0.97 (-1.69), i.e., the difference between the mean employment of assisted start-ups (5.10 in the first business year; 8.19 in the third business year) and matched nonassisted start-ups (6.08 in the first business year; 9.88 in the third business year). Again, the higher employment of assisted start-ups is not significant. Looking at the indicator for survival, assisted start-ups have a mean credit rating of 287.66 compared to the mean rating of 285.56 for their nonassisted matched counterparts. However, the difference fails to reach significance. The same tendencies can be observed when we look at the effects of business assistance as characterized by cluster 1. Again, matching does not reveal any significant differences with respect to initial capital, employment, or credit rating. Business assistance as characterized by Cluster 2 does not

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[22] This notation follows Caliendo (2006).

[23] Although a distribution theory for the cross-sectional and difference-in-difference kernel and local linear matching is derived in Heckman et al. (1998), standard errors for matching estimators are in practice generated

significantly affect our outcome variables either. However, the amount of initial capital (the credit rating) is higher (better) for assisted start-ups compared to their nonassisted counterparts (insignificantly, though). The use of other bandwidth parameters and other matching algorithms also results in insignificant estimates.[24]

Outcome		Mean outcome of matched		ATT	S.E.	p-value	#Observations	
		… Assisted start-ups	… Non-assisted start-ups				Assisted	Non-assisted
Overall	**Initial capital**	3.28	3.30	-0.02	0.14	0.89	189	249
	Employment 1st year	5.10	6.08	-0.97	0.61	0.16	188	249
	Employment 3rd year	8.19	9.88	-1.69	1.04	0.11	186	239
	Credit rating	287.66	285.56	2.09	7.15	0.77	161	202
Cluster 1 business assistance	**Initial capital**	3.29	3.34	-0.05	0.19	0.80	93	239
	Employment 1st year	4.96	6.07	-1.11	0.79	0.22	92	239
	Employment 3rd year	8.16	10.01	-1.85	1.16	0.11	91	229
	Credit rating	293.37	286.87	6.50	10.51	0.54	82	192
Cluster 2 business assistance	**Initial capital**	3.36	3.35	0.02	0.17	0.93	97	238
	Employment 1st year	5.30	5.98	-0.68	0.71	0.38	97	238
	Employment 3rd year	8.35	9.91	-1.56	1.30	0.23	96	229
	Credit rating	279.94	281.34	-1.40	9.15	0.88	80	193
Please note that no estimate reaches the 0.1 significance level.								

Table 9: Overview of results obtained from kernel matching employing optimal bandwidth parameters

In sum, the matching procedure cannot reveal any impact of business assistance on venture performance (measured by initial capital, employment in the first and third business year, and credit rating in the third business year) and thus cannot indicate any positive external effects created by business assistance schemes. Abstracting away from insignificant differences, the outcomes of matched assisted start-ups are most of the times inferior to those of matched nonassisted start-ups (in terms of having lower initial capital, lower employment, and a worse credit rating). This tendency either suggests that business assistance induces start-ups to grow more slowly (leading to less employment after three years or to invest less capital). But, then, it also points to the conditional independence assumption, which might not be met in the present analysis. The validity of the conditional independence assumption relies crucially on the possibility of comparing assisted and nonassisted start-ups on the basis of a broad set of pre-treatment characteristics. We have a rich dataset and the matching succeeds

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using bootstrap resampling methods. The use of bootstrapping is supported by Abadie and Imbens (2008), who suggest that the standard bootstrap can be applied to assess the variability of kernel matching estimators.
[24] These results are not shown here, but can be obtained from the authors.

in leveling out any differences with regard to, e.g., being an academic spin-off, the degree of novelty, previous self-employment, and social capital. However, there might be yet unobserved characteristics that explain the weak performance of assisted start-ups. Unfortunately, the very nature of the conditional independence assumption means that it cannot be tested.

However, unobserved differences between assisted and nonassisted start-ups would have to be very strong to be able to turn insignificant negative ATTs into significant positive ATTs. Therefore, we are confident in suggesting that business assistance does not impact on start-ups' performance as measured by initial capital, employment, and credit rating.

5. Discussion and conclusion

In this study we investigate perceived usefulness and economic effects of public business assistance in the founding process, utilizing unique data from Germany. Contrary to previous research that mostly considers business assistance as a binary treatment variable (e.g., Parker and Belghitar, 2006), we follow a cluster-based approach in public policy evaluation (Peck, 2005) and focus on actual take-up of business assistance. Our analysis reveals distinct patterns in the use of business assistance—irrespective of particular schemes. In line with earlier research on the take-up of business assistance (Hjalmarsson & Johansson, 2003; Barney et al., 1996; Chrisman & Leslie, 1989), the patterns identified in this study can be described either as intensive strategically-oriented support (Cluster 1) or less intensive operational assistance (Cluster 2).

Facing a lack of experimental design and a lack of control variables in previous evaluation studies (Gu et al., 2008), and given their equivocal results (Davidsson, 2002), we employ propensity score matching to identify whether business assistance in the nascent phase translates into subsequent business performance. Our results suggest that business assistance neither impacts the amount of initial capital at the beginning of the first business year (as a more proximal outcome), nor employment or credit rating after three years (as a more distal outcome). Even for the more intense and strategically-oriented business assistance described by Cluster 1, which is taken up by founders of more innovative start-ups, we could not find any effect on subsequent business performance.[25] Starting up this type of venture can be expected to be the most difficult and at the same time the most socially desirable (yielding

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[25] The same is true when we abstract from our cluster partition and evaluate the effect of intensive assistance (compared to no assistance at all) and assistance which has been rated as above-average useful (compared to no

positive external effects), which explains the increased policy focus on this type of start-up. Our analysis suggests that this policy interest has been successfully implemented, since innovative start-ups are more likely to make use of Cluster 1. Therefore, the lack of impact on our three outcome measures is unlikely to be explained by a bad person-treatment-fit, i.e. by the fact that business assistance was not used by the target group but by clients towards whom the assistance is not oriented.

