THE INITIAL RESOURCE-PERFORMANCE RELATIONSHIP IN NEW VENTURES: TOWARDS A CONFIGURATIONAL APPROACH

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ABSTRACT
We investigate the initial resource-performance relationship in start-ups from a configurational perspective. We rely on resource-based and industrial organization literature to develop an integrated view on determinants of competitive advantage. We subsequently identify ideal configurations of initial resources, strategy and environment by means of a decision tree analysis on a sample of 218 start-ups. Results show that (1) competitive advantage is determined by resource bundles rather than single resources, (2) multiple ways exist to reach a competitive advantage (equifinality), (3) both universalistic bundles and bundles contingent upon the environment exist, and (4) organizational and human capital are important initial resources.

INTRODUCTION
The relationship between initial resources (IR) and new venture performance has been frequently studied in entrepreneurship literature (e.g. Bamford, Dean & Douglas 2004). IR, i.e. the firm’s resources present at the point of inception, are considered to be important because they imprint the firm at start-up and thus affect its future competitive position (Bamford et al. 2004).

So far, two perspectives have dominated this research stream. Within the universalistic perspective, research focuses on the identification of resources that matter for all start-ups (Dahlqvist, Davidsson & Wiklund 2000). A number of valuable IR emerged from these empirical studies such as financial capital (Lee, Lee & Pennings 2001), outside advice (Chrisman & McMullan 2004), planning (Delmar & Shane 2003), owner-manager experience and education (Robinson & Sexton 1994), and networking (Brüderl & Preisendörfer 1998). Studies starting from a contingency perspective assume that the value of resources depends on the specific context in which they are deployed (Barney, Wright & Ketchen 2001). This context differs according to internal organizational factors such as the start-up’s strategy and external environmental factors such as uncertainty, munificence and turbulence. Although some studies confirm the existence of contingency effects, there still exists a lot of inconsistency.

Universalistic and contingency perspectives provide useful insights, but also neglect two important issues. First, IR may interact with each other. Black and Boal (1994) mention the existence of interdependencies between resources. These interdependencies raise the complexity of a resource system. Hence, the strategic value of IR resides at the bundle level rather than at the individual level. So far, however, universalistic and contingency models only analyzed independent additive effects of multiple resources on performance outcomes. Second, organizations face multiple contingencies. Barney and Clark (2007), for example, argue that the value of a firm’s resources should be evaluated within the context of the firm’s strategy and market environment. Consequently, the start-up’s competitive advantage may be dependent on the degree of multivariate fit between the resources, organizational and environmental context of the start-up (Wiklund & Shepherd 2005). To date, however, empirical research has mostly dealt with contingencies one at a time.

Given these gaps, research on the initial resource-performance relationship should move beyond universalistic or contingency perspectives. It should take into account that a competitive advantage will most likely arise from the complexity of resource bundles and the capability of simultaneously aligning a firm’s internal and external attributes: its resources, its strategic orientation, and its environment.
The key question then is no longer “Which IR create a competitive advantage?” but rather “Which combinations or configurations of IR, strategy and environment lead to a competitive advantage in start-ups?”

This central question is the starting point of this paper. The contribution of this study is both theoretical and methodological. First, we bring together insights from the resource-based (RB) and industrial organization (IO) literature in a configurational framework suitable for start-ups. Second, we use decision tree analysis on a sample of 218 start-ups to detect successful configurations of resources, firm strategy and environmental characteristics. This analysis technique matches our research purposes considering its ability to (1) account for equifinality, (2) model complex data structures with non-linear and deeply interacted relationships, and (3) explore data for knowledge discovery and theory building.

We start with a literature review and explore how theoretical insights on resource bundles and the multivariate fit between resources, strategies and the environment can be integrated in a configurational framework. We subsequently introduce the main objective of the paper. Next, we elaborate on the method used and discuss the results. We end with a discussion and implications for theory, method and practice.

INITIAL RESOURCE BUNDLES

The majority of empirical studies in start-ups treat IR as isolated elements without taking into consideration the effects of other resources. Yet, it can be argued that the strategic value of resources does not reside at the resource level, but rather at the resource bundle level because of interdependencies between resources. According to Black and Boal (1994), different types of interdependencies exist. Resources may (1) compensate for each other; (2) be substitutes for one another; (3) enhance each other; and (4) suppress each other. Hence, the value of a resource depends on the other resources. Furthermore, these interdependencies augment the complexity of the resource system. Complex resource systems are more unique to the firm and hence improve the rarity of the resource base (Black & Boal 1994). They are also causally ambiguous because sources of superior performance are more difficult to trace in complex networks (Amit & Schoemaker 1993; Barney & Clark 2007). This causal ambiguity entails the imperfect imitability of resource bundles and thus provides strategic value to the firm. According to the RBV (Barney, 1991), rare, inimitable and valuable resource bundles have the potential for being a source of sustained competitive advantage.

Conceptual frameworks indicating how strategic resource bundles look like and how their constituent elements are related to each other are scarce. Of the existing frameworks, the study of Black and Boal (1994) stands out. These authors use the RBV and social network theory to identify 22 theoretical configurations of resources that are expected to generate a sustainable competitive advantage. Although this study is theoretically valuable, it has not yet been empirically tested. The few existing empirical studies in start-ups are valuable but limited in the number of IR and the types of resource relationships examined. Chandler and Hanks (1998), for instance, examine the substitutability of human capital for financial capital. Brush and Chaganti (1999) test the interaction effect between organizational resources and human resources of the owner. Other research is difficult to generalize because of a qualitative study approach (e.g. Brush, Greene, & Hart 2001). As a result, more research into initial resource bundles is warranted taking into account all resources and resource relationships that in combination can influence a start-up’s competitive advantage.

