



Paper to be presented at the
35th DRUID Celebration Conference 2013, Barcelona, Spain, June 17-19

Determinants of market novelty of entrepreneurial firms

Uwe Cantner

Friedrich Schiller University Jena
Economics
uwe.cantner@uni-jena.de

Maximilian Goethner

Friedrich Schiller University Jena
Economics
maximilian.goethner@uni-jena.de

Sebastian Wilfling

Friedrich Schiller University
Economics
sebastian.wilfling@uni-jena.de

Abstract

This paper applies the evolutionary market development perspective to better understand when and how opportunities are found and created? (Short et al., 2010, p. 54). In particular, we propose that market novelty mirrors the nature of opportunities entrepreneurs pursue. We develop and empirically test a model of individual and firm-level determinants of market novelty in new ventures on the basis of opportunity creation and discovery. Using a dataset of 455 German start-ups, our results suggest that the emergence of new markets is an endogenous phenomenon driven by entrepreneurs and that an evolutionary economics perspective on opportunity formation might be a promising field for future research. In particular, market novelty is negatively related with industry related experience of the founder team. Moreover, an entrepreneurial personality profile of the lead founder is positively related with a high degree of market novelty. We also find that different innovation strategies are associated with the degree of market novelty.

Determinants of market novelty of entrepreneurial firms

Abstract:

This paper applies the evolutionary market development perspective to better understand “when and how opportunities are found and created” (Short et al., 2010, p. 54). In particular, we propose that market novelty mirrors the nature of opportunities entrepreneurs pursue. We develop and empirically test a model of individual and firm-level determinants of market novelty in new ventures on the basis of opportunity creation and discovery. Using a dataset of 455 German start-ups, our results suggest that market novelty is an endogenous phenomenon driven by entrepreneurs and that an evolutionary economics perspective on opportunity formation might be a promising field for future research. In particular, market novelty is negatively related with industry related experience of the founder team. Moreover, an entrepreneurial personality profile of the lead founder is positively related with a high degree of market novelty. We also find that different innovation strategies are associated with the degree of market novelty.

1. Introduction

According to Schumpeter (2002), entrepreneurs are agents of economic change who, through setting up new business ventures, create “something not yet being created on a regular basis in the static state of the economy” (pp. 409-410). In doing so, entrepreneurs contribute to the emergence and evolution of new markets (Metcalf et al., 2006). If new markets are seen as the seed of individual firms, rather than the whole social construction of institutional relationships and boundaries (see Fligstein, 2001), contrasting views exist how entrepreneurship is related to market novelty.

In general, market novelty mirrors the nature of opportunities entrepreneurs pursue (Dosi, 1997; Buenstorf, 2007; Dalqvist and Wiklund, 2012). We define an opportunity in the following according to Alvarez et al. (2010, p. 25) as “...a market imperfection.” While some authors link the emergence of novel markets with the discovery and exploitation of previously untapped, yet already existing, entrepreneurial opportunities (Dalqvist and Wiklund, 2012), others claim that new markets are set up as a result of entrepreneurial action upon newly created opportunities (Sarasvathy and Dew, 2005; Alvarez and Barney, 2007; Dew et al. 2011). Finally, a third view exists that integrates both creation and discovery of entrepreneurial opportunities into an *evolutionary framework of market development*. In more detail, in this approach opportunities are always created to some extent by entrepreneurs but are experimented against an intersubjective reality, namely by the market demand. Thus, in the latter sense, opportunities are also discovered and objective (Buenstorf, 2007; Alvarez et al., 2010; Alvarez et al., 2012). Correspondingly, the more a market matures, the more opportunities become objective, which for instance may crystallize in a dominant design (Geroski, 2003).

Drawing on established research in economics (Williamson, 1975; Gort and Klepper, 1982; Jovanovic, 1982; Jovanovic and MacDonald, 1994; Klepper, 1997; Pakes and Ericson, 1998; Geroski, 2003), as well as on management (Agarwal et al., 2002; Agarwal and Bayus, 2002) and organizational studies (Carroll and Hannan, 1989; Carroll, 1997; Carroll and Hannan, 2000), we use the *evolutionary framework of market development* in order to relate the concept of market novelty to the nature of opportunities entrepreneurs pursue. We therefore propose that in emerging markets creational efforts to exploit entrepreneurial opportunities are prevailing. As markets mature, opportunity discovery within existing markets becomes the basis for entrepreneurial behavior. Put differently, in case of high market novelty, opportunities are more likely to be created based on knowledge outside of markets. On the other hand, in established markets (i.e., low market novelty), opportunities are more

likely to be exploited with the help of actual market knowledge (see Buenstorf, 2007; Alvarez et al., 2010; Alvarez et al., 2012).

Previous research on market newness of new ventures (i.e., Dalqvist & Wiklund, 2012; Grégoire & Shepherd, 2012) focuses on the discovery of entrepreneurial opportunities but disregards theories on opportunity creation. Furthermore, market novelty is defined in terms of geographic expansion of markets rather than from a process perspective of market development. Against this backdrop, previous literature is only able to provide a limited understanding of the determinants of strategic entrepreneurial choices in the context of new business creation. An evolutionary market perspective however allows for predictions about the innovation behavior of entrepreneurs across different stages of market development (Utterback and Abernathy, 1975), a topic which is not well understood yet (Dalqvist and Wiklund, 2012).

This paper applies the evolutionary market development perspective to better understand “when and how opportunities are found and created” (Short et al., 2010, p. 54). In particular, we propose that the newness of markets which entrepreneurs enter mirrors the nature of opportunities they pursue. We develop and empirically test a model of individual and firm-level determinants of market novelty in new ventures on the basis of opportunity creation and discovery. Using a dataset of 455 German start-ups, our results suggest that the emergence of new markets is an endogenous phenomenon driven by entrepreneurs and that an evolutionary economics perspective on opportunity formation might be a promising field for future research.

The rest of the paper is organized as follows. In the next section we discuss the concept of market evolution as a nexus of market novelty and maturity. Section 3 focuses on the relationship between entrepreneurial characteristics and market novelty. Section 4 introduces our dataset and empirical strategy. Our results are presented in section 5. The paper concludes with a discussion of our results.

2. The evolution of markets and entrepreneurial opportunities

2.1. Market evolution and entrepreneurship

Entrepreneurship can be defined as the “nexus between enterprising individuals and valuable opportunities” (Shane, 2003, p. 9). Entrepreneurship research so far pays little attention to the nature of opportunities entrepreneurs exploit (Grégoire and Shepherd, 2012). In this respect, there is an ongoing controversy over whether market novelty is represented through opportunity *discovery* or opportunity *creation* (Sarasvathy and Dew, 2005; Alvarez

and Barney, 2007; Short et al., 2010; Dew et al. 2011). Some scholars suggest that the nature of opportunities changes with the evolution of markets (Dosi, 1997; Klepper, 1997; Buenstorf 2007; Alvarez et al., 2010). Moreover, entrepreneurial opportunities have their origin either *within* or *outside* of existing markets (Buenstorf 2007; Alvarez et al., 2010). On the other hand, from an evolutionary perspective¹, markets not only function as an institution coordinating competition and product allocation but they are also seen as a process. Here, the development of markets hence can be categorized into different phases with corresponding characteristics (Williamson, 1975; Dosi, 1982; Gort and Klepper, 1982; Klepper, 1997; Geroski, 2003; Buenstorf, 2007).

Thus, we suggest that novel markets are shaped by entrepreneurs who create opportunities. In contrast, when markets gain maturity, opportunity discovery within an established market becomes the prevalent entrepreneurial behavior. Consequently, akin to Gruber et al. (2008) we assume that there exists a continuum describing the opportunities that are pursued by entrepreneurs through founding a new venture. This continuum ranges from (co-)creating novel markets by creating opportunities (high market novelty) through starting-up in established markets and discover opportunities (low market novelty).

In the following, the archetypical and contrasting types of enterprising behavior, opportunity creation and discovery, are introduced and linked with the evolution of markets. This characterization is important, as it allows drawing conclusions about entrepreneurial determinants of market novelty.

2.2 High market novelty: opportunity creation

An established, though not generalizable pattern of the evolutionary process of market development views the birth point of a market at the time of the first commercial introduction of a new product. This might be fulfilled through one or even several firms simultaneously (Williamson, 1975; Gort and Klepper, 1982; Klepper, 1997). The initiation is followed by a second stage of market evolution which entails a surge of firm entry into the newly established market. In these first two stages, new entrants compete through different product set-ups, introducing product innovations into the young industry. At this point, product output grows, uncertainty is high, production methods are unspecialized and the product design is simple (Gort and Klepper, 1982; Malerba and Orsenigo, 1995; Klepper, 1997; Agarwal, 1998).

¹ For an overview of the theoretical implications of evolutionary economics see Dosi (1997) and Witt (2003).