We should note, however, that our results do not indicate that every individual scheme is ineffective in improving clients' start-up performance. We rather find that the actual use of business assistance in the aggregate (as provided by various kinds of business assistance schemes) does not impact performance (as measured by well-established and comprehensive indicators such as start-ups' amount of initial capital, their employment, and credit rating). Furthermore, against the backdrop that many founders reported very useful assistance, concluding that business assistance (on average) is not helpful *at all* (has no impact at all), might be premature – at least from the founders' perspective. This is also underscored by the fact that intensive strategically-oriented assistance (Cluster 1) is, on average, perceived as more useful compared to less intensive operational assistance (Cluster 2), which suggests a positive dose-response-relationship. We find that the weaker founders in Cluster 1 perceive business assistance as more useful. Entrepreneurial weakness was reflected by a lack of human and social capital, as well as by lack of an entrepreneurial personality make-up.

Although self-reported usefulness of business assistance is a relatively weak evaluation criterion, self-reported usefulness of policy measures informs about policy delivery and the acceptance of the policy measure (Storey, 2000). Our results regarding perceived usefulness of business assistance might further indicate that business assistance is effective in helping weak founders to overcome barriers in the nascent phase, continue the firm formation process, and, finally, to become actual entrepreneurs. Although our non-parametric matching procedure corrects the selection bias between assisted and non-assisted start-ups and allows for heterogeneous treatment effects (Caliendo, 2006) further research with greater sample sizes should investigate treatment effects for particular subgroups. This also includes tracking nascent entrepreneurs along the founding process in order to adequately estimate the effect of business assistance on getting emerging ventures started.[26]

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assistance at all). For both matching analyses we do not find any effect of business assistance either (the results are not depicted here, but can be obtained from the authors).

[26] Unfortunately, we cannot test for such a mechanism because we only have data on young entrepreneurs, i.e., those founders who finally succeeded in completing the nascent phase (survivor bias).

What are the political implications of our results? On the one hand, the positive evaluation of business assistance by weak founders themselves can be seen as policy success when publicly financed business is motivated by social policy or labor market policy which aim to help weak founders, e.g. the unemployed, to actually start a venture (Reynolds, 2007). On the other hand, even if sociopolitical reasons for the public provision of business assistance prevail (i.e. efforts to promote the economic status of disadvantaged groups), the impact of business assistance should translate into economically viable ventures. This implies that business assistance must sustainably compensate for and develop entrepreneurial resources that are argued to impact entrepreneurial success at the micro level (e.g., Markman & Baron, 2003) as well as fostering structural change and economic growth at the macro level (e.g., Fritsch & Schroeter, 2009). Otherwise, the provision of business assistance runs the risk of enabling weak founders to continue in the firm formation process who are most likely to run marginal businesses. Therefore, it will be a fruitful approach to examine assistance schemes' role in discouraging less promising start-up projects and thus allocating overall resources more efficiently.

A closer look at the identified patterns reveals further insights for policymakers: On the one hand, the vast provision of less intensive operational assistance (Cluster 2) points to an excessive focus on operational assistance. In contrast to strategically-oriented assistance, less intensive operational assistance is unlikely to impact on long-run business performance (Mole et al., 2009). Furthermore, operational services are hardly affected by ex-ante information asymmetries regarding the benefits of their use. Therefore, less intensive operational assistance could be most likely effectively and efficiently provided by, e.g., private consultants, accountants, or lawyers (Hjalmarsson und Johansson, 2003). On the other hand, the use of business assistance as characterized by Cluster 2 might also indicate poor policy delivery of strategic assistance. The generally lower perceived usefulness of assistance in Cluster 2 might be due to unsatisfied founders dropping out of assistance that was originally intended to be more strategically-oriented.

Our analysis has several limitations. First, our cross-sectional analysis is mainly based on retrospective data. Although we adopted the well-established Life History Calendar method to facilitate the recall process and to ensure the validity of our data (Belli et al., 2004; Caspi et al., 1996), longitudinal data and experimental designs are needed to strengthen causal inferences of business assistance. Second, small sample sizes and high standard errors provide good reasons to interpret the present results with some caution. At the same time, they should motivate future research which analyzes greater samples of entrepreneurial subgroups and in

this way might also overcome critique of the use of cluster analysis.[27] Third, our analysis lacks data about the use of nonsubsidized assistance, such as lawyers or nonsubsidized business consultants, who are most likely substitutes for publicly financed business assistance. Likewise, we did not examine business assistance in the start-up and post-start-up phase. We thus cannot generalize our results for these types of business assistance.

To conclude, we think that our findings should provide researchers and politicians ample opportunity for discussing the scope and intensity of public business assistance schemes, their expected effects and the justification of their public funding (e.g., between 2007 and 2013, the European Social Fund provides €45,000,000 on advice and coaching to support entrepreneurship in the federal German state of Thuringia alone (ESF, 2009)). Finally, we believe that our cluster-based evaluation approach effectively tackled the bewildering range of ever-changing policy schemes. However, less fragmented business assistance schemes would clearly facilitate quantitative evaluations by providing a higher number of comparable cases. Our analysis thus points to the need to restructure the overall provision of business assistance and to consider means of evaluating it when designing and implementing policies, e.g., by realizing more experimental designs to strengthen causal inferences. Therefore, a stronger "evaluation spirit and culture" at all levels of policy design, implementation, and delivery is needed.

Appendix

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[27] Peck (2005) notes that the clustering of policy take-up might be subject to criticism, since the results are relatively sensitive to the clustering algorithm and the similarity measure used.