MULTIPLE “FIT” CONSIDERATIONS: STRATEGY AND ENVIRONMENT

In searching for initial resource bundles that confer good performance, researchers should take into account that resource bundles alone do not generate a sustainable competitive advantage. They are only valuable if they enable a firm to conceive and implement strategies that exploit opportunities or neutralize threats in a start-up’s environment (Barney & Clark 2007).

Resources and strategy

Resources only create value if they are effectively deployed to support a strategy that creates valuable products and services for customers. Since resource needs differ across strategies, not all resources will be valuable to the same extent for a specific strategy. Innovation strategies require highly creative and innovative employees whereas cost strategies require lower-cost labor (Chandler & Hanks 1994). As such, the creation and realization of value in firms demands a high degree of fit between the strategy’s resource needs and the actual resource base. This hypothesis has been empirically tested. Wiklund and Shepherd (2003), for example, found that firms with an innovative, proactive and risk-taking mindset benefit more from knowledge-based resources than firms with a lower entrepreneurial orientation.

In RBV research, it is suggested that the choice for a specific strategy must be based on the resources the firm controls (e.g. Newbert, Kirchhoff & Walsh, 2007). This, however, is not obvious for
new ventures. Constructing an initial resource base from scratch is a time-consuming and complex process which is highly unlikely to be completed at foundation (Brush et al. 2001). Moreover, Sirmon and Hitt (2003) mention that in the resource evaluation stage, the first stage in building a resource base, a strategic orientation must already exist to provide the parameters for the resource building process. There are several ways in which a specific strategic orientation can come into existence. Strategies may meet a perceived market opportunity, solve a social problem, or be just a better way of doing things (Brush et al. 2001). This implies that, even though the strategy is dependent on resources for its implementation, the choice for a specific strategy will not necessarily be determined by the resources the firm controls. In some cases, strategies may focus on exploiting market opportunities for which the supporting resources are not yet at the disposition of the firm (Sirmon, Hitt & Ireland 2007). In other cases, the resources entrepreneurs bring into the firm may be so unique that a strategy follows. This, for example, occurs when entrepreneurs invent new technologies for which markets are currently non-existent (Newbert et al. 2007). In sum, we conclude that a start-up’s strategic course and its resource base can be (at least in part) mutually dependent.

**Strategy and environment**

Whether a strategy is competitive or not depends on the environment the firm operates in. IO based research contends that the environment delineates the boundaries within which and the methods by which firms can compete (Venkatraman & Camillus 1984). Hence, the strategic actions by which a firm can acquire a competitive position in the market are limited and influenced by the environment. For example, dynamic and uncertain environments require innovation or marketing differentiation strategies to cope with unpredictability and variability of customer demands (Miller 1988). A number of studies have supported the strategy-environment contingency relationship in start-ups. Sandberg and Hofer (1987) show that broadly defined founding strategies are more effective in early industry life cycle stages whereas focused founding strategies are more effective in later stages of the industry life cycle. Robinson and McDougall (2001), in turn, conclude that entrants pursuing broader scope strategies are better positioned for future success in industries with high entry barriers. Yet, a firm’s environment will not always condition its strategic choices. Several authors argue that organizations can enact their environment as well (Miller 1988; Venkatraman & Camillus 1984). For example, if a firm creates innovative goods or services, new niche markets may be created. As such, strategy and environment are likely to be mutually causally connected (Ward, Bickford & Leong 1996).

**Resources and environment**

Given that resources are only valuable when they enable the firm to conceive or implement strategies that exploit opportunities or neutralize threats in a firm’s environment, Barney and Clark (2007) posit that the value of a firm’s resources is not only contingent upon the strategy of the firm but also upon its environmental context. Similarly, Collis and Montgomery (1995) argue that the resources’ value is determined in the interplay with marketplaces. A resource that is valuable in a particular industry might not be in another. Resources only become valuable when they enable a firm to meet the market demands and deal with competitive pressures. Empirical evidence for this third contingency relationship is provided by Miller and Shamsie’s (1996) study on firm performance in Hollywood film studios which demonstrates that property-based resources are valuable in stable, predictable environments, whereas knowledge-based resources are more helpful in uncertain environments. Here too, it can be argued that causality can go in both directions. If firms introduce innovative products and services based on a new technology, they shape their environment and create new markets. But, firms may as well develop resource bases that accommodate opportunities dictated by the market.

**INITIAL RESOURCE BUNDLES AND NEW VENTURE PERFORMANCE: TOWARDS A CONFIGURATIONAL APPROACH**

From the above, we conclude that firms should simultaneously align their resources, strategy and environment to obtain a competitive advantage. The little empirical evidence available so far also points in this direction (Wiklund & Shepherd 2005). This conclusion is in line with a configurational view on competitive advantage. In a configurational perspective firms are looked upon as systems of interrelated internal and external organizational attributes or multivariate combinations that express complex interrelationships between its elements (Dess, Newport & Rasheed 1993). The central premise of configurational theory is that firms aligning the different elements that constitute the system will outperform firms that do not. An important assumption of configurational theory is the existence of *equifinality*. Equifinality is the notion that “a system can reach the same final state (e.g. superior performance) from different initial conditions and by a variety of paths” (Gresov & Drazin 1997). Different configurations may thus exist, each of them leading to a competitive advantage.
Two different views exist on configurations. First, in the congruence perspective (Gresov & Drazin 1997), the number of viable configurations is limited. Moreover, all surviving firms evolve towards one of these viable configurations and cluster together in homogeneous groups having the same constellation of key characteristics (Miller & Friesen 1984). This view on configurations assumes that several endogenous (functional relationships between organizational components and cognitive processes) and exogenous (environmental selection, institutional factors) forces are so imperative that a limited set of internally consistent configurations occurs in reality (Meyer, Tsui & Hinings 1993). The assumption of internally consistent configurations is, however, unlikely for start-ups. Starting companies still have the flexibility to change and are less susceptible to chaining (Bamford et al. 2004). As such, we don’t expect that the observed start-up configurations are all internally consistent and conclude that this view is less useful in this study.