From the viewpoint of the entrepreneur, novel markets are shaped by opportunity creation instead of opportunity discovery. The role of entrepreneurs is acting instead of passively observing the environment (Sarasvathy, 2001; Baker and Nelson, 2005; Alvarez and Barney, 2007). The development of novel markets premises that entrepreneurs intentionally bypass the institutional status-quo and iteratively develop new solutions through a trial-and-error process (Baker and Nelson, 2005). Nevertheless, this process is not simply a randomized recombination of existing ideas, resources or processes. Rather, entrepreneurs utilize heuristics and involve other stakeholders in order to reduce complexities. Hence, high market novelty is characterized by interdependent stakeholders and competitors, who bring in their characteristic preferences, values, capabilities and knowledge (Sarasvathy and Dew, 2005; Dew et al., 2011).

There is much more room in novel markets for creating than discovering opportunities. Novel markets are characterized by true uncertainty. Products are prone to error, preliminary and not coming up in an objectively accepted dominant design. Moreover, in new markets consumer needs are usually undefined (Geroski, 2003). Thus, entrepreneurs shaping novel markets encounter a future in which outcome distributions are not existent or not ascertainable at all (Dew et al., 2008; Klein, 2008). The utility of products and services develops over time through learning-by-using (Rosenberg, 1982). In that sense, objective opportunities emerge *ex-post* and are not given, as through lock in-effects even comparably inefficient solutions may become dominant (David, 1985). Thus, one may hardly argue that in novel markets objective opportunities exist, which makes it difficult that opportunities are discovered or ratable *ex-ante*.

2.3 Low market novelty: opportunity discovery

If markets mature, a drop in firm entry and an increasing number of exiting firms can be observed. Usually, the net number of firms in a market peaks at this stage. Furthermore, the tendency of firms for product innovations decreases as the product design stabilizes. This in turn leads to more automatized production methods. Correspondingly, process innovations become more important the more markets mature (Gort and Klepper, 1982; Klepper, 1997; Agarwal, 1998, Geroski, 2003). Finally, market development undergoes a shakeout followed by a stabilization of the number of firms in the market, often characterized by an oligopoly, strongly standardized product design, economies of scale and high entry barriers (Dosi, 1982; Gort and Klepper, 1982; Klepper, 1997, Geroski, 2003).

Within matured markets, the concept of opportunity discovery presumes that the entrepreneur is a discovering profiteer through arbitrage or scale economies. Opportunities for entrepreneurial profits emerge from market imperfections or disequilibria, which do always exist because of uncertainty, bounded rationality of actors and imperfect information within existing markets. Under these circumstances, external shocks, such as technological advancements, changes in preferences or resource scarcities may also serve as a source of opportunities. Put differently, entrepreneurs act as *discoverer* of unmatched needs or imperfectly exploited left opportunities. Opportunity discovery hence serves to approach new equilibriums as an adjustment to external shocks (Kirzner, 1997; Eckhardt and Shane, 2003; Klein, 2008). However, the concept of opportunity discovery assumes that entrepreneurs are not the creators of opportunities and innovations are treated, as a driver of market novelty, exogenous (Dalqvist and Wiklund, 2012). Therefore, opportunity discovering entrepreneurs are no market (co-) creators.

Regarding the relation of opportunity discovery and market development, in matured markets the number of product variants consolidates which actually "...define(s) the market" (Geroski, 2003; p. 102). Then a dominant design unifies different tastes of plenty of customers, which have a proper idea about the utility of the product, their expected performance and the value of the product (Geroski, 2003). Thus, only when a market has a certain establishment, something like objective discovery opportunities may start to exist (Alvarez et al., 2012). Put differently, arbitrage, even in an intertemporal sense that resources are combined to a new product which can be sold at a higher price than its components (Buenstorf, 2007), requires that there exists knowledge about reservation prices or clearly defined preferences.

Accordingly, opportunity discovery implicitly assumes that choosing entrepreneurs face an environment in which distributions of future events are known or at least are assessable. Opportunity discovery hence is rather a dominant strategy in established markets in which bounded rationality and imperfect information leads to arbitrage possibilities (Chandler et al., 2003; Alvarez and Barney, 2007).

3. Determinants of market novelty

3.1 Entrepreneurial characteristics as predictor of market novelty

The conceptual distinction between opportunity discovery and opportunity creation as a is important because both result from different entrepreneurial characteristics (Sarasvathy and Dew, 2005; Alvarez and Barney, 2007; Dew et al. 2011). The above introduced

evolutionary framework considers this matter. For example, individual or organizational tacit knowledge and routines are generally hard to copy but constitute important factors shaping new opportunities (Buenstorf, 2007). Regarding organizational knowledge, we test the relationship between industry related experience and market novelty. Other research found social interrelations of entrepreneurs to predict the creation of entrepreneurial opportunities and new markets (Aldrich and Fiol, 1994). In the following, we test this prediction. Finally, differences in individual and organizational behavior are regarded as crucial drivers of new market creation (Aldrich and Kenworthy, 1999). Innovations represent a divergent organizational behavior and may predict market novelty (Dalqvist and Wiklund, 2012). Thus, different innovation strategies (i.e., the introduction of product or process innovations) on the degree of market novelty are probed. Taken together, we expect that idiosyncrasies of the entrepreneurs and their organization may explain different propensities for entering into existing or (co-)creating novel markets.

3.2 Industry-related knowledge and expertise

In the framework of opportunity creation, novel markets are usually not developed out of prior existing markets, because the attributes of newly created opportunities are hardly ascertainable ex-ante (Dosi, 1982; Alvarez and Barney, 2007; O'Connor and Rice, 2012).

An entrepreneur's industry-related knowledge and expertise allows dealing with the tasks and problems specific to the industry the new venture is operating in. Theoretical arguments also suggest that existing knowledge decreases the effort to change capabilities, while it also reduces the stimulus to create new opportunities (Cohen and Levinthal, 1994; Levinthal and March, 1993; Aldrich and Kenworthy, 1999; Danneels, 2007). The engagement of entrepreneurs in creating new opportunities nevertheless depends on the learning endeavors in direction to them (Cohen and Levinthal, 1994). For instance, expertise in related industries may lead to a strong reliance on experience knowledge about customer needs. In turn, this reliance narrows the view of decision-makers on the applicability of business solutions instead of novelty and innovativeness (Christensen and Bower, 1996; Im and Workman, 2004; Danneels, 2007). Consequently, entrepreneurs with existing customer relationships should have a lower tendency to create new markets (Dew et al., 2008).

Another argument for a strong link between lower levels of industry-related knowledge and new market creation is the lack of knowledge regarding existing routines and operational practices (Aldrich and Kenworthy, 1999). As a consequence, lower levels of

industry experience should increase the likelihood to set-up a market creating firm instead of copying a business idea from an established market. Summing up, we propose that:

Hypothesis 1: Industry-related knowledge and expertise is negatively related to market novelty.

3.3 Entrepreneurial experience

According to the entrepreneurship literature, experience gained during earlier entrepreneurial episodes increases the likelihood to create an entirely new market with the current entrepreneurial project (Sarasvathy and Dew, 2005; Alvarez et al., 2010; Dew et al., 2011). In particular, experiential knowledge about acting under uncertainty may be helpful in shaping entirely new entrepreneurial opportunities (Alvarez et al., 2010). Such knowledge allows to recognize meaningful patterns and problem solutions in a fuzzy setting (Baron and Ensley, 2006), which may be particularly prevalent when a newly created entrepreneurial opportunity is being exploited. Moreover, opportunity creation requires leadership as this enterprise is hardly fulfilled by a single actor. Consequently, because efficient leadership emerges from experience, experienced entrepreneurs are more likely to create ventures which establish novel markets (Alvarez and Barney, 2007). Firm founders with previous start-up experience also may have developed networks of contacts to potential stakeholders (e.g., customers, suppliers, financiers). The involvement of these networks in developing the architecture of new markets entails establishing partnerships and commitments. These institutional settings are dependent on many parties beyond the individual entrepreneur. Thus, the variety of new knowledge which comes into the opportunity creation process through network ties of experienced entrepreneurs is comparably higher. Taken together, experienced entrepreneurs are more likely to attain a higher degree of market novelty when setting up their new firms (Sarasvathy and Dew, 2005; Dew et al., 2011). Hence, the following hypothesis applies:

Hypothesis 2: Entrepreneurial experience is positively related to market novelty.