A—Correlation table

		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	27
1	Bus. assistance	-	-	-0.02 / 0.02	0.00 / -0.01	0.00 / -0.06	0.09 / -0.04	0.27*** / -0.02	0.17*** / -0.07	-0.17*** / -0.15***	-0.05 / -0.06	0.12** / 0.05	0.04 / 0.08	-0.01 / -0.03	-0.05 / -0.01	-0.04 / 0.01	0.00 / 0.07	0.07 / -0.01	0.03 / -0.01	-0.03 / -0.06	-0.06 / 0.04	-0.20*** / -0.07	0.05 / 0.01	0.17*** / 0.08	-0.13** / 0.04	0.06 / -0.04	0.10* / 0.01	-0.05 / -0.02
2	Usefulness	-	-	0.14 / 0.24***	0.21** / 0.03	0.15 / 0.01	-0.14 / -0.20*	0.05 / -0.21**	0.11 / -0.11	-0.16 / -0.10	-0.16 / 0.06	-0.23** / 0.11	-0.09 / 0.14	0.02 / -0.06	0.04 / 0.10	0.06 / 0.07	0.07 / -0.03	-0.21** / -0.03	-0.14 / -0.14	-0.09 / 0.14	0.31*** / 0.11	0.03 / -0.01	-0.02 / 0.04	-0.01 / -0.03	-0.11 / 0.02	-0.01 / 0.05	0.11 / -0.03	-0.03 / -0.03
3	Initial capital	0.00	0.18**	-	0.31*** / 0.36***	0.26*** / 0.35***	0.04 / 0.02	0.03 / -0.01	0.15*** / 0.08	0.03 / 0.07	0.00 / 0.01	0.04 / 0.11**	-0.07 / -0.02	0.12** / 0.06	0.03 / 0.06	-0.08 / -0.03	-0.06 / -0.04	0.05 / -0.04	0.03 / 0.02	0.03 / 0.02	0.07 / -0.01	-0.02 / -0.03	-0.03 / 0.05	0.05 / 0.05	0.10* / 0.21***	0.13** / 0.10*	-0.17*** / -0.21***	-0.05 / -0.09*
4	Employm. 1st year	-0.01	0.11	0.31***	-	0.68*** / 0.71***	-0.05 / -0.03	-0.02 / 0.00	-0.01 / -0.03	-0.05 / -0.03	0.13** / 0.16***	-0.02 / 0.08	-0.03 / 0.02	0.13** / 0.18***	0.10* / 0.11**	0.05 / 0.06	0.01 / -0.01	-0.04 / -0.09*	-0.10* / -0.08	0.05 / 0.03	-0.03 / -0.02	-0.05 / -0.06	0.05 / 0.05	0.00 / 0.01	0.12** / 0.17***	0.07 / 0.13**	-0.12** / -0.19***	-0.06 / -0.10*
5	Employm. 3rd year	-0.04	0.07	0.28***	0.69***	-	-0.15** / -0.10*	0.11** / 0.09*	0.03 / -0.03	-0.11* / -0.08	0.12** / 0.14***	0.05 / 0.13**	0.01 / 0.03	0.14** / 0.14***	0.03 / 0.07	0.09 / 0.09*	0.00 / -0.01	-0.01 / -0.04	-0.14** / -0.17***	0.10* / 0.10*	0.02 / 0.02	-0.08 / -0.04	0.04 / 0.00	0.05 / 0.04	0.20*** / 0.26***	0.08 / 0.07	-0.18*** / -0.22***	-0.08 / -0.11*
6	Rating	0.03	-0.14*	0.02	-0.04	-0.13**	-	0.04 / 0.06	0.09 / 0.11*	0.12** / 0.13**	0.00 / -0.07	0.00 / 0.03	-0.02 / -0.02	0.02 / -0.03	-0.03 / -0.04	-0.08 / -0.08	-0.08 / -0.09	0.04 / -0.03	0.10* / 0.16***	-0.01 / -0.04	-0.16*** / -0.21***	-0.13** / -0.15***	-0.06 / 0.01	0.21*** / 0.16***	-0.11 / -0.11*	0.03 / 0.01	0.11* / 0.11*	-0.06 / 0.00
7	Academic spin-off	0.15***	-0.01	0.04	-0.03	0.10**	0.06	-	0.31*** / 0.21***	-0.08 / 0.01	-0.04 / -0.07	0.05 / -0.03	0.03 / -0.04	0.22*** / 0.14***	-0.08 / -0.06	-0.06 / 0.03	0.10* / 0.13**	0.04 / 0.06	0.00 / 0.00	-0.09 / -0.05	0.08 / 0.03	-0.16*** / -0.08	0.15*** / 0.04	0.01 / 0.05	-0.11** / -0.08	0.16*** / 0.10*	0.07 / 0.09*	-0.15*** / -0.13**
8	Novelty	0.05	0.03	0.11**	-0.02	-0.01	0.11**	0.31***	-	0.04 / 0.14***	-0.03 / 0.03	0.05 / -0.01	-0.02 / -0.03	0.07 / 0.06	-0.03 / 0.01	-0.02 / 0.06	-0.09* / -0.03	0.13** / 0.12**	-0.02 / -0.03	0.10* / 0.10*	0.07 / 0.06	-0.08 / -0.08	-0.01 / -0.05	0.10* / 0.16***	0.00 / 0.04	0.25*** / 0.17***	-0.04 / -0.02	-0.24*** / -0.20***
9	Previous self-employment	-0.18***	-0.11	0.06	-0.01	-0.07	0.10*	-0.06	0.09*	-	0.08 / 0.05	-0.13** / -0.06	-0.06 / -0.03	-0.01 / 0.05	-0.03 / -0.02	-0.03 / 0.02	0.02 / -0.04	0.08 / 0.02	-0.01 / 0.04	0.03 / 0.01	-0.09* / 0.05	-0.09* / -0.14***	0.05 / 0.08	0.05 / 0.08	-0.02 / -0.04	-0.10* / 0.02	0.06 / 0.02	0.05 / 0.00
10	Self-employed parents	-0.06	-0.04	0.02	0.14***	0.12**	-0.01	-0.02	0.00	0.12**	-	-0.03 / -0.07	0.00 / -0.04	0.00 / 0.01	-0.04 / -0.01	0.03 / 0.01	0.04 / 0.04	-0.10* / -0.02	0.01 / -0.08	-0.06 / -0.01	0.03 / 0.08	0.04 / 0.06	-0.01 / -0.02	-0.03 / -0.05	0.06 / 0.04	-0.10* / -0.04	0.01 / -0.04	0.04 / 0.04
11	Social capital (weak ties)	0.09*	-0.03	0.05	0.02	0.08	0.03	0.02	0.01	-0.11**	-0.07	-	0.24*** / 0.24***	0.03 / 0.02	0.04 / 0.00	-0.04 / -0.03	0.05 / 0.04	0.06 / 0.01	-0.06 / 0.01	0.01 / -0.02	0.02 / -0.09	-0.09 / -0.01	0.04 / -0.05	0.05 / 0.07	0.00 / 0.01	0.09* / 0.05	-0.02 / 0.00	-0.08 / -0.06
