

# **Density imprints and organisations' survival chances: a question of organisational ancestors<sup>\*</sup>**

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*While previous studies in organisational ecology have shown that the population density at the time of an organisation's founding influences its survival chances, the present study proposes that clarity regarding the form and function of a category of organisations moderates this effect. Focusing on four industries in East Germany and their development in the aftermath of the transition from socialism to a free market economy in 1990, results support prior findings (i.e., a high population density at an organisation's founding decreases its survival chances). However, this effect is less harmful when environmental experiences with the organisational form are small. The present study's results contribute to the recent discussion on population density, and they highlight the importance of transition economies as research contexts for organisational ecology.*

*Frühere Studien haben gezeigt, dass die Populationsdichte zum Gründungszeitpunkt einer Organisation deren Überlebenschancen nachhaltig beeinflusst. Aufbauend auf der Analyse von vier Organisationspopulationen in Ostdeutschland nach der Wiedervereinigung 1990, untersucht die vorliegende Studie, welche Wirkung die Neuartigkeit der Organisationsform auf diesen Effekt hat. Während eine hohe Populationsdichte zum Gründungszeitpunkt die Überlebenschancen von Organisationen reduziert, zeigt sich, dass dieser Effekt für Organisationsformen hinsichtlich derer die Umwelt weniger Erfahrungen hat, schwächer ausgeprägt ist. Die Studie diskutiert diesen Befund im Kontext bisheriger Studien zur Populationsdichte und hebt die Bedeutung der Transformationswirtschaften als Untersuchungsgegenstand des Organizational-Ecology-Ansatzes hervor.*

**Keywords:** *Organizational Ecology, Density Dependence, Organizational Forms, Transition Economies, Event History Analysis (JEL: P31)*

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## 1. Introduction

Carroll and Hannan's (1989b) general argument that population density at the time at which an organisation is founded affects its survival chances have received strong support from many studies across several different industries (e.g., Carroll/Hannan, 2000; Núñez-Nickel/Moyano-Fuentes, 2004). Theory proposes that organisations that are founded during periods of high density have higher mortality rates, while organisations founded during periods of low density have lower mortality rates. However, empirical results regarding such density imprints (or delayed density effects) have not been entirely consistent (Kuilman et al., 2009). While some studies do not provide statistical evidence for the density delay effect (Carroll/Swaminathan 1992; Wholey et al. 1992; McKendrick et al. 2003; Bogaert et al. 2006), others suggest a positive effect on an organisation's chances of survival with respect to high density at the time of the founding (Aldrich et al., 1994; Barnett, 1997). Moreover, the inconsistency of these findings cannot be explained by controlling for industry effects, firm sizes, and countries.

In this context, Dobrev and Gotsopoulos (2010) recently analysed the market entry of new firms in the early days of an industry, and they show how success is affected when the environment lacks clarity regarding the form and function of a novel category of organisation (i.e., a so-called "legitimacy vacuum disadvantage" affects organisations' chances of survival). Their major findings are (1) that the degree of population density at the time of an organisation's founding is imprinted and affects the organisation's mortality risk when maturing, and (2) that the stage of industry evolution moderates the so-called "legitimacy vacuum disadvantage." Based on these findings, Dobrev and Gotsopoulos (2010) develop a theory regarding the legitimacy vacuum and structural imprinting which suggests that the often-observed legitimacy effect of population density (i.e., a positive effect of increasing population density for firms with novel organisational forms) does not hold true after the industry has passed its formative stage. The so-called "novel categories of organisations," however, are often not entirely new but, rather, are built upon the principles and substructures of prior populations. An example is evident in the case of technological innovations that open the door for novel populations to emerge from existing ones (Carroll et al., 1996). Eastern Europe is of specific interest in this context; there entire economic sectors were privatized and formally socialistic forms of organisations were replaced by, and transformed into, Western-market types of organisations. However, the extent of transformation was not equally high for all kinds of organisational forms; that is, in some industries, change processes were much more radical and comprehensive than they were in other industries. Consequently, some organisational forms that have followed the transformation from socialism to a free market economy show

higher levels of novelty, while others strongly relate to their socialistic ancestors.

Past research on density imprints, however, has generally focused—as in the case of Dobrev and Gotsopoulos (2010)—on the growth and legitimacy processes of novel organisational forms, while the most recent work has turned toward the question of how similarities with ancestral populations influence organisational founding and failure rates (Dowell/David, 2011). In more detail, Dowell and David (2011) analyse the evolution of private liquor stores in Alberta, an organisational form that was government-owned and operated prior to 1993. Their results show that private liquor stores that were founded after the liberalization, which mimicked the templates of the ancestral population, show higher survival chances. They argue that this finding is due to already-existing blueprints, as well as the high stock of experience that the environment has made with the organisational form. Put differently, in contrast with novel organisational forms, liquor stores that were founded after 1993 in Alberta could rely upon well-proven routines, procedures, and resources. However, Dowell and David (2011) neglect the implications that their findings may have on the effect of density imprints—for example, how the experiences that the environment collects regarding the functions and forms of an organisation influence the effect of population density.