3.4 Entrepreneurial personality

To Schumpeter (2002, p. 417), the entrepreneur in his role as the creative destructor "...uses his personality and nothing but his personality". In fact, there is a well-established literature linking personality with entrepreneurial status (Zhao and Seibert, 2006; Rauch and

Frese, 2007; Zhao et al., 2010), and hence may be associated with the nature of opportunities entrepreneurs pursue too (Short et al., 2010). Furthermore, in order to exploit created opportunities, oftentimes charismatic leadership is necessary to fill other stakeholders with enthusiasm and to acquire resources for highly uncertain endeavors (Alvarez and Barney, 2007). Charismatic leadership decreases the perceived costs of his followers under uncertainty and thus encourages them investing in opportunity creation, which is highly uncertain (Alvarez and Barney, 2005). In turn, the realization of projects with a high degree of market novelty becomes more likely. However, charismatic leadership not only hinges on experience or expertise (Alvarez and Barney, 2007). Leadership is in fact related with an entrepreneurial personality profile² (Schmitt-Rodermund, 2004). We therefore expect the lead founders' charismatic leadership is more pronounced, if he possesses an entrepreneurial personality. On this ground, we propose:

Hypothesis 3a: An entrepreneurial personality profile of the lead-founder is positively related to market novelty.

Looking at the nature of opportunities, Shane (2003) argues that personality is not related with opportunity discovery. As we suggested that matured markets are predestined for opportunity discovery rather than creation, we expect an entrepreneurial personality profile not influential at the lower tail of the market novelty distribution. In contrast, at higher degrees of market novelty, personality is a crucial ingredient which is beneficial for creative destruction (Schumpeter, 2002; Alvarez and Barney, 2007). We therefore expect that:

Hypothesis 3b: An entrepreneurial personality profile has an effect at the upper but not at the lower quantiles of market novelty.

3.5 New ventures' innovation strategy: product and process innovation

The evolutionary perspective on market development allows to link the degree of market novelty of an entrepreneurial venture with its innovation strategy. At the starting point of market evolution, the development of underlying technologies is usually indeterminable. Uncertainty and multiple possible technological directions encourage and enable the entry of new businesses introducing competing product solutions (Dosi, 1982). At this stage, newly

² Schmitt-Rodermund (2004) suggests that an entrepreneurial personality is characterized by low agreeableness, high conscientiousness, high extraversion, low neuroticism, and high openness.

created markets are best circumscribed as being “fluid” with product designs and production processes being far from stable and well founded. Within these markets even the demand side is characterized by uncertainty. Competitive advantages are derived from product performance and differentiation (instead of a superior cost structure). Therefore, the dominant strategy for market entry is exploiting product innovations rather than process innovations (Utterback and Abernathy, 1975; Clark, 1985; Klepper, 1997).

Over the course of market evolution, however, markets act as selection mechanisms and narrow down the scope of design alternatives as well as the possibilities and incentives for entrepreneurs to realize product innovations (Dosi, 1982, 1988; Klepper, 1997). Market selection becomes possible after the initial stage, because producers and users accumulate knowledge in the production process and consumption within a market, which defines a certain range of competing products. Even though competition in this stage of market evolution still takes place through different product attributes and minor product innovations, several stable product designs emerge. Accordingly, customers gain familiarity with products as well as narrow defined preferences. In turn, this leads to more customized marketing and production. Consequently, product innovation opportunities decrease whereas process innovations become increasingly important. At this stage of market evolution, the rate of product and process innovation within the market is similarly high (Abernathy and Utterback, 1975; Clark, 1985; Klepper, 1997). Entering entrepreneurs hence are most likely to perform product as well as process innovations.

As customers and producers are increasingly familiar with the emerging dominant product design through the evolution of markets, market uncertainty diminishes. Unit output increases and process innovations outperform product innovations with respect to competitive advantages for entering entrepreneurial firms (Abernathy and Utterback, 1975; Clark, 1985, Klepper, 1997). One driving force in this respect are technological lock-in effects. In more detail, knowledge accumulation increases the efficiency of exploiting one technological solution over the other through economies of learning. As a result, market forces ruled out most of the competing product innovations. Moreover, the introduction of new product innovations through entering entrepreneurs becomes inefficient and thus hardly occurs (Dosi, 1988; Arthur, 1989).

In the last stage of market evolution, the product has a dominant design. Thus, production on a large scale in a systemic production process takes place. Competition among firms is conducted by costs and product prices. Under these conditions, production is highly capital intensive and major changes in product features or production processes are highly

expensive and neither efficient nor effective. Innovative activities now are rather observable outside of the market by suppliers of production technologies (Abernathy and Utterback, 1975). Hence, the rate of innovation within the market is rather low and entering entrepreneurs are neither expected to introduce product nor process innovations.

Corresponding to this explanation, we expect that a new venture pursuing a product innovation strategy is more likely to create a novel market than a new venture pursuing another innovation strategy (i.e., process innovation strategy, product *and* process innovation strategy, non-innovation strategy). Accordingly, we formulate the following hypotheses:

Hypothesis 4: Compared to a start-up based on a product *and* process innovation, a pure product innovation strategy is positively related to market novelty.

Hypothesis 5: Compared to a start-up based on a product *and* process innovation, a pure process innovation strategy is negatively related to market novelty.

Hypothesis 6: Compared to a start-up based on a product *and* process innovation, a non-innovation strategy is negatively related to market novelty.

4. Methods

4.1 Data

The data for our analysis stems from the Thuringian Founder Study (TFS), an interdisciplinary research project on determinants of successful entrepreneurship in Germany. The dataset drew from the German trade register (Handelsregister) for commercial and private companies, recording 2971 technology-oriented or knowledge-based start-ups (according to ZEW classification; Grupp et al., 2000) founded between 1994 and 2006 in Thuringia, Germany. From this list of firms, the research team of the TFS selected a random sample of 2604 start-ups. Founders of these firms were contacted by mail and telephone in order to recruit one founder per start-up, resulting in a response rate of 24.5% (based on the number of start-ups). Note that an important advantage of this recruitment procedure is the possibility to interview founders whose companies were already closed down. Hence, there is no bias toward surviving or particularly successful firms. Finally, 639 structured face-to-face interviews were carried out by the research team of the TFS in 2008. On average, an interview took one and a half hours. A key-informant approach was employed to collect the data. In case

of a team start-up, the lead-entrepreneur provided information on skills and prior experiences of each team member as well as the characteristics of the business start-up.

Some of the collected data refer to retrospective information (e.g., earlier events in the entrepreneur's life and business history) which can be subject to memory decay (Davidsson, 2008). To ensure data validity, the research team of the TFS employed the Life History Calendar (LHC) method (see Caspi et al., 1996 for a detailed description of the LHC method). Broadly speaking, the LHC employs mnemonic techniques using cognitive and visual memory anchors and retrieval cues. This method has been shown to collect more valid and reliable retrospective data than traditional questionnaires (Belli et al., 2004).

Overall, 133 cases had to be excluded either due to missing data or because they turned out not to be genuinely new start-ups but subsidiaries of existing companies. This leaves us with a final sample of 455 valid cases.

4.2 Measures

4.2.1 *Dependent variable: Market novelty*

The few existing measures of the novelty of entrepreneurial markets (Dahlqvist and Wiklund, 2012) strongly rely on the work of Kirzner (1997) which posits that opportunities for entrepreneurial action are exogenously given (rather than endogenously created). Since we assume a continuum between creating new markets and entering into existing ones, such an operationalization of market novelty would be prone to measurement error.

In the present paper, we extend previous work and measure the novelty of entrepreneurial markets from an *evolutionary perspective* of market development. Start-ups' market novelty is captured with four five-point bipolar scales (Item 1: 1 = "The target market was an established market" vs. 5 = "The target market was a young and strongly growing market"; Item 2: 1 = "The founding product targeted an established demand" vs. 5 = "The founding product created an entirely new market"; Item 3: 1 = "On the target market, there existed many competitors" vs. 5 = "On the target market, there existed no or just a few competitors"; Item 4: 1 = "The business model is not new" vs. 5 = "The business model is entirely new to the world"). Items 1-3 are motivated by theoretical arguments put forward in the previous parts of the paper. Item 4 is derived from the literature which emphasizes business models as the architecture in which a new venture exploits its underlying business opportunity (George and Bock, 2011). On the one hand, established business models can hinder the creation of breakthrough opportunities and new markets. On the other hand, innovative business models are established simultaneously to the creation of new markets

(O'Connor and Rice, 2012) or new markets are created by innovative business models (Holloway and Sebastiao, 2010). Thus, the novelty of a business model can be an important indicator of market novelty of the respective company.

A confirmatory factor analysis indicates significant factor loadings ($p < .001$) of the four market novelty items, ranging from .48 to .61 ($\chi^2 (2) = 10.306, p = .006, CFI = .948, RMSEA = .095$). We z-standardized and averaged the four market novelty items, resulting in the final variable *market novelty* ($\alpha = .63$).

4.2.2 Independent variables

We measured *industry experience* with a dummy variable indicating whether at least one founder of the start-up had acquired experience in the new venture's industry within the last three years prior to the first steps in the venture creation process (0 = no, 1 = yes).

Entrepreneurial experience was measured with a dummy variable indicating whether at least one founder of the start-up had launched another start-up prior to the first steps in the venture creation process (0 = no, 1 = yes).