12	Social capital (strong ties)	0.07	0.04	-0.03	0.00	0.02	0.02	0.00	-0.04	-0.08	-0.03	0.25***	-	0.07 / 0.07	0.01 / 0.00	0.00 / 0.03	-0.01 / -0.02	-0.01 / -0.03	-0.04 / 0.02	0.02 / 0.00	0.02 / 0.05	-0.06 / -0.04	0.03 / 0.00	0.04 / 0.04	-0.08 / 0.00	0.00 / -0.04	0.02 / 0.07	0.06 / -0.05
13	Team start-up	-0.02	-0.02	0.09*	0.15***	0.13***	0.00	0.20***	0.07	0.03	0.02	0.01	0.08	-	0.01 / 0.03	-0.02 / 0.01	0.06 / 0.02	0.06 / 0.02	0.08 / 0.04	-0.05 / -0.01	-0.04 / -0.01	-0.04 / -0.01	-0.01 / 0.02	0.06	-0.06 / -0.04	0.05 / 0.11*	0.03 / 0.03	-0.03 / -0.04
14	Conscientiousness	-0.03	0.06	0.04	0.09*	0.04	-0.02	-0.08*	-0.01	-0.03	-0.01	0.04	-0.02	0.00	-	0.19*** / 0.21***	0.11* / 0.19***	0.15*** / 0.12**	-0.27*** / -0.33***	0.40*** / 0.37***	0.21*** / 0.21***	0.03 / 0.04	-0.04 / -0.06	0.01 / 0.01	0.09* / 0.07	0.02 / 0.07	-0.16*** / -0.16***	0.08 / 0.05
15	Extraversion	-0.02	0.06	-0.03	0.06	0.08*	-0.08	-0.05	0.03	0.05	0.05	-0.04	0.03	-0.01	0.19***	-	0.03 / 0.09*	0.29*** / 0.33***	-0.31*** / -0.35***	0.61*** / 0.60***	0.17*** / 0.15***	0.04 / 0.06	-0.07 / -0.07	0.02 / 0.02	0.04 / 0.06	-0.08 / -0.06	-0.01 / -0.02	0.06 / 0.06
16	Agreeableness	0.04	0.01	-0.04	0.02	0.02	-0.07	0.09*	-0.04	-0.03	0.04	0.06	0.01	0.04	0.16***	0.05	-	0.04 / 0.06	-0.17*** / -0.15***	-0.49*** / -0.45***	0.02 / 0.06	-0.03 / -0.04	0.04 / 0.01	-0.01 / 0.04	0.06 / 0.04	-0.11** / -0.11**	-0.02 / 0.03	0.09* / 0.04
17	Openness	0.04	-0.10	0.01	-0.06	-0.05	0.01	0.04	0.14***	0.01	-0.04	0.02	-0.02	0.02	0.12**	0.31***	0.04	-	-0.27*** / -0.26***	0.54*** / 0.55***	0.03 / 0.07	-0.10* / -0.08	-0.04 / -0.05	0.15*** / 0.16***	-0.12** / -0.13**	0.04 / -0.02	0.06 / 0.11**	-0.01 / 0.03
18	Neuroticism	0.01	-0.12*	0.01	-0.06	-0.13***	0.12**	0.00	-0.03	0.05	-0.05	-0.02	-0.02	0.06	-0.29***	-0.31***	-0.16***	-0.25***	-	-0.43*** / -0.47***	-0.21*** / -0.18***	0.08 / 0.04	-0.04 / -0.08	-0.05 / 0.04	0.03 / -0.03	0.03 / 0.05	-0.05 / 0.04	-0.01 / -0.08
19	Entr. personality profile	-0.05	0.03	0.03	0.02	0.06	-0.02	-0.08*	0.10**	0.01	-0.00	-0.02	0.00	-0.04	0.37***	0.60***	-0.48***	0.54***	-0.43***	-	0.18*** / 0.14***	0.02 / 0.03	-0.11** / -0.08	0.10* / 0.05	-0.05 / -0.02	0.04 / 0.01	0.00 / -0.03	0.02 / 0.05
20	Current life satisfaction	-0.01	0.18**	0.02	-0.01	0.01	-0.18***	0.05	0.09*	0.03	0.07	-0.04	0.03	0.01	0.20***	0.16***	0.05	0.07	-0.23***	0.16***	-	0.05 / -0.01	-0.03 / -0.01	-0.02 / 0.03	0.01 / 0.01	0.01 / 0.02	0.05 / 0.01	-0.09 / -0.04
21	Year 1994–1997	-0.15***	-0.02	-0.03	-0.04	-0.04	-0.16***	-0.13***	-0.09*	-0.10**	0.06	-0.04	-0.06	-0.03	0.05	0.07	-0.04	-0.08*	0.03	0.05	0.03	-	-0.61*** / -0.64***	-0.46*** / -0.47***	0.09* / 0.02	0.06 / 0.09	-0.19*** / -0.14***	0.06 / 0.05
22	Year 1998–2001	0.03	0.03	-0.01	0.06	0.04	-0.02	0.12***	-0.03	0.06	-0.02	0.00	0.00	0.00	-0.09*	-0.11**	0.00	-0.05	-0.03	-0.12**	-0.04	-0.61***	-	-0.42*** / -0.38***	-0.01 / 0.00	-0.07 / -0.07	0.12** / 0.07	-0.06 / -0.01
23	Year 2002–2006	0.13***	-0.01	0.05	-0.02	0.00	0.19***	0.01	0.14***	0.05	-0.04	0.05	0.08	0.04	0.04	0.04	0.04	0.15***	0.00	0.07	0.00	-0.47***	-0.42***	-	-0.02 / -0.02	0.00 / -0.03	0.08 / 0.08	-0.01 / -0.05
24	Nace 2	-0.04	-0.06	0.16***	0.15***	0.24***	-0.12**	-0.12**	0.01	-0.01	0.03	0.01	-0.03	-0.05	0.08	0.04	0.04	-0.13***	0.01	-0.04	0.01	0.06	-0.03	-0.03	-	-0.30*** / -0.31***	-0.39*** / -0.42***	-0.24*** / -0.28***
25	Nace 3	0.01	0.03	0.11**	0.08*	0.06	-0.02	0.14***	0.23***	-0.04	-0.05	0.08	-0.01	0.07	0.02	-0.08	-0.09**	0.01	0.03	0.01	0.03	0.09*	-0.05	-0.05	-0.30***	-	-0.44*** / -0.38***	-0.27*** / -0.25***
26	Nace 7	0.06	0.04	-0.17***	0.13***	-0.17***	0.13**	0.09*	-0.05	0.03	0.00	-0.01	0.04	0.01	-0.13***	0.01	0.00	0.12**	-0.02	0.01	0.03	-0.15***	0.07	0.09*	-0.41***	-0.42***	-	-0.35*** / -0.34***
27	Nace x	-0.04	-0.03	-0.08*	-0.09*	-0.11**	0.00	-0.15***	0.21***	0.02	0.02	-0.09*	0.00	-0.03	0.06	0.03	0.06	-0.01	-0.03	0.03	-0.07	0.02	-0.01	-0.02	-0.25***	-0.26***	-0.35**	-