This study will engage prior arguments in this field of research and contribute to an explanation of the inconsistency of prior findings on the effect of density imprints by investigating whether or not the degree of organisational forms' novelty moderate the relationship between population density and organisational survival chances. Following the conceptual study of Kuilmann et al. (2009) and the findings by Dowell and David (2011), the study at hand argues that these inconsistent results regarding the effect of density imprints on an organisation's chances of survival are likely to be due to different degrees of already-established institutional patterns and experiences of the organisational forms under investigation. In the following paragraphs, the density delay effect on all organisations within four populations of organisations in north, central, and south Thuringia (a state in East Germany) will be analysed. The organisations under scrutiny were founded between 1990 and 2005 (i.e., right after the transformation of the former German Democratic Republic (GDR) from a socialistic to a free-market economy). The four observed populations can be distinguished according to the degree of relatedness of their “genes” to organisational forms that already existed in the former GDR. The study proposes that the effect of population density at the time at which an organisation is founded differs depending on this relatedness. More specifically, this research investigates whether or not the novelty of organisational forms affects the relationship between population density and organisational survival chances. In contrast, the competitive effect of a high population density at the time at which

an organisation is founded is—at least to some extent—counterbalanced for organisational forms with a high degree of novelty. For instance, a high population density for these organisations is also beneficial since it increases the population experiences regarding, for example, the type of organisational design that the environmental selection process prefers. As a result, the organisations' survival chances are less affected.

The study is organized as follows: In the following section, information about the history of the former GDR and some details about the populations under investigation will be provided. Then, arguments from the organisational ecology approach will be applied to develop the hypotheses. Thereafter, the data and the methods will be introduced. Finally, the results of the regression models will be presented and discussed at the end of the study.

## 2. Theoretical Background and Hypotheses

### 2.1 *From socialism to capitalism – Four types of organisational forms in the GDR*

Transition economies, such as the former GDR, provide an excellent opportunity for analysing the evolution of populations of organisations in the aftermath of radical institutional change. Nevertheless, the number of studies that apply organisational ecology arguments to research on transition economies is relatively low (for exceptions, see, for example, Dobrev, 2000, 2001, whose analysis, however, stopped in 1992; see also, to some extent, the work by Wyrwich and Krause (2011), who only partly focused on ecological arguments, though). Transition economies are found in countries in Central and Eastern Europe, which, after having had a central planning regime, have been transformed into market economies (Chikan/Demeter, 1995; Filatotchev et al., 2001; Lizal et al., 2001). In socialistic (centrally planned) economies, firm production (as well as the price of products), for example, is controlled by the government which affects all major sectors of an economy (Nuti et al., 1988; Collier, 1990; Steiner, 2010). In this context, the former GDR is specifically interesting: First, it was the most affluent and economically successful of the Eastern European countries. Second, while countries in Eastern Europe joint China in an attempted escape from the central planning regime, the GDR remained in this tradition (Bryson, 1990). Third, the economic system of the former GDR was instantaneously converted to a Western-style market-based economy with the unification of East and West Germany in 1990. In comparison, the process of transformation in other East European areas has been more gradual and continuous.

This study focuses on four populations of organisations that differ in their degree of similarity to organisational forms that existed during socialism. The four populations were defined out of a full sample that contains all kinds of

organisations operating in a specific region. While the definitions of these populations are less accurate than in most recent studies on organisational ecology—that is, the populations include not only one very specific organisational form but, rather, bundles of very similar organisational forms—the research design seems appropriate for this study. Laws during the GDR strongly affected and controlled two of the industries, namely the insurance and the real estate sectors. Consequently, established blueprints of these organisational forms became obsolete immediately after the transformation in 1990. The two other populations are based on organisational forms and sub-forms that did exist in the GDR in a very similar way, for example, newly-founded firms following the reunification of Germany could rely on established blueprints, well-proven routines, and procedures. Differences among the four organisational forms in the former GDR and those established following the reunification of Germany are summarized in Table 1. The four organisational forms that are addressed in this study are as follows:

(1) Hotels and restaurants exhibit an organisational form that has existed for hundreds of years all over the world. The basic products and services that hotels and restaurants provide, such as rooms, food, and beverages for guests, have remained the same; likewise, the demand for these products and services has been roughly the same in both capitalistic and socialistic societies. Therefore, hotels and restaurants have been, at least to some extent, able to rely on the population experiences and structures that former GDR organisations established. For example, jobs and qualified employees were present in similar numbers in the capitalistic West and in socialist East Germany. Such experienced employees served as conduits of knowledge, expertise, and experience: In 1990, 2% of all employees in East Germany worked in the hotel sector, compared with 1.9% in West Germany. After the transformation of East Germany, trained employees were available, and the relevant infrastructure, such as the suppliers, already existed. To summarize, organisations founded in this industry after the reunification show a strong relatedness to the organisational form that already existed in the former GDR. Existing knowledge and routines could generally be applied after the reunification.

(2) The second population includes organisations related to land transport, including railways, as well as passenger and freight transport on the roads. Similar kinds of organisational forms already existed in the former GDR. In this industry, the basic services remained constant; in the former GDR, logistics was already an essential function of the economy (Federal Statistical Office, 1990), and the logistics sector was well established. For example, similar to the hotel and restaurant industries, many people in the former GDR were employed in the transport sector. In 1991, 5.2% of all employees in East Germany worked in this sector, compared with 3.2% in West Germany. Even if the high number of employees who already possessed the required qualifications may have resulted

in a lower degree of productivity and efficiency, many potential employees were available following the reunification. In sum, in this industry, too, new organisations founded after the reunification could pursue many existing routines and procedures.