The measure of an *entrepreneurial personality* is based on the Big Five model of personality which was assessed using a well-validated German 45-item questionnaire (Ostendorf, 1990). Agreeableness (e.g., "good-natured vs. cranky"), conscientiousness (e.g., "lazy vs. diligent"), extraversion (e.g., "uncommunicative vs. talkative"), neuroticism (e.g., "vulnerable vs. robust"), and openness (e.g., "conventional vs. inventive") were measured by nine bipolar items each with answers ranging from (0) to (5). Cronbach's α coefficients exceeding 0.6 for all five traits indicate the internal consistency of the scales. Following previous research (Schmitt-Rodermund, 2004, 2007), we defined an entrepreneurial reference type with the highest possible score (5) in extraversion, conscientiousness, and openness, and the lowest possible score (0) in agreeableness and neuroticism. We then calculated an index for an individual's fit with this reference type. First, we estimated each interviewee's squared differences between the reference values and the personal values on each of the five scales. For example, if a person scored a 3 in neuroticism, the squared difference is 9 (because the reference value is 0). Second, the five squared differences were summed up for each person and, third, the algebraic sign of this sum was reversed (e.g., a value of 5 became -5). The resulting value served as the final variable entrepreneurial personality. The closer to 0 the values in this variable, the better the fit between an individual's Big Five personality profile and the defined entrepreneurial reference type.

With respect to venture type in terms of innovativeness, we differentiated whether the start-up's business idea was based on a *product innovation* ("Compared to your competitors, is your business idea based on a product or service that is new or qualitatively better?"; 0 = no, 1 = yes), a *process innovation* ("Compared to your competitors, is your business idea based on a product or service that has a higher value or could be faster or cheaper produced?"; 0 = no, 1 = yes), *product and process innovation* (0 = no, 1 = yes) or *no innovation* (0 = no, 1 = yes).

4.2.3 Controls

The empirical analysis is controlled for a number of factors which fall outside the purview of this study's theoretical focus, yet might potentially affect market novelty when setting up an entrepreneurial firm.

With respect to founder-specific control variables, we controlled for the *number of founding partners* at the time of new venture creation. We also took account of founders' *formal education* (highest educational attainment of the founders: 0 = none, 1 = university degree, 2 = doctorate).

Referring to firm-specific control variables, we capture a start-up's technological endowment using two variables, *patent stock* (number of patents which the founder(s) applied for either as inventor or applicant within the last two years prior to venture set-up) and *prototype* (indicating whether the start-up possessed a prototype of their core product at the time of new venture creation). The variable *start-up capital* indicates the total amount of financial resources available at the time of venture set-up. We also controlled for whether the entrepreneurial firm is an *academic spin-off* (0 = no, 1 = yes).

Finally, we capture industry-specific and year-specific effects on market novelty of entrepreneurial firms. Industry peculiarities are accounted for with five *sector-dummies* (industry sector of the start-up following NACE classification, recoded into dummy variables: (1) chemical industry, metalworking industry and engineering, (2) electrical engineering, fine mechanics and optics, (3) wholesale and retail, (4) ICT, research & development and services, (5) other sectors). In order to control for possible temporal influences in the analyses, three *year-dummies* are included (start of the first business year, recoded into dummy variables: (1) 1994-1998, (2) 1999-2001, (3) 2002-2008).

4.3 Estimation strategy

The evolutionary market process framework suggests that at earlier developmental market stages only a few firms creating opportunities, while at later market stages many more entrepreneurial firms strive to discover opportunities. Therefore, an OLS regression might be inappropriate to grasp predictors of market novelty, because the distribution of market novelty is skewed. This supposition is supported by the Lorenz curve in Figure 2 and the histogram (with kernel density estimation) in Figure 3. The appropriate alternative to account for a skewed distribution in regression analysis is a quantile regression (Coad and Rao, 2008). The semi-parametric quantile regression approach remedies the problem of outliers and skewed distributions. Furthermore, a quantile regression allows acknowledging varying effects of predictors at different points of the distribution of the dependent variable (Buchinsky, 1994; see Buchinsky, 1998 for an overview).

According to Koenker and Basset (1978), market novelty y_i of firm i relates to vector x_i of $K \times 1$ explanatory variables at the sample quantile θ in the following way:

$$y_i = x_i' \beta_\theta + u_{\alpha}, \quad \text{Quant}_\theta(y_i | x_i) = x_i' \beta_\theta. \quad (1)$$

In (1) $\text{Quant}_\theta(y_i | x_i)$ represents the conditional quantile of y_i conditional on x_i . In order to derive the estimator β_θ , the error term may u_{α} be minimized with the help of linear programming. The linear estimator of β_θ is then a result of all observations, which are weighted by the ratio θ for those observations below the quantile θ and $(1 - \theta)$ for those observations above it (Koenker and Hallock, 2001).

5. Results

Correlation coefficients are presented in Table 1 and Table 2 depicts summary statistics of our final dataset. Table 3 shows the results of our regression analysis. The dependent variable is market novelty. Figure 4 depicts the coefficients of the quantile regression over the distribution of market novelty. Hypothesis 1 predicts that a founder teams experience in related industries decreases the degree of a start-up respective market novelty. Our results corroborate this hypothesis, i. e. in case one founder team member possesses experience in related industries, the degree of market novelty is decreased by 0.32 ($p < 0.01$), in comparison to a totally non-experienced founder team. This result holds true for the upper quantiles when a quantile regression is employed, as for the .25, .5, .75 and .9 quantile we estimate a significantly negative effect. Entrepreneurial experience of the founder (team) was suggested

to be positively related with market novelty (hypothesis 2). The coefficients of both, of the OLS and of the respective quantile regressions, are non-significant. Thus, hypothesis 2 has to be rejected. Hypothesis 3a presupposes a relationship between an entrepreneurial personality profile and market novelty, while hypothesis 3b claims that this result holds true only for the upper tails of the market novelty distribution. The result of the OLS regression supports hypothesis 3a. Moreover, considering the results from the quantile regression, excepting the .9 quantile, the effect of the lead founders entrepreneurial personality fit on market novelty is insignificant. Correspondingly, hypothesis 3b is supported as well. Regarding firm innovativeness, we test whether certain innovation strategies are linked with market novelty. The comparison group is a product as well as a process innovation strategy for business start-up. Our results corroborate hypotheses 4-6. Particularly, in contrast with both a product and process innovation strategy, entrepreneurs who rely on a sole product innovation strategy reveal on average a 0.289 higher degree of market novelty ($p < 0.01$). In line with our argumentation above, entrepreneurs who either decide starting-up without innovation ($p < 0.01$) or solely process innovation ($p < 0.01$) enter on average into markets that have a lower degree of novelty, 0.465 and 0.468, respectively. Excepting in case of a sole product innovation strategy for the .1 and .25 quantile, those effects are significant over different quantiles of the market novelty distribution.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1. znovelty	1																		
2. prod	0.28*	1																	
3. proc	-0.28*	-0.22*	1																
4. noninno	-0.28*	-0.18*	-0.28*	1															
5. entrepexp	0.04	-0.03	-0.01	-0.05	1														
6. industrexp	-0.18*	-0.03	0.05	0.07	0.02	1													
7. epersonality	0.10	0.06	-0.06	-0.06	-0.04	0.04	1												
8. nfounder	0.18*	0.08	-0.13*	-0.03	0.25*	0.07	-0.02	1											
9. educ	0.20*	0.09	-0.03	-0.08	0.14*	0.11	-0.11	0.33*	1										
10. aso	0.28*	0.06	-0.07	-0.17*	0.02	-0.06	-0.13*	0.38*	0.39*	1									
11. capital	0.07	-0.02	-0.05	-0.06	0.12*	0.03	0.01	0.09	0.14*	0.02	1								
12. pat	0.32*	0.17*	-0.13*	-0.20*	0.06	-0.06	0.05	0.09	0.23*	0.23*	0.18*	1							
13. prototype	0.17*	0.06	-0.04	-0.19*	-0.05	0.06	0.04	0.04	0.14*	0.14*	0.02	0.21*	1						
14. nace2	0.05	-0.02	0.03	-0.14*	0.04	0	-0.02	-0.04	-0.06	-0.07	0.19*	0.05	0	1					
15. nace3	0.14*	0.07	-0.04	-0.07	0.01	-0.09	0.04	0.11	0.07	0.06	0.11	0.24*	0.08	-0.30*	1				
16. nace5	-0.07	-0.03	-0.05	0.16*	-0.03	0.05	0.08	-0.03	-0.13*	-0.10	-0.04	-0.12	-0.08	-0.13*	-0.13*	1			
17. nace7	0.01	0.06	0.03	-0.01	0	0.04	-0.04	-0.01	0.09	0.14*	-0.18*	-0.09	0.03	-0.42*	-0.41*	-0.18*	1		
18. y1999_01	-0.04	0	-0.01	0.03	0.03	0.09	-0.05	-0.02	0.01	-0.01	-0.01	0.04	0.05	-0.04	-0.03	-0.06	0.08	1	
19. y2002_08	0.09	0	-0.01	-0.16*	-0.01	0.01	0.03	0.07	0	0.20*	0.03	0.01	0.08	-0.03	-0.07	0.01	0.11	-0.37*	1