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.
The correlations with the variable *Usefulness* include only those 194 (96, 98) observations that took up business assistance in the overall sample (Cluster 1, Cluster 2).

Table A1: Correlation matrices
The correlation matrix for the overall sample (N=425) is depicted in the lower triangle on the left. The correlation matrices for the Cluster 1 and the Cluster 2 sample are provided in the upper triangle on the right. The upper coefficient describes the Cluster 1 sample (i.e., all nonassisted and all Cluster 1 observations; N=347), the lower coefficient the Cluster 2 sample (i.e., all nonassisted and all Cluster 2 observations; N=349). There are pairwise deletions because of refusals for several variables.

B—Variable choice and estimation of the propensity score

A propensity score model must be estimated for each outcome variable, including those variables that influence both the take-up of assistance as well as the respective outcome variable. These variables can be expected to account for the selection bias (Caliendo, 2006). To identify these variables, we look for variables that correlate with the take-up of business assistance and simultaneously with the respective success measure (initial capital, employment growth, and credit rating). Moreover, we conduct multivariate analyses to identify other distinguishing characteristics between assisted and nonassisted start-ups that have an impact at the same time on initial capital, employment growth, and credit rating, respectively. In the following, the variable choice for the propensity score of each sample is explained.

Overall. Table A1 shows that the variables *Previous self-employment* and the time dummies correlate both with the take-up of business assistance in general and our outcome variable *Credit rating.* Similarly, being an *Academic spin-off* correlates with both take-up of business assistance and *Employment.* Since the time dummies are a significant predictor of policy take-up and the industry dummies are correlated with most outcome variables, we include these dummies as balancing variables.[28] Similarly, we include the personality traits *Extraversion* and *Neurocitism. Extraversion* correlates positively, and the trait *Neuroticism* correlates negatively, with most outcome variables, which is in line with research on the personality-career success-link (Judge et al., 1999). Hence, we estimate the propensity score with the variables *Academic spin-off*, *Previous self-employment*, *Extraversion*, *Neuroticism*, and the year and industry dummies.

Cluster 1. The variables *Academic spin-off*, *Previous self-employment, Novelty*, *Nace 2*, and *Nace 7* are correlated with both the take-up of Cluster 1 business assistance as well as various outcome variables (Table A2). Similar to the analysis of overall assistance, the Big Five trait *Neuroticism* correlates significantly with *Employment* and *Credit rating*. Again, the year dummies correlate strongly with the take-up of business assistance (as described by Cluster 1) and the industry dummies correlate with most outcomes. Since ordinary least squares regressions cannot identify other joint predictors of the take-up of business assistance characterized by Cluster 1 and our outcome variables and following again the recommendation of Rubin and Thomas (1996, as explained in footnote 28) the propensity

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[28] This approach follows Rubin and Thomas (1996, p. 253), who recommend including a variable in doubt "unless … it can be excluded because there is a consensus that it is unrelated to the outcome variables or not a proper covariate."

score is finally estimated with the variables *Novelty*, *Academic spin-off*, *Previous self-employment*, *Extraversion*, *Neuroticism*, the year and industry dummies.

Cluster 2. Previous self-employment is the only variable that is correlated with the take-up of Cluster 2 business assistance (Table A3). However, similar to the correlations described above, the variables *Novelty, Academic spin-off*, *Extraversion*, and *Neuroticism* correlate with various outcomes and are thus included in the propensity score. Additionally, we have to balance Cluster 2 assisted start-ups and nonassisted start-ups on the basis of *Social capital (weak)* because preliminary matching procedures indicated that the matched samples will significantly differ in their weak social capital. Since ordinary least squares regression models cannot reveal any further characteristics which influence our outcome variables and that distinguish between assisted and nonassisted start-ups, the propensity score model is finally estimated with the variables *Novelty*, *Academic spin-off*, *Previous self-employment*, *Extraversion*, *Neuroticism*, and *Social capital (weak)*, as well as with the year and industry dummies.

