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Why are some regions entrepreneurial jump-starters?

Michael Wyrwich

Abstract

Previous research on market economies characterized by stable framework conditions shows that several regional factors determine start-up activity. Not much is known about what drives entrepreneurship in unstable environments characterized by significant institutional changes that affect the availability of entrepreneurial opportunities. To fill this gap, this paper focuses on post-communist regions in which start-up activity was basically nonexistent under socialism but significantly more in evidence after the institutional shock of introducing a market economy. It is argued and shown that the allocation of talent into productive entrepreneurship is higher in areas abundantly endowed with individuals who have a relatively high ability to detect viable entrepreneurial opportunities, as indicated by their qualification, and in regions home to a population that is characterized by a high alertness toward opportunities, as indicated by remnants of an entrepreneurial culture that pre-dates socialism. How institutional context affects entrepreneurship over the course of transition is reflected by the negative relationship between urbanization and entrepreneurship that presumably has to do with ill-devised socialist urban planning policies. The regional application of the theory on institutions and entrepreneurship outlined in this paper shows that an entrepreneurial rebound after an adverse large-scale shock accompanied by massive structural change and economic dislocation is most pronounced in areas with a strong human capital basis and a regional culture that favors entrepreneurship.

JEL-Classifications: L26; R1; P25

Keywords: Entrepreneurship, regional knowledge, transition

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1 Introductory remarks on instability in context and regional determinants of entrepreneurship

Entrepreneurship is a crucial element of regional development (e.g., Carree et al., 2002; Acs and Armington, 2004) but it is not equally distributed across space. Some places are fertile breeding grounds for entrepreneurship; others are entrepreneurial laggards. Several scholars investigate regional differences in entrepreneurship (e.g., Reynolds et al., 1994; Armington and Acs, 2002; Fritsch and Falck, 2007), and they all discover that entrepreneurship is a “regional event” (Feldman, 2001).

Differences in the level of new business formation across space are due to several factors, chiefly industry structure, knowledge, agglomeration externalities, and entrepreneurial culture (for extensive literature reviews, see Bosma et al., 2008; Sternberg, 2009; Stam, 2010). Because the regional milieu changes slowly changing over time, so does start-up activity. This implies that regions with a high level of new firm formation in the past will also have a high level of start-up activity in the future and, indeed, this is found to be the case in studies of established market economies for time spans of 10–20 years (e.g., Fritsch and Mueller, 2007; van Stel and Suddle, 2008; Andersson and Koster, 2011). One characteristic of these studies is that the framework conditions and thus the amount of entrepreneurial opportunities are stable throughout the period of analysis.

Not much is known about the role played by regional conditions in start-up activity when the level of entrepreneurial opportunities changes significantly due to instability in the general framework conditions. Such instability can be caused by natural catastrophes or terrorist attacks; for example, after the September 2001 terrorist attacks in New York City, there was an increase in local business founding rates (Paruchuri and Ingram, 2012). World War II is an example of a large-scale event during which the structural regional milieu and, consequently, previous source of entrepreneurial opportunity were destroyed in several areas. Another illustration of instability in context is institutional upheaval as reflected by the transition from socialism to a market economy in Eastern Europe in the late 20th century, during which

there was a transition from an institutional regime hostile to entrepreneurship (Earle and Sakova, 2000) to an economic system where entrepreneurship is a source of economic development and change (e.g., Audretsch and Thurik, 2001; Baumol, 2004).

These examples show that instability in context is more the rule than the exception over the course of history, thus calling for a new zeitgeist in regional entrepreneurship research that goes beyond stable framework conditions and short time periods, an approach that accounts for Schumpeter's plea to consider history in entrepreneurship studies (Schumpeter, 1947, 1949). This requires historically informed appreciative theorizing (Feldman, 2001) like that demonstrated in vivid analyses of the exceptional entrepreneurial breeding grounds of Silicon Valley in the United States (e.g., Saxenian, 1994; Kenney and Patton, 2005), the Cambridge cluster in the United Kingdom (e.g., Garnsey and Heffernan, 2005), and the Gnosjö region in Sweden (e.g., Wigren, 2003).