*p<.01

Table 1: Correlation coefficients

Variable	Mean	Std. Dev.	Min	Max
znovelty	0.00	0.70	-1.14	1.70
prod	0.13	0.33	0	1
proc	0.25	0.43	0	1
noninno	0.19	0.39	0	1
entrepexp	0.42	0.49	0	1
industrexp	0.89	0.32	0	1
epersonality	-21.53	5.71	-57.81	-6.49
nfounder	2.29	1.16	1	5
educ	1.06	0.63	0	2
aso	0.16	0.37	0	1
capital	3.35	1.33	1	7
zpatstock	0	1	-0.15	18.92
prototype	0.18	0.38	0	1
nace2	0.24	0.43	0	1
nace3	0.23	0.42	0	1
nace5	0.05	0.23	0	1
nace7	0.37	0.48	0	1
y1999_01	0.26	0.44	0	1
y2002_08	0.28	0.45	0	1

Table 2: Summary statistics

	OLS	q10	q25	q50	q75	q90
prod	0.289*** (0.0926)	0.192 (0.166)	0.210 (0.160)	0.395** (0.158)	0.318*** (0.119)	0.220* (0.130)
proc	-0.468*** (0.0701)	-0.372*** (0.0938)	-0.416*** (0.0934)	-0.478*** (0.0973)	-0.472*** (0.121)	-0.469*** (0.149)
noninno	-0.465*** (0.0758)	-0.338*** (0.110)	-0.448*** (0.108)	-0.496*** (0.103)	-0.583*** (0.140)	-0.313* (0.176)
entrepexp	-0.00858 (0.0571)	0.0495 (0.0794)	0.0516 (0.0769)	-0.0490 (0.0850)	0.00136 (0.0852)	0.0865 (0.120)
industrexp	-0.320*** (0.0932)	-0.0819 (0.205)	-0.398** (0.159)	-0.447*** (0.129)	-0.384*** (0.146)	-0.399** (0.155)
epersonality	0.0118** (0.00463)	0.00478 (0.00575)	0.00956 (0.00632)	0.00944 (0.00744)	0.0145 (0.00891)	0.0200** (0.00988)
nfounder	0.0226 (0.0260)	0.0232 (0.0381)	-0.00324 (0.0373)	0.0372 (0.0413)	0.0287 (0.0396)	0.0155 (0.0479)
educ	0.119** (0.0516)	0.0574 (0.0610)	0.148** (0.0723)	0.156** (0.0733)	0.179* (0.0962)	0.105 (0.0925)
aso	0.287*** (0.0950)	0.196 (0.155)	0.346** (0.171)	0.307** (0.144)	0.163 (0.141)	0.232* (0.137)
capital	0.00148 (0.0224)	-0.00697 (0.0299)	0.00531 (0.0323)	0.00160 (0.0315)	-0.000756 (0.0364)	0.0530 (0.0441)
zpatstock	0.00268 (0.0259)	0.0216 (0.0965)	-0.00399 (0.0924)	-0.0170 (0.104)	0.0924 (0.0839)	0.0389 (0.0688)
prototype	0.0988 (0.0708)	0.215* (0.114)	0.146 (0.112)	0.113 (0.106)	0.00335 (0.114)	-0.0407 (0.134)
nace2	0.281*** (0.0938)	0.198 (0.127)	0.225* (0.122)	0.238 (0.146)	0.304** (0.154)	0.381** (0.180)
nace3	0.286*** (0.0990)	0.170 (0.122)	0.180 (0.128)	0.246 (0.157)	0.319* (0.163)	0.327 (0.200)
nace5	0.202 (0.124)	0.128 (0.153)	0.216 (0.151)	0.179 (0.193)	0.160 (0.213)	0.0557 (0.244)
nace7	0.218** (0.0883)	0.0871 (0.123)	0.195* (0.116)	0.0979 (0.143)	0.270** (0.137)	0.288* (0.158)
y1999_01	-0.0262 (0.0645)	0.0299 (0.0871)	-0.0376 (0.0939)	-0.0228 (0.107)	-0.0460 (0.108)	-0.0789 (0.116)
y2002_08	0.0126 (0.0688)	0.00311 (0.0902)	-0.00700 (0.109)	-0.0267 (0.0954)	0.0434 (0.111)	0.130 (0.139)
_cons	0.252 (0.178)	-0.715** (0.306)	-0.119 (0.252)	0.265 (0.243)	0.734** (0.301)	1.043*** (0.329)
N	455	455	455	455	455	455
R2	0.3451	0.1723	0.1871	0.2235	0.2234	0.2213

Standard errors in parentheses

* p<.1 ** p<.05 *** p<.01"

Table 3: Regression analysis

6. Discussion and conclusion

This study probes entrepreneurial determinants of market novelty of entrepreneurial firms. We find that industry related founder team experience is negatively linked with market novelty (hypothesis 1). However, a founder teams' entrepreneurial experience is not related with market novelty and hence hypothesis 2 was not supported by our results. The above estimations also suggest a positive relationship between an entrepreneurial personality profile and market novelty (hypothesis 3a). The quantile regression though shows only a significant effect in the upper tail of the market novelty distribution, which corroborates hypothesis 3b. With respect to the innovative activities, our results show that a sole product innovation strategy is linked with a higher degree of market novelty (hypothesis 4). In contrast, starting-up in established markets accompanies rather with a non-innovation strategy (hypothesis 5) or a sole process innovation strategy (hypothesis 6).

The result that founder team experience in related industries negatively corresponds to market novelty provides some evidence that building up new organizational forms or capabilities is contradicted by existing cognitive frameworks (Alvarez and Barney, 2007). At present, relatively little evidence exists for this relationship. So far, only case study evidence by O'Connor and Rice (2012) provides some insights in this regard. They show that relying on existing customer relationships, markets or alliances decreases the market novelty of innovations. The answer to the question why some entrepreneurs are perhaps more relying on their existing capabilities when it comes to business start-up might be given by past success in related markets (see Audia et al., 2000; Gupta et al., 2006). An interesting finding concerns the insignificant effect of industry related experience at the .1 quantile. This finding might be explained by the fact that very low degrees of market novelty represent start-ups like franchise firms.

Entrepreneurial expertise was not related with market novelty. This contradicts existing evidence (Dew et al., 2011). However, experienced entrepreneurs may have a better understanding how prospective a novel market is (Baron and Ensley, 2006). For instance, Ucbasaran et al., (2009) find that experienced entrepreneurs generally identify opportunities with higher wealth creation potential. Further research may examine whether expertise with innovative entrepreneurship leads to higher degrees of market novelty. In addition, the interaction effect of market novelty and entrepreneurial expertise on venture performance is a fruitful future research avenue.

We find that an entrepreneurial personality profile on average increases the inclination to start up in rather novel markets. Looking at different points in the distribution, this effect vanishes at very low degrees of market novelty. This finding corresponds with the nature of

opportunities at different developmental market stages. At low degrees of market novelty, rather opportunity discovery is prevailing and thus rather cognition than personality traits may become important when opportunities are exploited (see Shane, 2003). In contrast, the creation of new markets requires entrepreneurial creativity (Amabile, 1996). And creativity is associated with personality (Feist, 1998; Zhao and Seibert, 2006). Future studies may focus on more narrow personality traits which can explain the creation of new markets, as narrow traits are suggested to be better predictors of entrepreneurial outcomes (Rauch and Frese, 2007a, 2007b). In a similar vein, personality might moderate the effect of market novelty on entrepreneurial performance. With respect to the creation of markets, entrepreneurial idiosyncrasies beyond the personality traits of entrepreneurs may be important. For example, Amabile (1996) proposed that intrinsic motivation promotes entrepreneurial creativity and the creation of novel markets, whereas extrinsic motivation is inimical. Therefore, these constructs ought to be taken into consideration in future studies on market novelty.

As expected by our hypotheses, innovation strategies pursued by entrepreneurial start-ups explain whether new markets are created or entry into established markets takes place. This finding underlines the important interplay between market development, technology and innovative entrepreneurship (Utterback and Abernathy, 1975; Dosi, 1988; Klepper, 1997). However, at present, evidence on innovative entrepreneurship and market evolution is scarce and the present study provides some insights in this regard. We thus follow the call of Dalqvist and Wiklund (2012), who stressed the importance of acknowledging different kinds of innovations for market novelty. Accordingly we distinguish between a product and process innovation strategy.

Interestingly, at the .1 and .25 quantile the effect of product innovation on market novelty is not significant. However, our innovation measure not grasps the radicalness of innovations. In this regard, breakthrough product or process innovations might be crucial for a high degree of market novelty (Tushman and Anderson; 1986; Olleros, 1986; Anderson and Tushman, 1990; O'Connor and Rice, 2012). Minor innovations maybe not have this effect. Future research hence may also concentrate on the relationship between the radicalness of innovations and market novelty.