Second, the central premise of the ideal types perspective is that there are a limited number of theoretically ideal configurations of which the constituting elements are consistent and mutually reinforcing. Contrary to the first view, firms can deviate from these ideal types and are not expected to migrate towards one of them (Doty & Glick 1994). The larger the deviation from these ideal types the worse performance will be. If well formulated, typologies of ideal types can provide direction to companies with respect to the desirable organizational configuration (Doty, Glick & Huber 1993). This second perspective promises to be a fruitful avenue for future RBV research in general because it provides a framework within which the complexity of R-S-E (resources-strategy-environment) systems can be captured (Venkatraman & Prescott 1990). Hence, by formulating ideal configurations, researchers can lift the RBV to a higher level of complexity and open up the black box of universalistic and contingency models. For start-ups in particular, this approach allows to break loose from the traditional lists of IR to be acquired or developed and to model real world complexity in a more realistic manner. An additional advantage is that configurational approaches don’t impose unidirectional causal relationships between the individual parts of the model (Ward et al. 1996). Also, a world in which not all existing firms are assumed to be in a state of consistency seems more realistic (compared to the congruence perspective), especially for start-ups since the process of developing a resource bundle and realizing a match with strategy and environment is time-consuming. At start-up, firms are involved in a process of nascency which is inherently incomplete.

The purpose of this study is to increase our understanding on the ideal configurations, comprising IR, strategy and environment, existing in start-ups. Current classifications of ideal configurations, either in the form of typologies or taxonomies, mostly focus on combinations of strategic, structural and/or environmental dimensions (e.g. Ward et al. 1996). Even though structure can be considered as an organizational resource, the role of other resources and resource bundles remains underexplored. Moreover, the majority of classifications have been formulated for large, established firms only, ignoring the specific context of start-ups in which owner-managers play a crucial role (Korunka, Frank, Luenger & Mugler 2003) and in which structural aspects of the business are commonly less complex than in established businesses (Chandler 1996). The expectation is that more straightforward and clear-cut ideal configurations will exist for small, young firms in comparison to large, established firms since the individual, business process and firm level exhibit close correspondence.

### METHODOLOGY

#### Data collection

Data were collected by the Flemish Policy Research Center for Entrepreneurship, Enterprises and Innovation. The START 2003 survey targeted incorporated Flemish firms in all economic sectors founded between September 1st 2001 and September 1st 2002 and employing 1 to 49 people. These upper and lower bounds in time and size ensure homogeneity and comparability of the firms studied. Structured questionnaires were sent by mail in October 2003 to 2679 start-ups. 512 start-ups could not be reached. 637 filled in the questionnaire after two reminders. This equals a response rate of 29.4 per cent. Because of item non-response, removal of non-independent firms and sub sampling on strategy (cf. infra), the analyses are based on 218 observations. Financial data to pronounce upon the firm’s competitive advantage (cf. infra) were retrieved from the BELFIRST database which contains the annual accounts of Belgian incorporated firms. Using annual accounts for performance measurement offers the advantage of a broad spectrum of audited performance measures that are comparable across organizations. This enhances the reliability of the measures and excludes common method bias.

Given a potential time gap of minimum one year and maximum two years between founding and the administration of the survey, survivor bias is likely. This bias is caused by sample firms not being representative of the population of firms at the time of start-up because firms may have gone bankrupt between the moment of actual start-up and the moment of surveying respondents. However, because our time frame between founding and questioning is much shorter than the average time frame of 8
years in similar studies (Bamford et al. 2004) and because the accompanying failure rate is only 10 per cent, survivor bias is moderate. We also examined possible non-response bias by comparing the means on several financial indicators in 2003 (gross value added, total assets, profitability, solvency, liquidity) among survey respondents and non-respondents. An ANOVA test statistic showed that both groups did not differ significantly from each other regarding their financial health.

Measures

Competitive advantage. Our dependent variable is a measure for the competitive advantage or disadvantage of the firm in terms of global financial condition, i.e. the likelihood of organizational survival. To create this measure, we first built a failure prediction model (FPM) based on the financial performance data of all Flemish incorporated and for profit firms founded between January 1st 2001 and December 31st 2002 that could be retrieved from BELFIRST. Additional criteria were imposed on the number of employees (less than 50 employees in 2003) and the presence of annual accounts (presence required in 2004). A distinction was further made between failed (the firm went bankrupt in 2005; =0) and surviving (the firm was still active in the same capacity in 2005 or 2006; =1). The resulting dummy served as the dependent variable in a logistic regression analysis modeling the probability of survival. The independent variables initially consisted of a set of essential financial predictors of start-up failure (e.g. Pompe & Bilderbeek 2005). This initial set contained different measures of profitability, solvency, liquidity and activity for the fiscal year 2004. Given that the selected financial indicators may differ across industries we added their industry-adjusted form to the initial set of independent variables (Dewaelheyns & Van Hulle 2004). By means of a stepwise selection procedure, we yielded a reduced set of financial indicators with significant parameters (p<.001). The following model adequately fitted the data (LR: p<.001; Hosmer and Lemeshow: p>.05): logit(p) = 2.5 + .46x1 - .53x2 - .04x3 + .91x4 - .93x5 - .71x6 - .87x7 + 1.02x8

with p the probability of survival, x1 the ratio net operating result/total assets (prof), x2 the industry-adjusted ratio quick assets/total assets (liq), x3 the ratio cash/amounts payable within 1 year (liq), x4 the ratio cash/current assets (liq), x5 the ratio trade debts/total assets (liq), x6 the ratio stocks/current working assets (liq), x7 a dummy variable with value 1 when overdue short-term priority debts is positive and 0 when overdue short-term priority debts is equal to 0 (liq), and x8 a dummy variable with value 1 when equity is positive or 0 and 0 when equity is negative (solv).