(3) The population of insurance and financial intermediary organisations includes security brokers and fund managers, insurance agents, and insurance brokers. Although insurance companies and related financial services existed in the former GDR, only two governmental organisations provided them: namely, the GDR's state insurance company (*Staatliche Versicherung der Deutschen Demokratischen Republik*) and the travel and reinsurance company of the GDR (*Auslands- und Rückversicherungs-AG der Deutschen Demokratischen Republik*). Based on paragraph 12 of the constitution of the GDR, both organisations were state-owned. Competition did not exist since the state clearly divided the insurance market between these two insurance organisations. Therefore, organisations that were founded in this industry after the reunification of Germany could not rely upon the experiences of a broad population of organisations because the wide range of insurance products that are typical in capitalistic societies were not developed. Further, Western-style insurance agents and insurance brokers were unknown in the former GDR. Again, focusing on qualified employees as carriers of knowledge and of know-how, right after the reunification in 1990, only 1.1% of all employees in the former GDR worked in the insurance and financial intermediation industries (i.e., all in the state-owned insurance companies). In West Germany, the number of employees in this industry was about three times higher and was spread over 700 insurance companies and thousands of self-employed insurance agents (Hoppenstedt, 1990; Parmentier et al., 1994). In addition, the knowledge and experience that employees had accumulated during their employment in state-owned insurance companies was nearly worthless, or even a handicap, during the integration of these employees into the newly-founded insurance organisations following reunification (i.e., their knowledge was essentially obsolete) (Hüning/Thielecke, 1994). Moreover, while in West Germany, the insurance agent, banker, and tax consultant, etc., professions were well known; in the GDR, all of these professions were merged and subsumed into a single educational program. Hence, the knowledge and expertise of employees in insurance agencies in the GDR was not only obsolete to a large extent, but it also was not as specialized as that of their West German colleagues. Additionally, insurance companies that were founded after reunification were strongly profit-oriented, while the GDR's state-owned insurance organisations focused on collective aims. To summarize, the organisational forms of insurance companies and insurance brokers were novel in East Germany after the country's transition to a market economy.

(4) The fourth population is comprised of real estate organisations, including real estate agencies and real estate management. Under socialism, living space was typically built and allocated by or for the state, so private organisations belonging to this population were non-existent. In the former GDR, laws for the creation and distribution of living space were in effect (summarized in the regulations for *Wohnraumlenkung & Wohnungswirtschaft* of the Department of Justice of the GDR). Moreover, based on paragraph 37 of the constitution of the GDR, all citizens were guaranteed living space for themselves and for their families. Rent was not a function of supply and demand; rather, it was determined by the government. While private ownership of houses and flats was possible, the state fixed the prices (§9 SHP, Socialistic Housing Policy [*Sozialistische Wohnungspolitik*]). Additionally, for private individuals, the land for building was free (§7 SHP). Therefore, organisational forms, such as today's real estate brokers or commercial real estate management companies, did not exist in the GDR. Hence, experience and knowledge regarding how to run a capitalist real estate organisation was relatively minimal immediately following the reunification of Germany in 1990. In summary, this form can also be characterized as a novel organisational model that spread after the reunification.

*Table 1: Differences between the organisational forms in the former GDR and the novel forms after the reunification of Germany*

Organisational form	In the former GDR	After the reunification of Germany
Hotels and restaurants	Regional limited competition	National and international competition (changes in the market strategy) Increased importance of economic efficiency for organisational success (changes in the market strategy and the mission statement)
Land transport	Regional limited competition Weak relevance of economic success	National and international competition (changes in the market strategy) Increased importance of economic efficiency for organisational success (changes in the market strategy and the mission statement)

Activities auxiliary to financial intermediation	Only two state-owned insurance organisations exist	The organisational form of insurance companies and insurance brokers, as well as their wide range of products, was totally new for the East German economy. Therefore, the new organisational form differed from the former GDR forms in all organisational core features—that is, in their mission statement, governance structure, market strategy, and core technology (referring to product innovations and portfolio)
Real estate activities	Living space was built and allocated by the state	Profit-oriented real-estate organisations focusing on the development and selling of real estate, as well as real estate agencies, were relatively unknown after the reunification of Germany. However, the new organisational form differed from the former GDR forms in all organisational core features—that is, in their mission statement, governance structure, market strategy, and core technology (referring to product innovations and portfolios)

## 2.2 Hypotheses

Questions regarding market entry and exit due to competition and the existence (or nonexistence) of institutional claims are often analysed in accordance with the density dependence theory (e.g. Hannan/Freeman, 1987, 1988; Carroll/Hannan, 1989a, 1989b; Hannan/Carroll, 1992; Baum, 1995; Lomi, 2000; Dobrev, 2000, 2001; Wezel/Lomi, 2003; Wezel, 2005; Dobrev/Kim, 2006; Dobrev/Gotsopoulos, 2010; Lomi et al., 2010) and recently opened the door for organisational ecology research in the field of strategic management (Geroski et al., 2010; Zhou/van Witteloostuijn, 2010; Peng, 2012). Following the general density dependence theory, which focuses on the contemporaneous effects of population density, the density delay argument, which refers to the imprint of conditions based on population density, states that the degree of density at an organisation's founding has a deceleration effect on organisational survival chances (Carroll/Hannan, 1989b; Lomi/Larsen, 1996; Lomi et al., 2005). These studies propose that the time lag between cause (high density) and effect (high mortality risk) creates the often observed, inversely u-shaped density curve of population evolution.