The focus of the aforementioned case studies is on the role of the formal and informal institutional context for shaping entrepreneurial places over time. Such a historically informed institutional approach can also be applied in a multi-regional setting. A starting point is acknowledging the role of institutional arrangement in the allocation of entrepreneurial talent, which is vividly demonstrated in the seminal contribution by Baumol (1990) on entrepreneurship in different historical epochs. By "institutions" is meant the formal "rules of the game" as reflected by rules, laws, and constitutions; informal institutions are norms, conventions, and manner in which a society conducts itself. Informal institutions can persist despite changes in the formal framework (e.g., North, 1990; 1994). The formal framework provides the entrepreneurial opportunities (e.g., Baumol, 1990; Henrekson, 2007); informal institutions, such as attitude toward entrepreneurship and alertness to opportunity, determine their exploitation (e.g., Beugelsdijk, 2007).

In one of the few historically informed multi-regional approaches, one focused on U.S. regions, Glaeser et al. (2012) posit that it is the long-term persistence of informal institutions, such as local entrepreneurial attitude, that explains the finding that proximity to historical mines (and the accompanying

business climate) affects entrepreneurship negatively. The persistence and resilience of regional differences of entrepreneurial culture in the face of severe changes in the formal institutional framework is demonstrated by Wyrwich (2012), who finds that remnants of the pre-socialist regional entrepreneurial culture in the German Democratic Republic (GDR) influence start-up activity positively after another disruptive shock event—transition to a market economy. The enduring effect of such an informal institution despite radical changes in the formal “rules of the game” is also indicated by van Stel and Cieslik’s (2012) analysis of entrepreneurship in Eastern Europe.

The latter examples demonstrate that transition from socialism to a market economy provides an intriguing opportunity to study entrepreneurship against the background of disruptive institutional change. This paper shows that spatial differences in the allocation of talent for productive entrepreneurship in such transition environments are affected not only by the entrepreneurial awareness of the local population but also by the region’s endowment of actors with a relatively high ability to detect opportunities. In this respect, this research applies the historically informed theorizing on the role of institutions for the level and mode of entrepreneurial activities as advocated by scholars such as Baumol (1990) to the regional dimension. The paper also demonstrates how institutions shaped the role of regional conditions in making certain places entrepreneurial jump-starters after dissolution of the Soviet system.

The intriguing natural experiment of German reunification is exploited for an empirical analysis. This event was accompanied by the wholesale transfer of West Germany’s extant institutional framework to the eastern part of the country, which was an exogenous institutional shock (Brezinski and Fritsch, 1995). This natural experiment has been the focus of a great deal of work (e.g., Fritsch, 2004), but it continues to hold much potential for further investigation and, indeed, this paper is the first to examine how and which regional conditions influenced entrepreneurship in the wake of German reunification. The paper focuses on the role played by regional human capital and entrepreneurial culture, both of which reflect ability and awareness of the local population to disengage from existing socialist economic structures by

starting firms. Further, the role of urbanization in providing entrepreneurial opportunities is investigated.

The empirical results show that the employment share of a highly-qualified workforce just before transition has a positive influence on the emergence of entrepreneurship. This effect works through regional differences in the human capital of the local population and its members' ability to detect entrepreneurial opportunities. The analysis also reveals that remnants of entrepreneurial culture have a positive effect on start-up activity just after transition. In addition, this paper demonstrates the dynamic self-reinforcing nature of this cultural effect, something previously analyzed only in a stable context (Andersson and Koster, 2011). The findings suggest that entrepreneurial culture is a crucial, resilient, region-specific informal institution that survives significant historical discontinuities.

Another finding of this study is that population density has a negative effect on start-up activity, which is in sharp contrast with many findings for the United States and Western Europe. An explanation for this result has to do with urban adjustment processes and accompanying negative externalities in response to ill-devised socialist regional development strategies. Thus, population density is a case in point for the role of institutional context in mediating the role of regional conditions for entrepreneurship.

Altogether, the empirical results show that there are systematic effects of regional conditions on entrepreneurship even when there is a severe rupture with the past. This is discussed in more detail in the following section. The third section introduces the data, measurements, and methods employed in the empirical analysis. The results are highlighted in Section 4 and general lessons for research and policy are touched upon in Section 5.