The propensity to take-up business assistance is estimated with a logit model (Table B1). In accordance with the discussion above, the selected variables are regressed on either the take-up of business assistance in general, Cluster 1 business assistance, or Cluster 2 business assistance. Since we are primarily interested in prediction and data reduction, redundancy and collinearity are of little account (Smith, 1997). However, this limits the interpretation of the coefficients, which are not further discussed here.

	Overall	Cluster 1 business assistance	Cluster 2 business assistance
Academic spin-off	0.7600**	1.1654 ***	0.0439
Novelty		0.1499 *	-0.1688 *
Previous self-employment	-0.8270***	-0.8779 ***	-0.7157 ***
Social capital (weak ties)			0.1878
Extraversion	0.0109	0.0036	0.0673
Neuroticism	0.1117	0.3281	0.0034
Year 1994–1997	-0.9093***	-1.2090 ***	-0.7447 **
Year 1998–2001	-0.4200	-0.5573 *	-0.4186
Nace 2	-0.0051	-0.5698	0.2807
Nace 3	0.0844	-0.1331	0.0674
Nace 7	0.1703	0.1698	0.1041
Constant	0.1859	-0.8186	-0.4240
N	441	340	342
LR chi2 (k)	(9) 35.64	(10) 51.62	(11) 16.63
Prob > LR	0.0000	0.0000	0.1192
Pseudo R2	0.0591	0.1294	0.0408

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B1: Estimation of the propensity score

C—Imposition of the common support

The common support condition ensures that any set of characteristics of assisted founders and their start-ups (which is captured by the propensity score) can be also observed for nonassisted ones. The kernel density functions (Figure C1) illustrate the distribution of the propensity score for assisted and nonassisted observations—overall and separately for each cluster-specific analysis. The region of common support lies within the overlap (highlighted by the black boxes). The condition of common support requires discarding 3 (8, 7) observations from the analysis of business assistance overall (Cluster 1, Cluster 2).

Note: Observations inside the region of common support lie within the black box. All observations outside the box are excluded from the matching procedure.
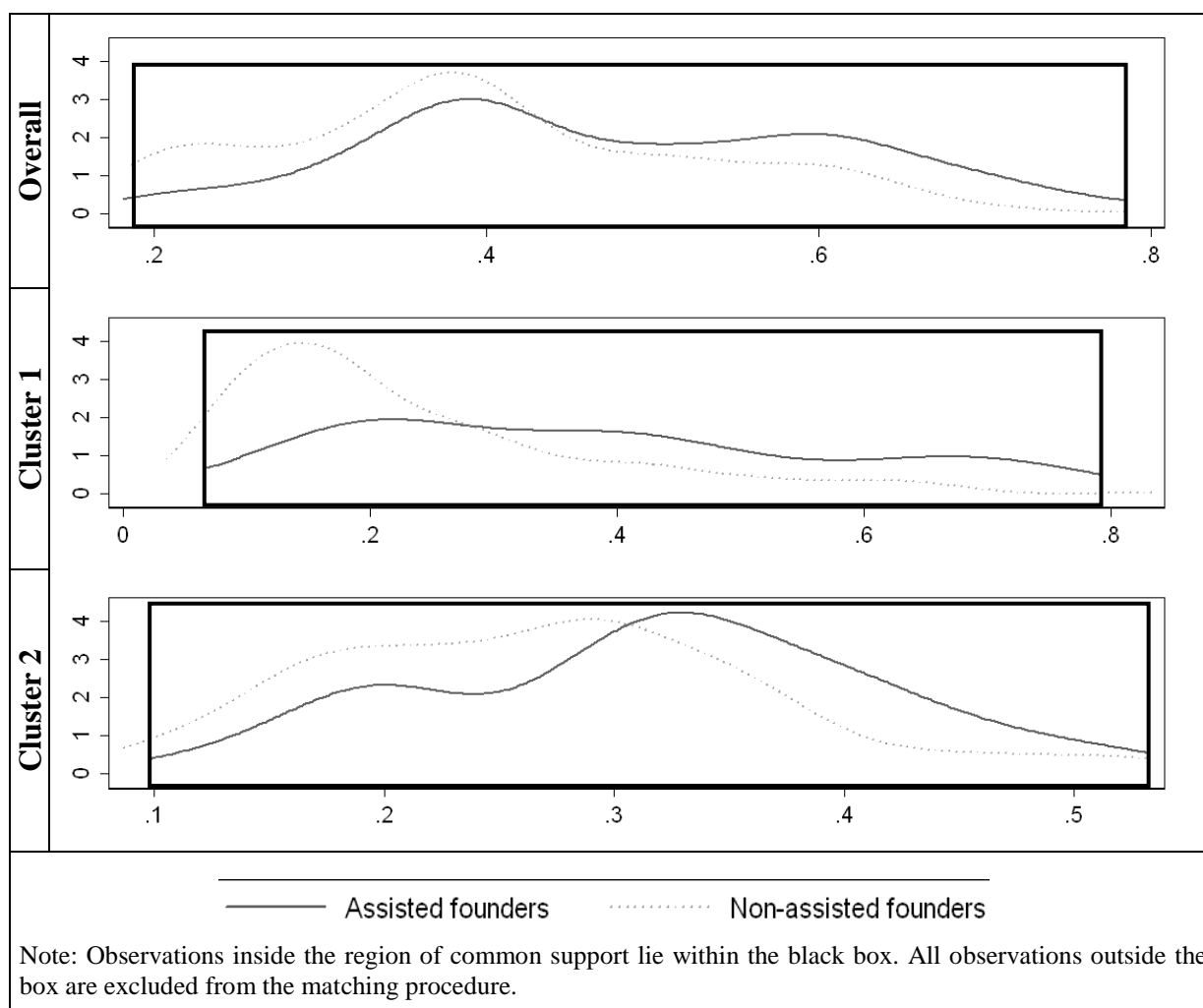
Figure C1: Distribution of the propensity score for the analysis of business assistance overall, Cluster 1 business assistance, and Cluster 2 business assistance

D—Matching quality

T-tests for equality of means in the assisted and nonassisted start-ups indicate the balancing of the variables before and after matching (Tables D1a–D1c). After matching, assisted and nonassisted start-ups differ only with respect to strong social capital in the analysis of business assistance in general (Overall take-up, Table D1a). This should not be of concern since there is no evidence that this variable impacts on our outcome variables.