Following Stinchcombe's (1965) imprinting argument, population density at the time of an organisation's founding may have a lasting effect on the length of its life cycle. Organisations founded at the peak of a population life cycle show higher mortality risks, which persist even after the number of organisations has declined (Hannan/Carroll, 1992). Two major arguments support such a relationship. First, organisations founded in periods of high population density are faced with resource scarcity and stronger competition, both of which subsequently lead to strong selection pressure. Because recovering from organisation deprivation that occurred during the founding process is difficult, organisational failure rates tend to be persistently high (Kuilmann et al., 2009). Second, high population density at the time of an organisation's founding leads to tight niche-packing (Carroll/Hannan, 1989b). As new entrants in a population usually cannot compete with already established population residents, they tend to be pushed to the margins of resource distribution. When operating in such environments, young organisations develop routines that decrease their ability to operate in a more fecund area of the market space later on (Kuilmann et al., 2009). Following these general arguments concerning the delayed effects of population density on the survival chances of organisations, it is hypothesized:

*H1: The survival chances of newly founded organisations decrease with an increasing population density at the time of their founding.*

Even if the aforementioned hypothesis has been frequently tested (for an overview, see Carroll/Hannan, 2000; Núñez-Nickel/Moyano-Fuentes, 2004), the question remains as to whether or not the density delay argument applies to all kinds of populations in the same way. McKendrick et al. (2003), for example, studied the global population of disk array producers between 1986 and 1998. In their analysis, they found no significant effect of population density on an organisation's chances of survival at the time of its founding. In addition, a study on Dutch audit firms between 1884 and 1939 did not support the density delay argument (Bogaert et al., 2006; for similar findings, see Carroll/Swaminathan, 1992; Wholey et al., 1992; Dobrev et al., 2006). Moreover, some studies do not find consistent results regarding density delay effects. Barnett (1997), for example, analysed breweries and telephone companies in the United States. Although Barnett's findings for the brewery industry indeed support the density delay argument, telephone companies seem to take advantage of a higher population density rate at the time of their founding. Moreover, several authors propose that such a positive density delay effect is not at all surprising. Their major argument, also known as the trial-by-fire hypothesis, proposes that organisations founded during periods of intense competition learn intensely from both their own experiences and those of their cohorts. In this way, they not only reach the level of resistance to competition that organisations founded under more benign conditions enjoy, but they also overshoot and become more resistant (Swaminathan, 1996; Greve/Rao, 2006).

These divergent results suggest that the density delay argument may not apply to all kinds of populations to the same extent (Kuilmann et al., 2009). The study at hand argues that the inconsistent results may be due to differences in industry development, such as different stages of population evolution. In general, organisational evolution is driven by new entrants to populations of organisations that better fit the particular environmental requirements, as well as by the dissolution of organisations that no longer fit those requirements. Since organisations are characterized by structural inertia, which decreases the likelihood of fundamental change with age (Hannan/Freeman, 1984), founding conditions play an important role in organisational success. New entrants to populations of organisations are established according to the blueprints, rules, and routines of organisations that already exist in the population (i.e., they copy or imitate successful organisations or the templates of successful organisations). However, novel forms of organisations (new populations) lack a well-established master copy or blueprint of how to design a successful organisation; in other words, it is unknown what a successful organisation looks like. In contrast, newly founded organisations in a group or population of an older organisational form can rely on blueprints, rules, and regulations that are more highly evolved. For those mature organisational forms, significant improvements and developments are rather rare. Moreover, it is not only the population that develops and carries experiences and knowledge, but also the institutional environment that continuously collects information regarding a novel organisational form. For example, the educational system “learns” what abilities and skills the new organisational form requires and requests.

Subsequently, in populations at different evolutionary stages (i.e., relatively old populations and populations representing relatively new organisational forms), the intensity of the effect of population density at the time of an organisation's founding on its long-term survival chances differs. According to the density delay effect described in Hypothesis 1, high population density at an organisation's founding generally decreases that newly founded organisation's chances of survival (for exceptions, see the overview of Greve/Rao, 2006). However, this effect should be less harmful in populations with novel forms, as a high population density not only increases resource scarcity and competition but also provides opportunities for organisations to copy the best elements of different nascent organisational designs from a larger pool of organisations. For organisations with novel forms, an increasing number of organisations that join the population supports the evolution of a dominant blueprint and thus increases the amount of population experience (Haveman, 1993; Miner/Haunschild, 1995; Ingram/Baum, 1997; Baum/Ingram, 1998; Miner et al., 1999).

Of course, also for novel organisations, a high degree of population density at their founding implies strong competition and resource scarcity. However, the potential for considerable advancements and improvements in the organisational

design is much higher for organisations with novel forms compared with organisations with well-established forms. With an increasing stock of population experience and knowledge, however, the effect of population learning becomes slower. In populations with older or better-established organisational forms, the effect of learning through the population's accumulated experiences is lower (i.e., small advancements rather than large innovations are made in the organisational form).

In summary, the study argues that the negative effect of high population density on an organisation's survival chances at the time of its founding is moderated by the degree of novelty in the form of an organisation. It is proposed that for organisations in developed populations (i.e., organisations in which the blueprints have already matured) a high degree of population density at their founding is more harmful than it is for organisations with novel forms. Subsequently:

*H2a: The negative effect of high population density at the founding of an organisation is moderated by the novelty of the organisational form.*

Following the arguments explained in the previous paragraphs, the effect of the novelty of organisational forms should decrease with an increasing stock of population experience: In the first years following the transformation of the GDR, experiences with the insurance and the real estate sectors were lacking. Consequently, a high population density at the founding of organisations within these populations was less harmful (see the arguments leading to Hypothesis 2a). However, over time (i.e., in the late 1990s and the beginning of the 20<sup>th</sup> century) the advantages of having a novel organisational form that counterbalances the negative effect of a high population density decrease. This argument is in line with Hypothesis 2a. Organisational forms with high degrees of novelty following the reunification also mature over time. Consequently, the initial positive effect of form novelty decreases as the form matures—and the stock of population experiences increases (Haveman, 1993; Miner/Haunschild, 1995; Ingram/Baum, 1997; Baum/Ingram, 1998; Miner et al., 1999). Observing a 15-year-period after the reunification allows one to analyse the effect of form maturity. Therefore I hypothesize:

*H2b: The positive moderating effect of organisational form novelty on the negative effect of a high population density at the founding of an organisation diminishes over time.*

### 3. Data and Methods

#### 3.1 Data selection and data collection

The sample used for empirical testing is based on a dataset of 36,930 organisations registered at the Chamber of Commerce in Erfurt (in the area of

middle and north Thuringia, Germany), between January 1, 1990, and December 31, 2005. In Germany, all firms in the trade and industry sectors have to register at their regional chambers of commerce by law. Subsequently, the data set includes all registrations and de-registrations of organisations in the industry sectors under discussion: (1) hotels and restaurants, (2) insurance and financial intermediation, (3) real estate, and (4) land transport. In this context, the registrations and de-registrations of organisations at the Chamber of Commerce can be seen as dates of organisational founding and closing (Brüderl/Schüssler, 1990). However, some specific cases of organisational de-registration were not taken into consideration (i.e., the closure of organisations that were registered twice, subsidiaries of organisations, organisations that changed their chamber of commerce districts, or cases in which the founder moved and did not leave a forwarding address) (for a similar approach, see also Oertel/Walgenbach, 2012).

### **3.2 Dependent variable**

*Organisational survival.* The exact date of the organisation's registration and de-registration is essential to the analysis and included for all organisations in the dataset. Based on the date of closing, a dichotomous dependent variable "organisational survival" was coded—1 for organisations that failed in the observation period, 0 for organisations which continued to exist at the end of the observation period.

### **3.3 Independent variables**

*Density.* To measure the delayed effect of population density on the survival chances of newly founded organisations, a variable "density" measuring the number of organisations within a population at the time of the founding of new organisations was defined. As this variable can take a wide range of values, the logarithm of the density variable in the analysis of the study was applied.

*Degree of relatedness.* Following the aforementioned differentiation of organisational forms based on the degree of relatedness to past organisational forms, a variable "Novel Form" was defined. For hotels and restaurants, as well as land transport (i.e., organisational forms that show clear degrees of relationship to ancestors in the GDR) the variable held the value 0. Meanwhile, for novel organisational forms (i.e. firms in the insurance, financial intermediation, and real estate sectors) the variable was given the value of 1.

### **3.4 Control variables**

*Organisational size.* Earlier studies in organisational ecology have shown that the size of an organisation influences its survival chances (Aldrich/Auster, 1986; Ranger-Moore, 1997). In order to control for the effect of organisational size, a

variable “size” that includes eleven categories<sup>1</sup> was defined: 0, 1–3, 4–6, 7–9, 10–19, 20–49, 50–99, 100–199, 200–499, 500–999, and more than 1000 employees, at the time of the founding of an organisation. Using the founding size of the organisation, the study follows Geroski et al.’s (2010) line of reasoning. They argued that the founding size is especially important since it serves as a proxy for the start-up’s initial resource capabilities. Moreover, Droutriaux (1992) showed that a firm’s initial size tends to be a major determinant of its future size.

*Legal Form.* In addition, the dataset contains information about the legal form of the organisations under analysis. In all, the dataset includes 35 different categories, most of which have a relatively small number. However, based on the basic differentiation between corporations, private companies, and small tradesmen, three different groups of legal forms were defined. Small tradesmen were coded as 0 (e.g., *Kleingewerbetreibende*), private companies (e.g., *Offene Handelsgesellschaften [OHGs]* and *Kommanditgesellschaften [KGs]*) as 1, and corporations (e.g., *Gesellschaften mit beschränkter Haftung [GmbHs]*) as 2. Based on German corporate law, these categories were defined according to the degree of formalization of the legal forms. Not included in our analysis were Associations (*Vereine*), foundations (*Stiftungen*), and foreign legal forms (for a similar approach, see Oertel/Walgenbach, 2012).

## 4. Methodology

To test the hypotheses, a piecewise constant exponential model was used (Box-Steffensmeier/Jones, 2004; Cleves et al., 2004; Blossfeld et al., 2007). This model is a simple generalization of the general exponential model and requires an exponential form for the baseline hazard. In contrast with most applications of transition rate models, the piecewise constant exponential model accounts for the time-dependence of processes and covariates (Powers/Youn, 2009). For example, as hypothesized in H2b, the effect of form novelty varies over time. In contrast with the general exponential model, the piecewise constant model allows one to split the observation period into several sub-periods and to analyse changes in organisations’ mortality risk over time. Therefore, even if an exponential distribution is assumed in each episode, base rates may vary freely across them: This is what makes the piecewise constant exponential model very flexible and broadly applicable.

## 5. Results

Figure 1 shows the density distribution of the four populations in the sample. The absence of a shakeout was potentially due to the specific situation of

<sup>1</sup> These categories were already included in the dataset. More detailed information about the number of employees was not available.

transformational economies in which most industry developments are set back to zero. In such situations, shakeouts may not be observed because of the sudden and strong demand for products and services, as well as the relatively small number of organisations providing these products and services. Moreover, Figure 1 shows that after a short period of increasing population density—the increase was relatively extreme when taking into account that population density for some industries (as for example in the case of insurance and financial intermediary organisations) was very low in the GDR—the degree of population density remains relatively constant over time (an exception is the real estate sector, which shows relatively constant growth rates in population density until 2005).