To obtain an assessment of the financial condition of the start-ups in our sample at the end of 2004, we calculated their probability of survival by applying the above FPM. The closer to one the higher the probability of survival and the healthier the firm was found. We subsequently dichotomized the probability score by allocating firms to the “1” class when their probability score was above the sector trimmed average (the threshold for realized competitive advantage) and to the “0” class when their probability score was below the sector trimmed average. Firms that effectively failed by the end of 2004 were allocated to the lower class. The result is a variable representing the competitive (dis)advantage of the firm in terms of global financial condition. In our final sample 143 firms were classified as financially superior and 75 firms were classified as financially inferior.

This measure holds a number of advantages over commonly used measures such as ROA, ROE, and growth. Firstly, this measure is appropriate in a start-up context since companies are primarily preoccupied with the struggle to survive in the first years of their life cycle (Churchill & Lewis 1983). Secondly, this measure is limitedly subject to goal differences and hence highly comparable among new businesses. Although some authors argue that shareholders will liquidate the company if better opportunities exist outside the firm (Carton & Hofer 2006), we argue that most companies are founded to last. Data from BELFIRST show that only 10 % of the exited firms involve voluntary liquidations. Thirdly, this measure unites several performance dimensions such as profitability, solvency, liquidity, and activity into one figure, reflecting the overall financial condition of the firm (Pompe & Bilderbeek 2005). This is an important feature since RB theory always refers to performance outcomes in general terms, e.g. success, competitive advantage, and superior performance. We thus assume that firms should score well on multiple dimensions to have a competitive advantage. It is difficult to attribute a firm a (realized) competitive advantage when it has an above average profitability but at the same time a poor liquidity or solvency.

Resources. We include 16 measures spread over five resource categories which have been frequently linked to performance in prior research (Table 1). The first resource category is financial capital. Financial capital is the aggregate of all the monetary assets of the business (Dollinger 2002). Financial resources are crucial to new firms because they provide the means to acquire other resources critical to the development of products and services (Ireland, Hitt & Sirmon 2003). A second important resource category is human capital (Rauch, Frese & Utisch 2005). Human capital can be defined as the entire
body of capabilities, knowledge, skills, and experience of the firm’s employees and owner-managers as well as the capacity to add to this reservoir of knowledge, skills and experience through individual learning (Dess & Lumpkin 2001). Ireland et al. (2003) argue that human capital is necessary to take actions in new venture firms. For example, knowledge is needed on the administrative procedures to start a business. Social capital is the third category (Lee et al. 2001). Social capital refers to the ability of actors to extract benefits from their social structures, networks and memberships (Davidsson & Honig 2003). Typical benefits from networking are access to financial capital, privileged access to critical knowledge, and preferential opportunities for new business (Inkpen & Tsang 2005). Since start-ups generally have limited resources, networks provide an important channel to complement these scarce resources. A fourth category includes organizational capital. Organizational capital is the ensemble of processes, systems, routines and practices by which the venture’s strategy can be implemented (Chrisman, Bautenschmidt & Hofer 1998). Organizational resources include among other things HRM systems (Barney & Wright 1998), the organizational structure, the formal reporting structure, management control systems and planning systems (Barney & Clark 2007). Organizational resources are rarely a source of competitive advantage. Though, their presence is a necessary condition if a firm is to realize its full competitive potential. A final category is geographic capital. Geographic capital can be thought of as the benefits that go with a firm’s geographic location (Boekestein 2006). Example benefits are good visibility for customers, lower local taxes or lower price of land.

Table 1 Overview of resource variables

<table>
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<th>Variables</th>
<th>Description</th>
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<tr>
<td><strong>Financial capital</strong></td>
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<tr>
<td>INCAPITAL</td>
<td>The logarithm of the amount of initial capital available at start-up (in euro) (Bamford, Dean &amp; McDougall 2000; Cooper, Gimeno-Gascon &amp; Woo 1994)</td>
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<tr>
<td>MGTFIN</td>
<td>The percentage of equity capital in the possession of the organization’s management (McConnell &amp; Servaes 1995)</td>
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<tr>
<td>PROFFIN</td>
<td>The percentage of total liabilities and equity provided by professional equity and loan capital providers (Carter, Williams &amp; Reynolds 1997)</td>
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<tr>
<td><strong>Human capital</strong></td>
<td></td>
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<tr>
<td>EMPLEDUC</td>
<td>The average employees’ educational level, ranging from 1 to 3; 1=elementary education; 2=secondary education; 3=higher education (Rauch et al. 2005)</td>
</tr>
<tr>
<td>MGTEDUC</td>
<td>The management team’s average educational level, ranging from 1 to 5 where 1=elementary education; 2=secondary education; 3=3 year college education; 4=4 year college education; 5=university education (Robinson &amp; Sexton 1994)</td>
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<tr>
<td>NFOUNDERS</td>
<td>The number of founders, ranging from 1 to 12 (Eisenhardt &amp; Schoonhoven 1990)</td>
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<tr>
<td>SCTEXP</td>
<td>Average number of years of management sector experience, ranging from 0 to 45 (Delmar &amp; Shane 2004)</td>
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<td><strong>Social capital</strong></td>
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<tr>
<td>ADVICE</td>
<td>The number of outside advisors (accountant, lawyer, consultant, bank, employers’ organization, HR service provider, mentor), ranging from 0 to 7 (Watson 2007)</td>
</tr>
<tr>
<td>ALLIANCES</td>
<td>The number of partners with which the start-up has collaborated to improve or develop products/services (suppliers, customers, R&amp;D companies, companies from the same sector, companies from other sectors, universities or other non-profit research institutions, and government bodies), ranging from 0 to 7 (Koka &amp; Prescott 2002)</td>
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<tr>
<td><strong>Organizational capital</strong></td>
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<tr>
<td>PLAN</td>
<td>Additive index measuring the presence of different sections in the business plan (business description of the product or service that will be developed, risk analysis, investment plan, market analysis, strategy, personnel planning and management, mission statement), ranging from 0 to 7 (Brush &amp; Chaganti 1999)</td>
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<tr>
<td>HRM</td>
<td>Additive index composed of dummy variables that capture the implementation of HRM practices related to knowledge creation and knowledge sharing (employee training, evaluation, skill based pay and competence mapping), ranging from 0 to 14 (Rauch et al. 2005)</td>
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</table>
PARTICIPATION Indicator of average employee participation in several domains (supply of products/services, strategy, innovation projects, education, …), ranging from 1 to 4 where 1 = no participation at all; 2 = employees are informed; 3 = employees have advisory power; 4 = employees take part in the decision process (Barney & Wright 1998)