Overall take-up of business assistance										
	Before matching		**Initial capital** After matching		**Employm. 1st year** After matching		**Employm. 3rd year** After matching		**Credit rating** After matching	
	Mean of…		Mean of matched…		Mean of matched…		Mean of matched…		Mean of matched…	
	… assisted start-ups	… non-assisted start-ups (poten-tial controls)	… assisted start-ups	… non-assisted start-ups (actual controls)	… assisted start-ups	… non-assisted start-ups (actual controls)	… assisted start-ups	… non-assisted start-ups (actual controls)	… assisted start-ups	… non-assisted start-ups (actual controls)
	N = 194	N = 251	N = 189	N = 249	N=188	N=249	N = 186	N = 239	N = 161	N = 202
Academic spin-off	**0.16**	**0.07**	0.16	0.17	0.16	0.17	0.17	0.17	0.18	0.17
Novelty	1.38	1.25	1.41	1.36	1.42	1.36	1.42	1.34	1.51	1.40
Previous self-employment	**0.28**	**0.45**	0.28	0.28	0.27	0.28	0.26	0.28	0.27	0.27
Parents self-employed	0.14	0.19	0.14	0.18	0.14	0.18	0.13	0.17	0.13	0.17
Social capital (weak ties)	**0.33**	**0.24**	0.34	0.27	0.34	0.27	0.34	0.28	0.35	0.28
Social capital (strong ties)	0.40	0.34	**0.41**	**0.32**	**0.41**	**0.32**	**0.41**	**0.31**	**0.42**	**0.31**
Team start-up	0.66	0.69	0.67	0.72	0.67	0.72	0.67	0.72	0.68	0.74
Conscientiousness	3.62	3.67	3.60	3.67	3.60	3.67	3.61	3.67	3.58	3.65
Extraversion	3.19	3.22	3.19	3.22	3.18	3.22	3.18	3.21	3.20	3.23
Agreeableness	3.11	3.07	3.10	3.10	3.10	3.10	3.10	3.10	3.11	3.07
Openness	3.20	3.16	3.20	3.20	3.20	3.20	3.20	3.19	3.22	3.20
Neuroticism	1.38	1.37	1.40	1.36	1.40	1.36	1.40	1.36	1.40	1.37
Entr. pers. profile	-21.75	-21.04	-21.78	-21.04	-21.79	-21.04	-21.81	-21.10	-21.73	-20.91
Year 1994–97	**0.32**	**0.47**	0.31	0.35	0.31	0.35	0.32	0.35	0.29	0.32
Year 1998–01	0.37	0.34	0.38	0.37	0.38	0.37	0.38	0.37	0.36	0.35
Year 2002–06	**0.31**	**0.20**	0.31	0.29	0.31	0.29	0.30	0.29	0.35	0.33
Nace 2	0.21	0.24	0.20	0.21	0.20	0.21	0.20	0.21	0.20	0.22
Nace 3	0.24	0.24	0.25	0.28	0.25	0.28	0.25	0.28	0.27	0.30
Nace 7	0.39	0.33	0.39	0.36	0.39	0.36	0.38	0.36	0.39	0.34
Nace x	0.16	0.19	0.16	0.14	0.16	0.14	0.16	0.15	0.14	0.14
Propensity score	**0.48**	**0.40**	0.48	0.47	0.48	0.47	0.48	0.47	0.49	0.48

Please note: The balancing of the variables is shown after kernel matching with the optimal bandwidth. Bold numbers indicate significant different means between observation from assisted start-ups and nonassisted start-ups before and after matching in a two-sided t-test (10% significance level). Because of the imposition of the common support (see Appendix C) and missing values for each outcome variable, the matched samples have fewer observations. Furthermore, each t-test might lack observations because of refusals for several variables.

Table D1a: Group differences between assisted and nonassisted start-ups before and after matching