Figure 1: Density distribution between 1990 and 2005

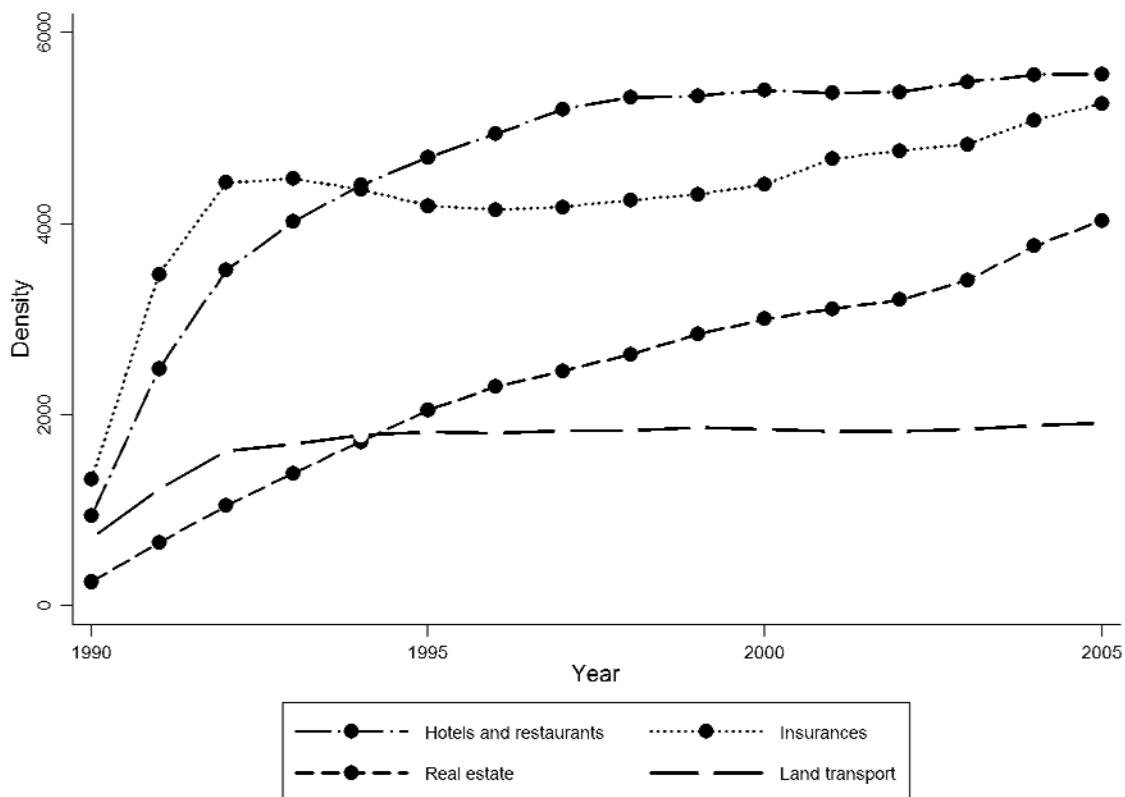


Table 2 presents the means, standard deviations, and total number of cases, as well as the minimum and maximum values of the variables used in the later analysis. Moreover, table 3 shows detailed descriptive statistics for each industry in the sample. Overall, 59% of the organisations under analysis were closed within the observation period. The average age of the organisations is about five-and-a-half years. The differentiation between the founding cohorts shows that at the beginning of the 1990s in particular, many organisations were founded. This boom can be attributed to the so-called “gold rush fever” right after the reunification of Germany.

*Table 2: Descriptive Statistics*

Variable	Mean (S.D.)	Min	Max	N
Death	.59 (.00)	0	1	21650
Organisational age (years)	5.41 (.02)	1	16	199799
Founded 1990-1992	.30 (.00)	0	1	11094
Founded 1993-1995	.19 (.00)	0	1	7139
Founded 1996–1998	.16 (.00)	0	1	5952
Founded 1999–2001	.15 (.00)	0	1	5356
Founded 2002–2005	.20 (.00)	0	1	7389
Density at the founding of an organisation (ln)	8.05 (.00)	7.65	8.63	297289.50
Density at the founding of an organisation with a novel organisational form (ln)	4.14 (.02)	0	8.57	152929
Size	.42 (.01)	0	10	15388
Legal form	.23 (.00)	0	2	8319
Location	.48 (.00)	0	1	17766
Hotels and restaurants	.37 (.00)	0	1	13773
Activities auxiliary to financial intermediation	.34 (.00)	0	1	12380
Real estate activities	.18 (.00)	0	1	6654
Land transport	.11 (.00)	0	1	4123

Table 3: Descriptive Statistics – Industry Differences

		Hotels and restaurants	Activities auxiliary to financial intermediation	Real estate activities	Land transport	Total
Death	Mean	.64	.61	.44	.57	.59
	S.D.	.48	.49	.50	.49	.49
	Min	0	0	0	0	0
	Max	1	1	1	1	1
	N	8760	7595	2930	2365	21650
Organisational age (years)	Mean	5.11	5.31	5.57	6.43	5.41
	S.D.	4.34	4.69	4.22	4.92	4.52
	Min	1	1	0	1	1
	Max	16	16	16	16	16
	N	70396	65797	37075	26531	199799
Founded 1990 – 1992	Mean	.26	.38	.16	.40	.30
	S.D.	.44	.49	.37	.49	.46
	Min	0	0	0	0	0
	Max	1	1	1	1	1
	N	3614	4746	1065	1669	11094
Founded 1993 – 1995	Mean	.20	.18	.20	.20	.19
	S.D.	.40	.38	.40	.40	.39
	Min	0	0	0	0	0
	Max	1	1	1	1	1
	N	2739	2235	1354	811	7139
Founded 1996 – 1998	Mean	.19	.13	.18	.13	.16
	S.D.	.39	.33	.38	.34	.37
	Min	0	0	0	0	0
	Max	1	1	1	1	1
	N	2640	1587	1184	541	5952