Our study provides several contributions. In general, the relationship between the nature of opportunities and entrepreneurial characteristics is a widely understudied field and the present paper offers some additional insights. First of all, we show that the degree of market novelty when entrepreneurial firms start up is negatively related with market related knowledge. Secondly, our results show that the personality of the lead founder of

entrepreneurial firms affects entry into highly novel markets. Third, we find that the innovation strategy corresponds to the degree of entrepreneurial firms. Moreover, we draw on a model that integrates the evolutionary market theory with the nature of opportunities. This framework handles markets not only from a coordinating point of view, but rather from a process perspective. The advantage of this approach, in comparison to Dalqvist and Wiklund (2012), is that the relationship between innovation strategies and market novelty can be explained.

Despite these contributions, our study has several limitations. One limitation refers to our data, which is restricted to entrepreneurs starting-up in highly innovative industries, while most of them are innovative. Nevertheless, the majority of business founders in Germany are non-innovative (Hagen et al., 2011). Therefore, generalizing our results to all kinds of business founders might be misleading. Future research might investigate a representative subsample of the whole population of business founders in order to achieve more generalizable results. Another limitation concerns our measure for product and process innovation. A measure acknowledging the radicalness of innovations may lead to further insights. Additionally, we only consider start-ups in investigating the determinants of entrepreneurial market novelty. Market entry and the pursuit of opportunities, however, may to a much larger extent takes place from already existing firms through diversification (Buenstorf, 2007). A promising future research gap hence is the examination of market novelty determinants of both, diversifier entrants and business start-ups. Finally, the creation of novel markets and their evolution is a sociological phenomenon, which is hardly fulfilled by a single entrepreneurial firm (see Fligstein, 2001). Therefore other studies may investigate the interplay between different actors when it comes to the emergence and evolution of markets.

In conclusion, Buenstorf (2007) proposes that evolutionary economics is a promising approach in entrepreneurship research in order to explain the nature of opportunities entrepreneurs pursue. The evolutionary approach stresses the importance of entrepreneurial idiosyncrasies, like the knowledge constituting organizations or the experience of the individual lead founder. Moreover, from the evolutionary perspective the rate of innovation is important in explaining the stage of market development. These suppositions are mirrored by our results and therefore entrepreneurship research may be informed from insights of the evolutionary economics branch.

References

- Agarwal, R. (1998): Evolutionary trends of industry variables. *International Journal of Industrial Organization*, Vol. 16, pp. 511-525.
- Agarwal, R., and Bayus, B. L. (2002): The Market Evolution and Sales Takeoff of Product Innovations. *Management Science*, Vol. 48, pp. 1024-1041.
- Aldrich, H. E., and Fiol, C. M. (1994): Fools rush in? The institutional context of industry creation. *Academy of Management Review*, Vol. 19(4), pp. 645-670.
- Aldrich, H. E., and Kenworthy, A. L. (1999): The accidental entrepreneur: Campbellian antinomies and organizational foundings. in: J. A. C. Baum, and B. McKelvey (Eds.), *Variations in Organization Science: In Honor of Donald T. Campbell*, pp. 19-33, Thousand Oaks, CA: Sage.
- Alvarez, S. A., and Barney, J. B. (2005): How do entrepreneurs organize firms under conditions of uncertainty? *Journal of Management*, Vol. 31, pp. 776-793.
- Alvarez, S. A., and Barney, J. B. (2007): Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal*, Vol. 1(1), pp. 11-26.
- Alvarez, S. A., Barney, J. B., and Anderson, P. (2012): Forming and Exploiting Opportunities: The Implications of Discovery and Creation Processes for Entrepreneurial and Organizational Research. *Organization Science*, Articles in Advance.
- Alvarez, S. A., Barney, J. B., and Young, S. L. (2010): Debates in entrepreneurship: Opportunity formation and implications for the field of entrepreneurship. In: *Handbook of Entrepreneurship Research*, eds. Z.J. Acs and D.B. Audretsch, pp. 23-46. New York: Springer.
- Amabile, T. M. (1997): Entrepreneurial Creativity through Motivational Synergy. *The Journal of Creative Behavior*, Vol. 31, pp. 18-26.
- Anderson, P., and Tushman, M. L. (1990): Technological discontinuities and dominant designs: A cyclical model of technological change. *Administrative Science Quarterly*, Vol. 35, pp. 604-633.
- Arthur W. B. (1989): Competing technologies, increasing returns, and lock-in by historic events. *Economic Journal*, Vol. 99, pp. 116-131.
- Audia, G., Locke, E. A., and Smith, K. G. (2000): The paradox of success: An archival and laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal*, Vol. 43, pp. 837-854.
- Baker, T., and Nelson, R. E. (2005): Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage. *Administrative Science Quarterly*, Vol. 50, pp. 329-366.
- Baron, R., and Ensley, M. (2006): Opportunity recognition as the detection of meaningful patterns: Evidence from comparisons of novice and experienced entrepreneurs. *Management Science*, Vol. 52, pp. 1331-1344.

- Buchinsky, M., (1994): Changes in the U.S. wage structure 1963-1987: application of quantile regression. *Econometrica*, Vol. 62, pp. 405–458.
- Buchinsky, M., (1998): Recent advances in quantile regression models: a practical guide for empirical research. *Journal of Human Resources*, Vol. 33, pp. 88–126.
- Buenstorf, G. (2007): Creation and pursuit of entrepreneurial opportunities: An evolutionary economics perspective. *Small Business Economics*, Vol. 28, pp. 323–327.
- Carroll, G. R. (1997): Long-term evolutionary change in organizational populations: theory, models and empirical findings from industrial demography. *Industrial and Corporate Change*, Vol. 6, pp. 119-145.
- Carroll, G. R., and M. T. Hannan (1989): Density delay in the evolution of organizational populations: A model and five empirical tests. *Administrative Science Quarterly*, Vol. 34, pp. 411-430.
- Carroll, G. R., and Hannan, M. T. (2000): *The Demography of Corporations and Industries*. Princeton University Press, Princeton.
- Caspi, A., Moffitt, T. E., Thornton, A., Freedman, D., Amell, J. W., Harrington, H., Smeijers, J., and Silva, P. A. (1996). The Life History Calendar: A research and clinical assessment method for collecting retrospective event-history data. *International Journal of Methods in Psychiatric Research*, Vol. 6, pp. 101–114.
- Chandler, G. N., DeTienne, D., and Lyon, D. W. (2003): Outcome Implications of Opportunity Creation/Discovery Processes. In: *Frontiers of Entrepreneurship Research*. Eds. N. Churchill, W. Bygrave, J. Butler, S. Birley, P. Davidsson, W. Gartner & P. McDougall. Wellesley, MA: Babson College.
- Chesbrough, H., and Rosenbloom, R. S. (2002): The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology. *Industrial and Corporate Change*, Vol. 11, pp. 529–555.
- Christensen, C. M., and Bower, J. L. (1996): Customer power, strategic investment and the failure of leading firms. *Strategic Management Journal*, Vol. 17, pp. 197-218.
- Clark, K. B. (1985): The Interaction of Design Hierarchies and Market Concepts in Technological Evolution. *Research Policy*, Vol. 14, pp. 235-251.
- Coad, A., and Rao, R. (2008). Innovation and firm growth in high-tech sectors: A quantile regression approach. *Research Policy*, 37-4, 633-648.
- Cohen, W., and Levinthal, D.A. (1994): A fortune favors the prepared firm. *Management Science*, Vol. 40, pp. 227–251.
- Covin, J. G., and Slevin, D. P. (1991): A Conceptual Model of Entrepreneurship as Firm Behavior. *Entrepreneurship Theory & Practice*, Vol. 16, pp. 7-24.
- de Koning, A., and D. Muzyka (1996): The convergence of good ideas: When and how do entrepreneurial managers recognize innovative business ideas? In: *Frontiers of*