Take-up of Cluster 1 business assistance

	Before matching		Initial capital — After matching		Employm. 1st year — After matching		Employm. 3rd year — After matching		Credit rating — After matching	
	Mean of…		Mean of matched…		Mean of matched…		Mean of matched…		Mean of matched…	
	…assisted start-ups	…non-assisted start-ups (potential controls)	…assisted start-ups	…non-assisted start-ups (actual controls)	…assisted start-ups	…non-assisted start-ups (actual controls)	…assisted start-ups	…non-assisted start-ups (actual controls)	…assisted start-ups	…non-assisted start-ups (actual controls)
	N=96	**N=251**	**N=93**	**N=239**	**N=92**	**N=239**	**N = 91**	**N = 229**	**N = 82**	**N = 192**
Academic spin-off	**0.27**	**0.07**	0.27	0.25	0.27	0.25	0.27	0.25	0.28	0.25
Novelty	**1.86**	**1.25**	1.90	1.88	1.92	1.89	1.92	1.86	2.01	1.97
Previous self-employment	**0.27**	**0.45**	0.28	0.31	0.27	0.31	0.26	0.30	0.29	0.31
Parents self-employed	0.15	0.19	0.15	0.16	0.14	0.16	0.13	0.15	0.16	0.14
Social capital (weak ties)	**0.36**	**0.24**	0.36	0.29	0.37	0.29	0.37	0.30	0.36	0.29
Social capital (strong ties)	0.38	0.34	0.40	0.33	0.40	0.33	0.40	0.32	0.39	0.31
Team start-up	0.68	0.69	0.68	0.75	0.68	0.76	0.68	0.75	0.68	0.78
Conscientiousness	3.56	3.67	3.56	3.64	3.56	3.64	3.55	3.64	3.54	3.64
Extraversion	3.15	3.22	3.16	3.19	3.15	3.19	3.16	3.18	3.17	3.22
Agreeableness	3.08	3.07	3.07	3.08	3.07	3.08	3.06	3.09	3.07	3.06
Openness	3.25	3.16	3.24	3.23	3.25	3.23	3.25	3.22	3.28	3.23
Neuroticism	1.40	1.37	1.40	1.39	1.40	1.39	1.41	1.38	1.39	1.36
Entr. pers. profile	-21.92	-21.04	-21.83	-21.21	-21.86	-21.20	-21.86	-21.25	-21.62	-20.88
Year 1994–97	**0.25**	**0.47**	0.25	0.27	0.25	0.27	0.25	0.27	0.21	0.23
Year 1998–01	0.40	0.34	0.40	0.40	0.40	0.40	0.41	0.40	0.40	0.40
Year 2002–06	**0.35**	**0.20**	0.35	0.33	0.35	0.33	0.34	0.33	0.39	0.36
Nace 2	**0.13**	**0.24**	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14
Nace 3	0.29	0.24	0.29	0.28	0.29	0.28	0.30	0.28	0.30	0.30
Nace 7	**0.44**	**0.33**	0.44	0.46	0.43	0.46	0.43	0.46	0.43	0.44
Nace x	0.15	0.19	0.14	0.13	0.14	0.13	0.14	0.13	0.13	0.12
Propensity score	**0.38**	**0.23**	0.38	0.37	0.39	0.37	0.39	0.37	0.40	0.38

Please note: The balancing of the variables is shown after kernel matching with the optimal bandwidth. Bold numbers indicate significant different means between observation from assisted start-ups and nonassisted start-ups before and after matching in a two-sided t-test (10% significance level). Because of the imposition of the common support (see Appendix C) and missing values for each outcome variable, the matched samples have fewer observations. Furthermore, each t-test might lack observations because of refusals for several variables.

Table D1b: Group differences between assisted and nonassisted start-ups before and after matching

Take-up of Cluster 1 business assistance										
	Before matching		**Initial capital** **After matching**		**Employm. 1st year** **After matching**		**Employm. 3rd year** **After matching**		**Credit rating** **After matching**	
	Mean of…		Mean of matched…		Mean of matched…		Mean of matched…		Mean of matched…	
	… assisted start-ups	… non-assisted start-ups (poten-tial controls)	… assisted start-ups	… non-assisted start-ups (actual controls)	… assisted start-ups	… non-assisted start-ups (actual controls)	… assisted start-ups	… non-assisted start-ups (actual controls)	… assisted start-ups	… non-assisted start-ups (actual controls)
	N = 98	**N = 251**	**N = 97**	**N = 238**	**N=97**	**N=238**	**N = 96**	**N = 229**	**N = 80**	**N = 193**
Academic spin-off	0.06	0.07	0.06	0.07	0.06	0.07	0.06	0.07	0.08	0.07
Novelty	**0.91**	**1.25**	0.92	0.91	0.92	0.91	0.92	0.92	0.96	0.94
Previous self-employment	**0.29**	**0.45**	0.29	0.30	0.29	0.30	0.28	0.29	0.28	0.28
Parents self-employed	0.14	0.19	0.14	0.20	0.14	0.20	0.14	0.18	0.12	0.19
Social capital (weak ties)	0.30	0.24	0.30	0.29	0.30	0.29	0.29	0.29	0.33	0.30
Social capital (strong ties)	0.42	0.34	0.41	0.34	0.41	0.34	0.41	0.33	0.45	0.35
Team start-up	0.65	0.69	0.65	0.69	0.65	0.69	0.65	0.68	0.66	0.71
Conscientiousness	3.67	3.67	3.67	3.67	3.67	3.67	3.68	3.66	3.65	3.63
Extraversion	3.23	3.22	3.23	3.24	3.23	3.24	3.22	3.23	3.26	3.24
Agreeableness	3.14	3.07	3.14	3.07	3.14	3.07	3.15	3.07	3.16	3.03
Openness	3.16	3.16	3.16	3.15	3.16	3.15	3.15	3.15	3.16	3.15
Neuroticism	1.36	1.37	1.36	1.34	1.36	1.34	1.36	1.34	1.37	1.37
Entr. pers. profile	-21.59	-21.04	-21.59	-20.95	-21.59	-20.95	-21.64	-20.95	-21.69	-20.89
Year 1994–97	0.39	0.47	0.38	0.38	0.38	0.38	0.39	0.38	0.38	0.36
Year 1998–01	0.35	0.34	0.35	0.38	0.35	0.38	0.35	0.38	0.31	0.36
Year 2002–06	0.27	0.20	0.27	0.24	0.27	0.24	0.26	0.24	0.31	0.28
Nace 2	0.29	0.24	0.29	0.28	0.29	0.28	0.29	0.27	0.30	0.30
Nace 3	0.19	0.24	0.20	0.21	0.20	0.21	0.20	0.22	0.21	0.22
Nace 7	0.35	0.33	0.34	0.32	0.34	0.32	0.33	0.33	0.35	0.31
Nace x	0.17	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.14	0.17
Propensity score	**0.32**	**0.27**	0.32	0.31	0.32	0.31	0.32	0.31	0.33	0.32

Please note: The balancing of the variables is shown after kernel matching with the optimal bandwidth. Bold numbers indicate significant different means between observation from assisted start-ups and nonassisted start-ups before and after matching in a two-sided t-test (10% significance level). Because of the imposition of the common support (see Appendix C) and missing values for each outcome variable, the matched samples have fewer observations. Furthermore, each t-test might lack observations because of refusals for several variables.

Table D1c: Group differences between assisted and nonassisted start-ups before and after matching

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