Founded 1999 – 2001	Mean	.15	.13	.17	.12	.15
	S.D.	.36	.34	.38	.32	.35
	Min	0	0	0	0	0
	Max	1	1	1	1	1
	N	2115	1609	1147	485	5356
Founded 2002 – 2005	Mean	.19	.18	.29	.15	.20
	S.D.	.40	.38	.45	.36	.40
	Min	0	0	0	0	0
	Max	1	1	1	1	1
	N	2665	2203	1904	617	7389
Density at the founding of an organisation (ln)	Mean	8.30	8.24	7.66	7.28	8.05
	S.D.	.47	.38	.64	.35	.59
	Min	6.85	7.19	5.53	6.56	5.53
	Max	8.62	8.57	8.30	7.55	8.62
	N	114343 .70	101973.3 0	50955. 69	30016.8 9	297289 .50
Density at the founding of an organisation with a novel organisation form (ln)	Mean	0	8.24	7.66	0	4.14
	S.D.	0	.38	.64	0	4.04
	Min	0	7.19	5.53	0	0
	Max	0	8.57	8.30	0	8.57
	N	0	101973.3 0	50955. 69	0	152929
Size	Mean	.59	.09	.45	.77	.42
	S.D.	.96	.34	.93	1.37	.90
	Min	0	0	0	0	0
	Max	7	5	9	10	10
	N	8100	1113	2991	3184	15388
Legal form	Mean	.16	.05	.63	.32	.23
	S.D.	.54	.31	.93	.73	.63
	Min	0	0	0	0	0
	Max	2	2	2	2	2
	N	2197	605	4179	1338	8319

Location	Mean	.43	.51	.58	.40	.48
	S.D.	.49	.50	.49	.49	.50
	Min	0	0	0	0	0
	Max	1	1	1	1	1
	N	5897	6355	3855	1659	17766

Regarding the results of the regressions in Table 4, Hypothesis 1 finds support. Model 1 shows that with an increasing degree of population density at the time of an organisation's founding, that organisation's chances of survival decrease ( $\beta = 0.245$ ,  $p = 0.01$ ). This result is robust and significant across all models. Hypothesis 2a states that the density delay effect is mediated by the relatedness of an organisational form to earlier organisational forms. The results of model 2 support this hypothesis ( $\beta = -0.156$ ,  $p = 0.01$ ). While the survival chances of start-ups in general decrease with an increasing degree of population density at the time of their founding, this effect is positively moderated for organisations representing a novel form. This result may be due to the evolutionary process of organisational form establishment: early entrants either could not rely at all, or could rely only partly, on population experiences regarding what type of organisational design was preferred in the environmental selection process, while later entrants were able to rely on these experiences. In order to give further support to the argument that a high density at the time of organisational founding is less harmful for novel forms, the mortality risk for organisations with novel forms over different cohorts is analysed in model 3. The model supports hypothesis 2b and shows that the mortality risk related to organisations with novel forms was relatively high at the beginning of the 1990s (e.g. for organisations founded between 1990 and 1992,  $\beta = 0.138$ ,  $p = 0.01$ ) but decreased over time (e.g. for organisations founded between 2002 and 2005,  $\beta = -0.115$ ,  $p = 0.01$ ). This finding also supports the argument that the effects of population density on organisations rely on population experiences with the selection process accumulated from the past. Because of these experiences (i.e., a more sophisticated stage of organisational form evolution and the emergence of advantageous organisational blue prints) organisations with novel forms founded in late cohorts have better survival chances than do organisations with novel forms founded in early cohorts.

The effects of the control variables size and legal form show the expected findings. With an increasing founding size for organisations, mortality risk decreases. Moreover, the mortality risk of corporations is lower than that of private companies which itself is again lower than that of simple tradesmen.

Table 4: Regression Results

	(1) H1	(2) H2a	(3) H2b
< 3 years	-3.649*** (0.117)	-4.235*** (0.149)	-3.443*** (0.119)
3-6 years	-4.137*** (0.117)	-4.721*** (0.149)	-3.927*** (0.120)
6-9 years	-4.469*** (0.118)	-5.054*** (0.149)	-4.260*** (0.121)
9-12 years	-4.732*** (0.120)	-5.317*** (0.151)	-4.525*** (0.123)
12-15 years	-4.981*** (0.126)	-5.567*** (0.156)	-4.778*** (0.129)
Founded 1990-1992	0.0181 (0.0197)	0.0301 (0.0198)	-0.0654** (0.0276)
Founded 1996-1998	-0.0518** (0.0217)	-0.0574*** (0.0217)	0.0103 (0.0292)
Founded 1999-2001	-0.111*** (0.0238)	-0.110*** (0.0238)	-0.0133 (0.0325)
Founded 2002-2005	-0.266*** (0.0270)	-0.261*** (0.0270)	-0.200*** (0.0374)
Density_ln	0.245*** (0.0141)	0.318*** (0.0181)	0.219*** (0.0143)
Novel Form	-0.136*** (0.0140)	1.113*** (0.190)	-0.129*** (0.0285)
Density_ln * Novel Form		-0.156*** (0.0237)	
Novel Form * Founded 1990-1992			0.138*** (0.0366)
Novel Form * Founded 1996-1998			-0.133*** (0.0434)
Novel Form * Founded 1999-2001			-0.190*** (0.0470)
Novel Form * Founded 2002-2005			-0.115** (0.0524)
Size	-0.108*** (0.00919)	-0.111*** (0.00923)	-0.112*** (0.00925)
Legal Form	-0.146*** (0.0131)	-0.154*** (0.0132)	-0.145*** (0.0131)
Observations	79,356	79,356	79,356
Log Likelihood	-45,747.661	-45,726.155	-45,706.531
Subjects	36,930	36,930	36,930