FOLLOWER Indicates whether the business is a newcomer/de novo businesses (a business that didn’t exist before) (0) or a follower business (a business that is only new in a legal sense and already was in operation) (1) (Brüderl, Preisendörfer & Ziegler 1992)

SIZE Number of employees, ranging from 1 to 43; used as a proxy for firm structure since these are closely linked. (Santoro & Chakrabarti 2002)

LICENSE Indicator of the presence of license agreements in the firm: 0 = no license contracts; 1 = one or more license contracts (Fernandez, Montes & Vazquez 2000)

<table>
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<th>Geographical capital</th>
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<td>LOCATION Index, from 1 to 8, counting the number of business location characteristics for which alignment is reached between their importance and fulfillment for the individual business (e.g. accessibility by road, parking facilities, visibility for the most important customers, location with respect to customers, attractive rent or land price, low local taxes) (Boekestein 2006)</td>
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Strategy. Strategic management literature refers to several value creating strategies like cost leadership, innovative differentiation, or quality differentiation (Porter 1985). Strategy classifications often distinguish between firms that exploit existing markets and firms that explore or create new markets (Beckman 2006). Explorative and exploitative strategies are considered as fundamentally different and opposite market approaches that require distinct processes, structures and capabilities to ensure successful implementation (He & Wong 2004). Explorative strategies seek to gain a competitive advantage through radical innovations, the creation of new markets and products, experimentation, frequent change and discovery. Exploitative strategies build upon incremental innovation, refinement, routinization, and efficiency to create value (Beckman 2006).

Strategy is measured by means of an instrument compiled of 13 items representing four key strategic dimensions: price competition, innovative differentiation, technological orientation, and proactiveness (Durand & Coeurderoy 2001). This 13-item instrument was factor analyzed (explorative and confirmative) followed by a cluster analysis on the four factors obtained (price competition; α=0.76; innovative differentiation; α=0.70; proactiveness; α=0.70; technological orientation; α=0.81). The cluster analysis resulted in three clusters, each with a different strategic orientation. The first cluster (exploitation-oriented) groups firms which systematically set lower prices in comparison to competitors. Price-competitors score low on the factors proactiveness, innovative differentiation and technological orientation. The second cluster (exploration-oriented) holds firms that display proactive behavior by focusing on future demand and emphasize novelty and technological differentiation rather than pricing. Firms from the third cluster do not distinguish themselves on any of the four dimensions. Since we don’t know whether these firms score high on other strategic dimensions (e.g. quality) or pursue no specific strategy at all, we excluded them from the sample. A dummy variable (SO) denotes the strategic orientation of the firm with 0 representing exploitation and 1 representing exploration.

Environment. Among environmental contingencies, uncertainty and munificence received considerable attention because of their influence on the functioning of businesses (Sirmon et al. 2007). First, environmental uncertainty refers to the (perceived) inability to predict the business environment accurately because of deficits in the supply of information (Aragón-Correa & Sharma 2003). Firms operating in uncertain environments experience a higher level of failure risk than firms operating in stable environments because it is more difficult for them to anticipate changes. If firms in unstable and dynamic environments want to survive, they have to design an internal organization that is apt to frequent and sudden change. Uncertain environments generally ask for innovative and proactive strategies and resources that can be easily converted to serve other goals (Miller 1988). Second, environmental munificence can be defined as the richness of the firm’s environment regarding resources available to the firm or the capacity of an environment to sustain growth for one or more organizations (Castrogiovanni 1991). When firms operate in munificent environments, they will have a higher probability of survival because they have access to a larger pool of resources. When resources are scarce, competition will increase and firm performance will decrease. The munificence of a firm’s environment affects its internal organization. Sirmon et al. (2007), for instance, argue that in lean
environments, managerial skills in selecting and/or developing resources are important for firm success. Others suggest that lean environments promote lean and efficient competitive practices and organizational designs such as cooperation with other firms and an overall tendency to short-term thinking (Rothenberg & Zyglidopoulos 2007).

The variable measuring demand uncertainty (DUNCERTAINTY) is based on managerial perceptions of the environment. This is an ordinal variable and consists of three levels: (1) demand is stable and predictable, (2) demand fluctuates but is predictable, and (3) demand fluctuates and is unpredictable. The second measure for environment is MUNIFICENCE measured as the average annual growth in value added per four-digit sector in the 2000-2003 period.

Analysis technique
To identify ideal start-up configurations, we rely on an inductive approach which consists in empirically deriving ideal types from samples of firms by means of some algorithm (in our case decision tree analysis). In contrast, the deductive approach is a theory-based approach in which ideal types are a priori identified based on theoretical insights. In general, the deductive approach is considered to be a good starting point for building and testing theory because the theory development process is not constrained by the sample as might be the case in inductive approaches (Doty & Glick 1994). However, when the number of attributes and the potential complexity caused by (possibly non-linear) interdependencies between these attributes is so high that a priori defining ideal types becomes a daunting task, it might be useful as a researcher to explore the domain empirically before moving on to making and testing hypotheses (Short, Payne & Ketchen 2008). We argue that an exploratory approach is a good point of departure in this case because domain knowledge on ideal R-S-E systems in start-ups is limited. As such, empirically searching for ideal configurations in start-up samples might be considered as a prelude to theory development.