- Entrepreneurship Research*. Eds. N. Churchill, W. Bygrave, J. Butler, S. Birley, P. Davidsson, W. Gartner & P. McDougall. Wellesley, MA: Babson College.
- Dahlqvist, J., and Wiklund, J. (2012): Measuring the market newness of new ventures. *Journal of Business Venturing*, Vol. 27, pp. 185- 197.
- Danneels, E. (2007): The process of technological competence leveraging. *Strategic Management Journal*, Vol. 28, pp. 511–533.
- Dew, N., Read, S., Sarasvathy, S. D., and Wiltbank, R. (2011): On the entrepreneurial genesis of new markets: effectual transformations versus causal search and selection. *Journal of Evolutionary Economics*, Vol. 21, pp. 231-253.
- Dew, N., Sarasvathy, S. D., Read, S., and Wiltbank, R. (2008): Immortal firms in mortal markets? An entrepreneurial perspective on the “innovator’s dilemma.” *European Journal of Innovation Management*, Vol. 11, pp. 313–329.
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, Vol. 41, pp. 417–440.
- Dosi G. (1982): Technological paradigms and technological trajectories. *Research Policy*, Vol. 11, pp. 147–162.
- Dosi, G. (1988): Sources, procedures and microeconomic effects of innovation. *Journal of Economic Literature*, Vol. 26, pp. 1120–1170.
- Dosi, G. (1997): Opportunities, incentives and the collective patterns of technological change. *Economic Journal*, Vol. 107, pp. 1530–1547.
- Eckhardt, J. T., and Shane, S. A. (2003): Opportunities and entrepreneurship. *Journal of Management*, Vol. 29, pp. 333–349.
- Feist, G. J. (1998): A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*, Vol. 4, pp. 290-309.
- Fligstein, N. (2001): *The Architecture of Markets: An Economic Sociology of Twenty-First-Century Capitalist Societies*. Princeton, NJ: Princeton University Press.
- Geroski, P. A. (2003): *The evolution of new markets*. Oxford University Press, Oxford.
- George, G., and Bock, A. J. (2011): The business model in practice and its implications for entrepreneurship research. *Entrepreneurship Theory and Practice*, Vol. 35, pp. 83–111.
- Gort, M., and Klepper, S. (1982): Time paths in the diffusion of product innovations. *The Economic Journal*, Vol. 92, pp. 630-653.
- Grégoire, D. A., and Shepherd, D. A. (2012): Technology-market combinations and the identification of entrepreneurial opportunities: an investigation of the opportunity-individual nexus. *Academy of Management Journal*, Vol. 55, pp. 753-785.

- Gruber, M., MacMillan, I. C., and Thompson, J. D. (2008): Look before you leap: market opportunity identification in emerging technology firms. *Management Science*, Vol. 54, 1652-1665.
- Greve, A., and Salaff, J. W. (2003): Social Networks and Entrepreneurship. *Entrepreneurship Theory & Practice*, Vol. 28, pp. 1-22.
- Grupp, H., and Legler, H. (2000): *Hochtechnologie 2000: Neudefinition der Hochtechnologie für die Berichterstattung zur technologischen Leistungsfähigkeit Deutschlands*. Karlsruhe/Hannover: Fraunhofer-Institut für Systemtechnik und Innovationsforschung (ISI) und Niedersächsisches Institut für Wirtschaftsforschung (NIW).
- Gupta, A. K., Smith, K. G., Shalley, C. E. (2006): The interplay between exploration and exploitation. *Academy of Management Journal*, Vol. 49, pp. 693–706.
- Hagen, T., Kohn, K., and Ulrich, K. (2011): *KfW Gründungsmonitor*. Frankfurt am Main: KfW Bankengruppe.
- Holloway, S. S., and Sebastiao, H. J. (2010): The Role of Business Model Innovation in the Emergence of Markets: A missing Dimension of Entrepreneurial Strategy. *Journal of Strategic Innovation and Sustainability*, Vol. 6, pp. 86-101.
- Im, S., and Workman, J.P. (2004): Market orientation, creativity and new product performance in high-technology firms. *Journal of Marketing*, Vol. 68, pp. 114-32.
- Jovanovic, B. (1982): Selection and the evolution of industry. *Econometrica*, Vol. 50, pp. 649-670.
- Jovanovic, B., and MacDonald, G. M. (1994): The Life Cycle of a Competitive Industry. *Journal of Political Economy*, Vol. 102, pp. 323-347.
- King, L. A., McKee-Walker, L., and Broyles, S. J. (1996): Creativity and the five-factor model. *Journal of Research in Personality*, Vol. 30, pp. 189–203.
- Kirzner, I. M. (1997): Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of Economic Literature*, Vol. 35(1), pp. 60–85.
- Klein, P. G. (2008): Opportunity Discovery, Entrepreneurial Action, and Economic Organization. *Strategic Entrepreneurship Journal*,
- Klepper, S. (1997): Industry Life Cycles. *Industrial and Corporate Change*, Vol. 6, pp. 145-181.
- Koenker, R., and Bassett, G. (1978): Regression quantiles. *Econometrica*, Vol. 46, pp. 33-50.
- Koenker, R., and Hallock, K (2001): Quantile Regression: An Introduction. *Journal of Economic Perspectives*, Vol. 15, pp. 143-156.
- Levinthal, D. A., and March, J. G. (1993): The myopia of learning. *Strategic Management Journal*, Vol. 14, pp. 95–112.
- Luksha P. (2008): Niche construction: the process of opportunity creation in the environment. *Strategic Entrepreneurship Journal*, Vol. 2(4), pp. 269–283.

- Malerba, F., and Orsenigo, L. (1995): Schumpeterian patterns of innovation. *Cambridge Journal of Economics*, Vol. 19, pp. 47-65.
- Marcati, A., Guido, G., and Peluso, A. M. (2008): The role of SME entrepreneurs' innovativeness and personality in the adoption of innovations. *Research Policy*, Vol. 37 (9), pp. 1579-1590.
- Metcalfe, J. S., Foster, J., and Ramlogan, R. (2006): Adaptive economic growth. *Cambridge Journal of Economics*, Vol. 30, pp. 7-32.
- O'Connor, G. C., and Rice, M. P. (2012): Market Creation for Breakthrough Innovations: Enabling and Constraining Mechanisms. *Journal of Product Innovation Management*, DOI: 10.1111/j.1540-5885.2012.00996.x
- Olleros, F. (1986): Emerging industries and the burnout of pioneers, *Journal of Product Innovation Management*, Vol. 1, pp. 5-18.
- Ostendorf, F. (1990): *Sprache und Persönlichkeitsstruktur. Zur Validität des Fünf-Faktoren Modells der Persönlichkeit*. Regensburg: Roederer Verlag.
- Pakes, A., and Ericson, R. (1998): Empirical Implications of Alternative Models of Firm Dynamics. *Journal of Economic Theory*, Vol. 79, pp. 1-45.
- Rauch, A., and Frese, M. (2007a): Let's put back the person into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation and success, *European Journal of Work and Organizational Psychology*, Vol. 16 (4), pp. 353-385.
- Rauch, A., and Frese, M. (2007b): Born to be an entrepreneur? Revisiting the personality approach to entrepreneurship. In Baum, J. R., Frese, M., and Baron, R. A (Eds.), *SIOP Organizational Frontiers Series: The Psychology of Entrepreneurship*, pp. 41-65, Mahwah, NJ: Lawrence Erlbaum.
- Rosenberg, N. (1982): *Inside the Black Box: Technology and Economics*. Cambridge University Press: Cambridge, MA
- Schmitt-Rodermund, E. (2004): Pathways to successful entrepreneurship: Parenting, personality, early entrepreneurial competence, and interests. *Journal of Vocational Behavior*, Vol. 65, pp. 498-518.
- Schumpeter, J. A. (2002): New translations: Theorie der wirtschaftlichen Entwicklung. *American Journal of Economics and Sociology*, Vol. 61 (No. 2), pp. 405-437 (originally published in 1911).
- Sarasvathy, S. D., and Dew, N. (2005): New market creation as transformation. *Journal of Evolutionary Economics*, Vol. 15(5), pp. 533-565.
- Sarasvathy S. D., and Venkataraman S. (2011): Entrepreneurship as method: open questions for an entrepreneurial future. *Entrepreneurship Theory & Practice*, Vol. 35(1), pp. 113-135.
- Shane, S. (2003): *A General Theory of Entrepreneurship*. Cheltenham: Edward Elgar.

- Short, J. C., Ketchen, D. J., Shook, C. L., Ireland, R. D. (2010) The concept of “opportunity” in entrepreneurship research: Past accomplishments and future challenges. *Journal of Management*, Vol. 36, pp. 40-65.
- Tushman, M. L., and Anderson, P. (1986): Technological discontinuities and organizational environments, *Administrative Science Quarterly*, Vol. 31, pp. 439-465.
- Ucbasaran, D., Westhead, P., and Wright, M. (2009): The extent and nature of opportunity identification by experienced entrepreneurs. *Journal of Business Venturing*, Vol. 24, pp. 99-115.
- Utterback, J. M., Abernathy, W. J. (1975): A dynamic model of process and product innovation. *Omega*, Vol. 3(6), pp. 639–656.
- Williamson, O. E. (1975): *Markets and Hierarchies: Analysis and Antitrust Implications*. Free Press: New York.
- Witt, U. (2003): Evolutionary economics and the extension of evolution to the economy. In his: *The Evolving Economy. Essays on the Evolutionary Approach to Economics*. Cheltenham: Edward Elgar, pp. 3-34.
- Wood, M., and W. McKinley (2010): The Production of Entrepreneurial Opportunity: A Constructivist Perspective, *Strategic Entrepreneurship Journal*, Vol. 4(1), pp. 66–84.
- Zahra, S. (2008): The virtuous cycle of discovery and creation of entrepreneurial opportunities. *Strategic Entrepreneurship Journal*, Vol. 2(3), pp. 243–257.
- Zhao H., and Seibert S. E. (2006): The Big Five personality dimensions and entrepreneurial status: A meta-analytical review. *Journal of Applied Psychology*, Vol. 91, pp. 259–271.
- Zhao, H., Seibert, S. E., and Lumpkin, G. T. (2010): The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, Vol. 36(2), pp. 381-404.