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1; Standard errors in parentheses; Reference category: Founded: 1993-1996

## 6. Discussion and conclusion

This study applied the density dependence theory of the organisational ecology approach to analyse how an organisation's reliance on ancestor organisational

forms moderates the effect that population density at an organisation's founding has on its chances of survival. Results show that an increasing degree of population density at the founding of an organisation decreases its survival chances, while this density delay effect is less harmful for novel organisational forms. Newly founded organisations with novel forms are usually faced with the problem of unproven and less-matured blueprints. With a high number of operating organisations, it is possible for start-ups with novel organisational forms to evaluate which specific structures and features make an organisation successful. They can rely on proven organisational elements from the novel organisational forms (i.e., the maturing process of a novel organisation has begun).

The results of the study have implications for further research in organisational theory, especially for the concept of density delay and the analysis of organisational "genes" or form relatedness. Earlier research on density delay has focused mainly on developing theoretical arguments and on empirically testing the basic argument (in this study, hypothesis 1). However, following the argumentation of Kuilman et al. (2009), earlier studies did not ask why populations differ in terms of the effect that the degree of population density has on the survival chances of newly founded organisations. The results of this study provide an explanation for this phenomenon since it shows that the novelty of the organisational form (i.e., the degree of relatedness of organisational forms to earlier established organisational forms) strongly influences the density delay effect. This explanation is in some ways related to a Lamarckian view of evolution rather than to the generally proposed Darwinian approach. From a Darwinian view, it is generally proposed that renewal in populations of organisations results from the closure of organisations that no longer meet environmental requirements and from the establishment of new organisations that do meet these requirements. From this perspective, variations in organisational forms often stem from chance or accident. However, if this "new" variation fits well with environmental requirements, new entrants will copy it, and consequently, the composition of the population will change over time. However, it seems to be the case—especially in transition economies—that some kinds of knowledge and experiences are carried and passed on in a population even if specific forms of organisations no longer exist. This argument is in line with the evolutionary approach of Jean-Baptiste de Lamarck, who proposed that specific characteristics of species are passed on from one generation to another. While the Lamarckian theory is rather unsupported in biology, it seems to fit well with organisational theory and may help to explain phenomena in which specific features and structures are passed from one organisational form to another.

Moreover, the study applies organisational ecology arguments to analyse organisational survival chances in transition economies. While research on

transition economies only paid scant attention to this approach, specific arguments, such as density dependence or imprinting, offer fruitful explanations that could help to explain organisational development in the formally socialistic states of Europe. In contrast, while a few studies in organisational ecology already use the quasi-experimental research setting resulting from a radical institutional change after the Fall of the Iron Curtain in 1990 (see, for example, the studies by Dobrev [2000, 2001] on the Bulgarian newspaper industry), the great potential that Central and East European countries and firms offer in advancing ecological ideas has not yet been sufficiently recognized. Consequently, this study is one more attempt to develop a theory that would be both beneficial for transition economy research and organisational ecology.

With regard to strategic management, the study's results have implications for the question of when an organisation should enter emerging markets. Results show that, in general, entering markets is beneficial as long as the degree of population density is low. High degrees of population density usually have a negative delayed effect on the survival chances of new entrants. However, this strategic implication differs depending on the novelty of the organisational form of the entrant. When new entrants are unable to rely on established organisational forms, the negative effect of high population density upon founding is less harmful.

## 7. Limitations

While this study is a first step regarding a better understanding of the effect that organisational form relatedness has on the influence of population density at the founding of an organisation, the study has some limitations. First, in order to increase the understanding of the influence of organisational form relatedness on the survival chances of organisations, a more detailed analysis is needed. For example, future analysis should not only focus on how "gene" relatedness between present and past organisational forms influences the density delay effect, but also on what kinds of "genes" influence this interdependence, and to what extent. Moreover, it would be of high interest to find a more detailed and more differentiated measure of novelty. While in this study I applied a very rough measure based on a dummy, future studies should evaluate the results presented in this study by approaching more fine-grained measures of novelty. Second, as already mentioned within the study, the definition of the populations is less specific than in most recent studies in the field of organisational ecology. Also, if such a classification is reasonable in this context, future studies may consider defining populations of organisations more specifically by distinguishing between different organisational forms in more detail. Third, coming up with the discussion of a Lamarckian view of organisational evolution, the study does not show if, how, and what kinds of features and characteristics are passed from one organisational form to another during the

time of transformation. However, these questions are difficult to answer with large-scale quantitative datasets. Subsequently, the idea of a Lamarckian evolution may be a good starting point for future studies—especially those studies which focus on transition economies—that apply a qualitative research setting. Finally, a deeper analysis of the effects of population experience and knowledge on the survival chances of organisations was not possible since the information about the organisations in the dataset is not sufficiently detailed. However, such information is needed to answer the question regarding what kinds of organisational competences are especially important for organisational survival compared with those that are not. Therefore, further studies should try to analyse—again, for example, on a qualitative basis—what features, apart from the novelty of the organisational form, may influence the effect of population density on the chances that an organisation will survive.

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