We use decision tree analysis as a tool for finding organizational configurations that distinguish financially superior from financially inferior start-ups. A classification tree is a decision model that can be viewed as a tree, consisting of internal nodes and leaves. Each internal node formulates a condition on a variable, which splits the data set into two or more mutually exclusive subsets such that these subsets are as homogeneous as possible with regard to the class variable (the dependent variable which is usually binomial). Each of these subsets can be further divided by more internal nodes, until a leaf node has been reached and a class is attributed to all data instances in that particular subset (Rokach & Maimon 2005). This process results in a number of unique paths (decision rules) indicating how variables and variable levels can be combined in different ways to arrive at specific classes (e.g. financially superior versus inferior).

This analysis technique has the advantage that it takes into consideration the premises of configurational theory, thereby avoiding the problems related with more widely used research methods like standard regression analysis with interaction terms, cluster analysis and profile deviation analysis (see Edwards 1993; Delery 1998; Guest, Conway & Dewe 2004; Fiss 2007 for drawbacks of these methods). First, decision tree analysis can distinguish multiple pathways to success and thus account for equifinality. Since decision trees are exploratory by nature, the level at which equifinality occurs should emerge from the data. Additionally, the ideal configurations are not necessarily made up of the same variables as is the case in cluster analysis. It is possible that a decision tree generates an ideal organizational configuration with only one variable and at the same time another configuration with five variables. This is because decision tree analysis iteratively searches for the most discriminating variable per subsample. The result is a tree in which the position of the variable corresponds to its discriminatory power (Guest et al. 2004). The higher a variable is located in the tree, the more discriminating it is between firms with different performance levels. Second, decision trees can model complex data structures with non-linear and deeply interacted relationships between the predictor variables. Unlike regression analysis with interaction terms, decision tree analysis can handle higher order interactions and still generate comprehensible and interpretable models. This is important because we must be able to understand how the predictor variables interact in order to gain knowledge. Third, classification trees are nonparametric and thus especially suited for exploratory knowledge discovery. Finally, in contrast with qualitative comparative analysis (QCA), which has been recently introduced in management research as a novel tool for studying organizational configurations (Fiss 2007; Rihoux & Ragin 2009), decision tree analysis can handle high-dimensional data. QCA must keep the number of conditions or independent variables low because the number of possible logical combinations of conditions can quickly exceed the number of observations (Rihoux & Ragin 2009). In this case, there is a risk that an individual explanation will be obtained for each individual observation. Moreover, in decision tree analysis continuous independent variables can be used as they do not require complex transformations to fuzzy variables as in QCA. Despite the aforementioned advantages,
decision tree analysis is not entirely free from criticism. Classification trees may give too complex
trees that are difficult to comprehend. This can be countered by enforcing more pruning as to make the
decision tree smaller. Also, decision trees can be computationally expensive to train. Note that in this
case, computational duration was in the order of seconds.

RESULTS
The application of the decision tree algorithm C4.5 (Quinlan 1993) resulted in the decision tree in
Figure 1. In line with the equifinality principle, there seem to be several ways to financial superiority
in start-ups, in casu six. There are also six ways to financial inferiority. Together, these different
combinations form 12 rules that fully cover the dataset. A stratified cross-validation shows that these
rules on average classify 61.5 % of the observations correctly (the accuracy of the training set was 78.9
%). The confusion matrix reveals a specificity of 29.3 % and a sensitivity of 78.3 % for our decision
model. This demonstrates that our prediction model is good at predicting financial superiority, but bad
at predicting financial inferiority. A possible explanation could be that in predicting financial
inferiority other variables may be more discriminating, e.g. “too great a reliance on a single customer”
or “an ineffective management team” (Bruno, Leidecker & Harder 1987). The rules predicting the
observations as superior are correct in 68 % of the cases, the rules predicting inferiority are correct in
41.5 % of the cases. The consequence for this study is that we can only draw conclusions with
sufficient reliability for the configurations associated with financial superiority. The poor predictive
power of the rules associated with inferiority prevents us from making reliable inferences about the
combinations of variables that lead to poor financial results. Therefore, but also because our major
objective is to determine configurations leading to superior performance, we will only focus on the six
combinations of firm attributes that are associated with competitive advantage (path 1 to 6 in Figure 1).

DISCUSSION
On the higher theoretical level, interesting findings emerge with respect to equifinality, the role of
resource bundles and the role of multivariate fit between resources, strategy and environment in
determining competitive advantage. First, the analysis shows that there exist six different ways for
start-ups to reach a competitive advantage. This is an important finding because it proves that the basic
assumption of equifinality in configurational theory is pertinent and hence that the same final state (i.e.
competitive advantage) can be reached by a variety of paths. Second, of the six ideal configurations,
five contain more than one resource confirming the importance of the resource bundle level. As such,
our findings show that the value of resources indeed lies in their combination and that business success
is a matter of a whole rather than a separate piece. The only exception is the first ideal configuration in
which follower businesses are grouped without additional conditions. This could indicate that a single
resource is powerful enough to guarantee success. Yet, follower businesses can be thought of as
representing a set of multiple time-dependent management processes whereby a bundle is implicitly
present in this variable. It could also be an indication of the omission of resources that discriminate in a
follower context. Third, resources occupy the highest positions in the decision tree. This substantiates
the RBV assertion that resources are the prime determinants of competitive advantage. It also indicates
that for start-ups in particular, IR are indeed important discriminators of success. In fact, in five of the
six ideal configurations, resources are the only discriminators which seems to suggest that there exist
universalistic resource combinations which work equally well under any strategic orientation and in
any environmental context. It must be noted that at higher pruning levels of the decision tree (i.e. the
tree is less pruned), strategic and environmental contingencies do more frequently emerge. However,
these combinations are so specific that generalization to other data becomes difficult. This implies that
a competitive advantage in start-ups is in the first place dependent on a set of resources and only in
more specific circumstances on a set of resources that fit strategic and environmental conditions. From
this result, it also follows that initial resource bundles are substitutable in the short run. This does not
conflict with the RBV since inimitability or limited substitutability are assumed to impact the
sustainability (hence longevity) of a competitive advantage. We also found one resource bundle which
only resulted in a competitive advantage in a particular environment. We can conclude that, for the
constructs under study, some initial resource bundles are ideal in all strategic and environmental
contexts while other resource bundles are only ideal in particular contexts. It must be noted that this
result does not detract from the fit assumption. It only suggests that there is no differential impact of
the initial resource bundles on performance across the considered contingencies.