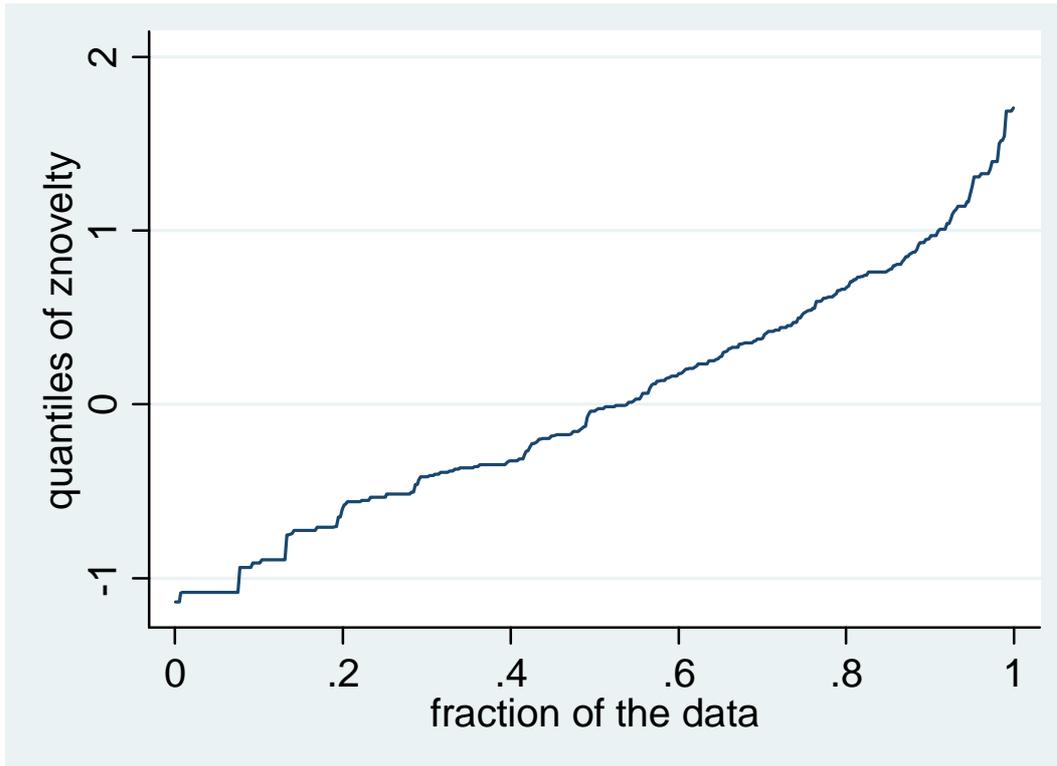


Figure 1: Lorenz curve of the dependent variable market novelty

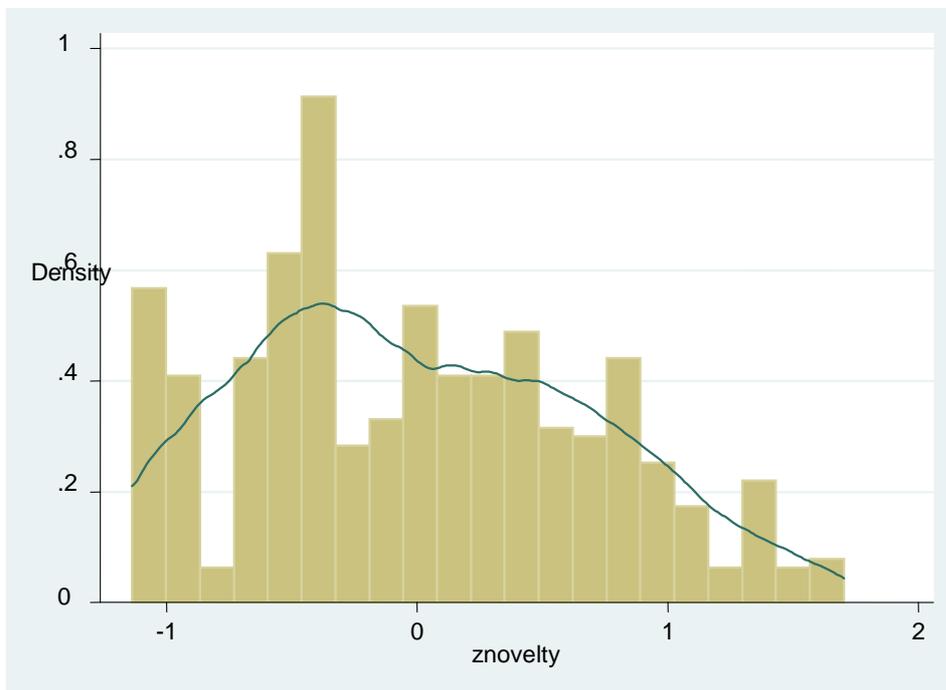


Figure 3: Histogram with kernel density estimation of the dependent variable market novelty

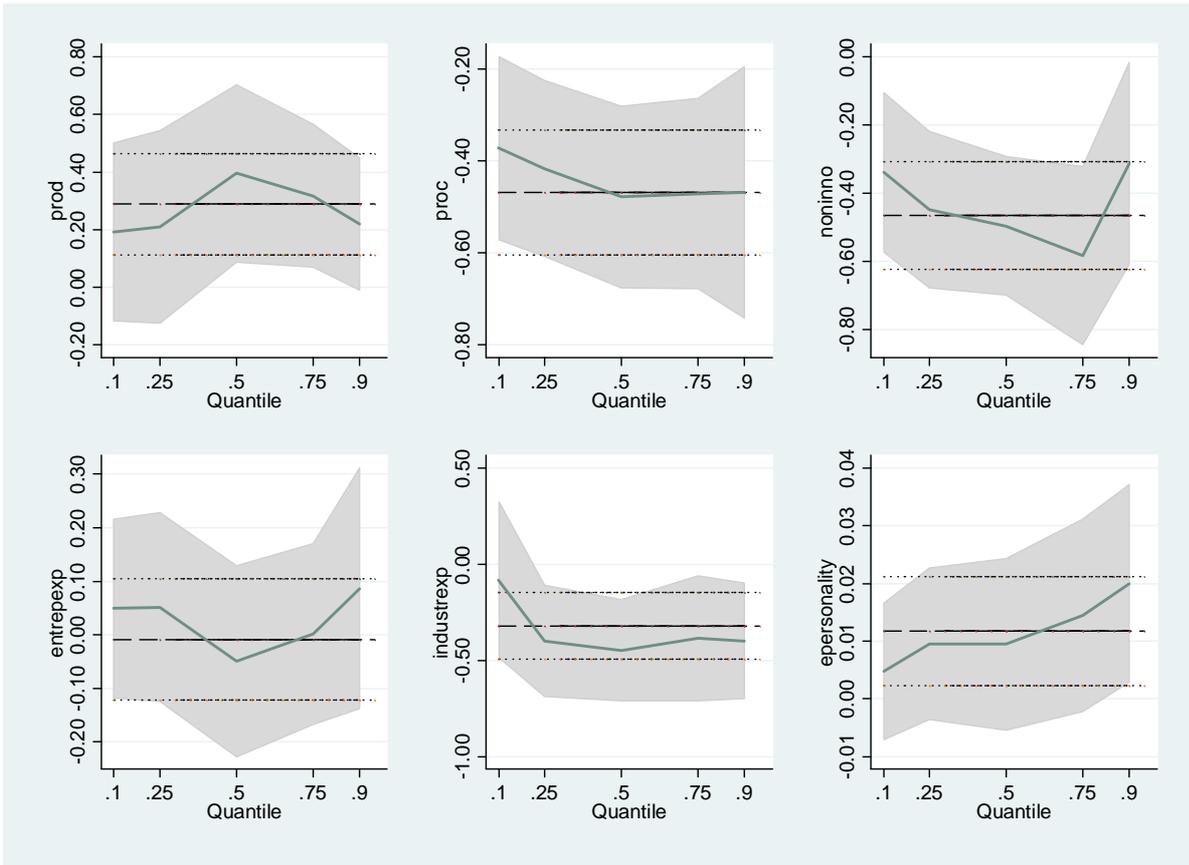


Figure 4: Quantile regression estimates. *Note:* Vertical axes show coefficient estimates of named explanatory variable in quantile regression models; horizontal axes depict the quantiles of the dependent variable; horizontal lines represent OLS estimates with 95% confidence interval; quantile regression error bars correspond to bootstrapped 95% confidence intervals (100 bootstrap replications).