On the lower theoretical level, the analysis provides insight into the specific variables, variable
levels and variable interactions that discriminate between financially superior and inferior start-ups.
The decision tree reveals that the majority of the discriminating variables are organizational
(FOLLOWER, HRM, LICENSE, SIZE) and human (MGTEDUC, NFOUNDERS, SCTEXP) capital
variables. Since a number of these organizational capital variables also contain a knowledge component, particularly the HRM and LICENSE variables, it can be argued that knowledge resources and knowledge-creating capabilities are the main determinants of competitive advantage in start-ups. This finding corroborates the knowledge-based view of the firm in which knowledge is considered the most important strategic resource (Curado & Bontis 2006). It is also consistent with the ideas expressed and the results found in previous new venture studies (e.g. West & Noel 2009). Yet, as will become clear from the ensuing discussion, some knowledge resources are not always unequivocally positive. Depending on the situation, higher levels may not always induce positive effects just as lower levels may not always induce negative effects. Also note that of the contingency factors (strategy and environment) only one showed up in the tree, namely demand uncertainty.

**Figure 1** Resulting decision tree

The first ideal configuration, arising after the first split, denotes being a follower business as a sole distinguishing characteristic for financial superiority (path 1). This finding is consistent with the **liability of newness** principle which holds that young firms have a greater propensity than older firms not to prosper (Bruton & Rubanik 2002). Inversely, older businesses have better chances of survival than younger businesses. Authors attribute this greater propensity to prosper in older firms to the presence of established roles and routines and the presence of established connections with suppliers and customers (Brüderl et al. 1992). Moreover, older businesses have had the time to develop a strong reputation, a value-stimulating culture, and other time-dependent strategic resources. Since this branch wasn’t split up further by the algorithm, this means that the other variables (resources and contingency factors) cannot significantly differentiate between successful and unsuccessful followers.

Even if financially superior firms are proportionally more present in follower businesses than in de novo businesses (73 % versus 54 %), de novo businesses can still be prosperous. It turns out that the management’s education is an important differentiator in de novo firm success. Firms with a higher educated management team have a 66 % probability of being superior versus 32 % for firms with a lower educated management team. The pivotal role of owner-manager education in start-up success has already been established in previous studies (e.g. McKelvie & Davidsson 2009). Its general knowledge and skill generating capability and assistance in the accumulation of specific knowledge has made of formal education an important contributor to start-up success (Davidsson & Honig 2003). Even though important, it proves that start-ups can still attain a competitive advantage in the absence of a higher-educated management team by compensating for this lack with minimal eight years of sector experience, but only in the case where one person founded the firm (path 2). Thus, although firms with a higher-educated management team are more likely to attain a competitive advantage in general, sector experience can make up for a lack of education. This suggests that sector experience can provide similar knowledge and skills otherwise emanating from education. For instance, sector experience can, next to generating industry-specific knowledge, provide generic knowledge on topics such as accounting, financing, and personnel management. Experience can also generate skills such as problem solving capabilities, which are regarded as by-products of a higher education. The fact that this compensatory relationship only exists in the case where one person founded the business could have to do with the way education was measured. Since education is the average education of the management team, it could be that in a management team with at least two persons, one person has a higher education and another person a lower education. As such, compensation with experience is less
imperative than in the case where both team members have a lower education. Obviously, this issue does not arise in a one man management team.

Just as a lack of education does not necessarily result in bad performance, so does a higher education not automatically lead to success. There are four scenarios in which de novo firms with a higher-educated management team can be successful. The first is by developing an elaborate system of HR practices that bring about the creation and dissemination of employee knowledge and skills (path 3). This finding shows that the management of knowledge streams is an important means to achieve a competitive advantage. This is also one of the core premises of the knowledge-based view, namely that knowledge generation and transfer capabilities are tightly linked with gaining and sustaining competitive advantage (Bogner & Bansal 2007). After all, this capability expresses the firm’s orientation towards learning which is considered to be essential to compete in the current knowledge economy. In itself, HR practices (as organizational capital) do not embody the capability to develop new knowledge. Yet, this dynamic capability can originate in the implementation of these practices as a result of which capability and practice will be closely connected. We can conclude that the combination of knowledge itself (in the person of the manager) together with the knowledge process is a powerful tool to excel in business (Bogner & Bansal 2007).

In the absence of a fully elaborated HR system in de novo businesses with a highly educated management team, firms can obtain an edge over competitors by investing in a license agreement but only in an environment with demand certainty (path 4). In itself, licenses, which are typically considered as sources of rare and imperfectly imitable technological opportunities (Rothaermel & Thursby 2005), do not appear to be convincing instruments for obtaining a competitive advantage. The output shows that firms with a license agreement have a 50 % chance of being successful while firms without a license agreement have a 63 % chance of financial superiority. The presence of a license agreement is thus neither positive nor negative while the absence of a license agreement is slightly positive. Yet, the resource bundle with licenses can lead to a superior global financial condition in an environment where demand is stable and predictable. Because license agreements often require long-term investments in a specific technology, firms can become less flexible, which is a disadvantage in an environment with unstable and unpredictable demand. In contrast, in demand certain environments, where flexibility is no requirement, licenses can develop their full potential for the firm in terms of generating unique products or services. Another reason for this finding could be that in uncertain markets license agreements need flanking by supporting knowledge generating processes because these processes provide the knowledge on the firm and the environment that is necessary to adequately deal with external changes. So, our conclusion is that some resource bundles only generate positive performance effects when they are in line with their environment.

Thirdly, de novo firms are also categorized as superior when they combine a less then fully elaborated HR system with the absence of a license agreement and a moderately educated management team (path 5). This finding is hard to explain because there seems to be no specific reason for the higher probability of financial superiority in firms with a moderately educated management team (100 %) compared to firms with a highly educated management team (58 %). A possible explanation could be that we failed to include variables that are strongly related to education and that provide a sensible justification for this configuration.

Lastly, de novo firms can obtain a competitive advantage when they combine a higher educated management team with a less then fully elaborated HRM system, the absence of a license agreement, at least 63 % management ownership, at most 5 outside advisors, and at most 11 employees (path 6). We learn from this result that management ownership is an important performance discriminator in certain start-ups. The positive effect of an increased degree of management ownership confirms the agency theoretical proposition that firms will perform better when ownership and decision-making authority are united in the same person(s) (Jensen & Meckling 1976). In the case where ownership and management do not entirely overlap, agency problems may arise. In new ventures, these problems primarily arise from disagreements between external owners and owner-managers on the most appropriate course of action (Sapienza & Gupta 1994). In literature, outside investors are ascribed a more aggressive, short-term orientation than (founding) owner-managers who wish to develop their brainchild in a more sustainable (hence long term oriented) way. From this configuration, we also learn that outside advice below a certain threshold produces positive performance effects while outside advice above a certain threshold produces negative performance effects. Given that each firm in this sub sample consulted at least one advisor, this outcome is comparable with prior findings (Watson 2007). However, the fact that this variable only emerges in this combination could point to a compensating effect for the absence of a fully elaborated HRM system. This would suggest that internal knowledge generation is to some degree exchangeable for external knowledge generation. Usually, it is assumed that internal knowledge acquisition is a guarantee for firm-specificity, hence
also for competitive advantage, while external knowledge acquisition is not because of the external knowledge’s public character (Matusik & Hill 1998). Yet, Chrisman and McMullan (2004) note that the contextual, experiential learning process that may accompany outsider assistance may lead to the creation of tacit knowledge which is difficult to codify, replicate and transmit. Also, when invoking outside advice, existing internal knowledge is usually combined with the external knowledge which in combination may lead to new firm-specific knowledge. Finally, this configuration also reveals that although firms with maximum five different external advisors have a greater propensity for financial superiority, only small firms fulfill this predestination. A possible explanation could be that an overlap between ownership and management (i.e. high degree of management ownership) only works well in small firms. It could be argued that when companies have more complex structures, the ownership, control and management functions need to be more spread in order to succeed. When these functions are too much concentrated in only a few people in large firms, managers may lose their overview on the business and start to make mistakes against the rules of good corporate governance.

LIMITATIONS AND IMPLICATIONS
In this study, our goal was to throw light on the initial resource-performance relationship from a configurational perspective. In searching for ideal R-S-E configurations in start-ups, we proceeded inductively and explored a dataset for interactions between variables by means of a promising research technique called decision tree analysis. Because of the exploratory nature of our study, the results remain tentative. Also, the modest specificity of the outcome calls for some prudence. Another limitation is the use of proxies for measuring different kinds of capital. Proxies can approximate but not replace the true value of the underlying construct. Yet, the direct assessment of resources that are difficult to observe like human and social capital remains one of the most challenging tasks in RB research (Davidsson 2005). Hence, further research will be needed to corroborate our findings. Yet, as a first onset, this study carries important implications for future theory, method and practice. For theory, our research results confirm the need for more configurational theory since it was revealed that equifinal multivariate combinations exist in real-world data. Even though all elements already exist to walk the path of a holistic RBV, little consideration has been given to this issue so far; probably because configurations are so complex. RB configurational theory must be able to predict which resources go together and which don’t, which resource bundles are universally positive and which bundles only score under particular circumstances. In the meantime, this study attempts to provide some direction to theory developers of start-up ideal configurations. For method, we introduce an analytical technique in entrepreneurship research which is especially suited for analyzing configurations since it can account for equifinality and model complex data structures with non-linear and deeply interacted relationships. An additional advantage of decision tree analysis is that it can handle large amounts of data and variables and still produce generalizable results. Hence, we draw attention to a methodology that can overcome most of the problems associated with current methodologies used for configurational research such as cluster analysis, profile deviation analysis, or multivariate regression analysis. This is important since the use of methodologies which are in correspondence with a theory’s premises is a prime condition for theoretical development and knowledge generation. Additionally, we use a measure for financial performance (likelihood of organizational survival) which matches a start-up context. As such, we also ensure the correspondence between methodology and context. For practice, this study’s results can inform owner-managers of start-ups about the factors and combinations of factors that matter for start-up success. For instance, it was shown that in de novo firms knowledge resources, either in the form of stocks or flows and either internally or externally acquired but with a prominent position for the management’s knowledge and skills, are important discriminators of firm success. Evidence was also found on the existence of a compensatory relationship between the education and the experience of the management team. Additionally, insights were generated on the alternatives that exist for start-ups to attain superior financial performance. Together, these insights are crucial for practitioners because they provide more realistic guidelines for business as compared to single-practice recommendations.

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