2 Conceptual thinking about a general framework of regional entrepreneurship

To properly understand regional phenomena such as differences in entrepreneurship, the institutional and historical context needs to be considered (Hess, 2004; Welter, 2011). However, there is not much assessment of historic and institutional context in previous studies that take a multi-regional

perspective since their focus is on cross-sections, short time periods, and stable environments. Thus, Schumpeter's (1947, 1949) call to assess history in the study of entrepreneurship is rarely reflected in analyses of entrepreneurship across space.

One way to rectify this situation is by considering the role of disruptive change when studying entrepreneurship. Such a change is understood here as a major historical shock resulting in severe disturbance of trajectories or a rapid change in regional and/or supra-regional (institutional) conditions. Examples of major shocks include natural catastrophes and civil wars but also institutional upheaval as occurs where there is a rapid change in the general conditions of economic activity (Newman, 2000). Such ruptures with the past can be investigated from at least two angles.

First, one can explore regional differences in entrepreneurship over longer time periods that include a great many of both incremental and path-breaking ruptures, as analyzed in the work by Fritsch and Wyrwich (2012), who find that self-employment rates across German regions in the mid-1920s have an effect on start-up activity 80 years and a great many shocks later. Their results indicate that this persistence in entrepreneurship is driven by an enduring positive regional entrepreneurial climate. Such long-term analyses help in understanding the persisting influence of regional entrepreneurial resources. A second approach is to study entrepreneurial phenomena in the immediate aftermath of disruptive change and investigate the role of regional conditions in entrepreneurial rebound. The following section illustrates the intriguing opportunities such an analysis can present by using as an example of the collapse of communism in the late 20th century, which was a radical institutional upheaval in many respects, not the least for entrepreneurship.

2.1 Start-up activity across regions and institutional upheaval

The transition from a socialist centrally planned economy to a market economy was an institutional upheaval that substantially increased the number of entrepreneurial opportunities. Under communism, entrepreneurship was prohibited, which resulted in low self-employment rates (Acs and Audretsch, 1993). Over the course of transition, a window of opportunity opened. Demand was especially high for consumer goods, which had been in short sup-

ply under communism. Therefore, it was relatively easy to find a market niche and there was a surge in start-up activity (Smallbone and Welter, 2001). Once the entrepreneurial race was underway, pronounced regional differences became visible (e.g., Barjak, 2001; Berkowitz and De Jong, 2005; Welter, 2007).

This difference in regional rates and success of entrepreneurship suggests that regional factors have an effect on the development of entrepreneurship in transition economies. It could be argued that some regions within socialist planned economies could have been entrepreneurial breeding grounds if such activity had been encouraged by policy makers. Put differently, if institutional conditions for starting a firm had been more favorable for allocating entrepreneurial talent toward starting ventures under socialism, in some regions a great many local actors would have chosen to become business owners. When the institutional context changed, these potential entrepreneurs did indeed start firms. Similarly, individuals with a high endowment of entrepreneurial ability and preference for entrepreneurship could have been more entrepreneurial in some regions under socialism anyway but turned their talent to the shadow economy (Aidis and van Praag, 2006) or took entrepreneurial initiative within state-owned enterprises or even within socialist mass organizations (Rona-Tas, 1994). This reasoning is in line with Baumol (1990), who emphasizes the crucial role of institutional arrangements for the allocation of entrepreneurial talent into different forms of entrepreneurial activity, of which starting a firm is just one example.

When the formal institutional conditions for (productive) entrepreneurship became more favorable, the structural makeup of the regional economic landscape may have provided generic assets that evolved into specific ones appropriate for the emergence of start-up activity in a way similar to the process that leads to the emergence of new industries in particular regions (e.g., Scott and Storper, 1987; Storper, 1995; Boschma and Frenken, 2003). Local resources might be seen as regional bundles that could be recombined by economic actors after severe ruptures and used to shape regional development paths (Bathelt and Boggs, 2003). After the fall of the Iron Curtain, these assets and resources might have been “recycled” by entrepreneurs for use in starting firms. This reasoning is in line with Garud and Karnøe’s (2001) notion

that entrepreneurs attempt to disengage from structures while reusing resources. Indeed, entrepreneurs are claimed to be the chief actors when it comes to breaking new paths and following new trajectories in a transition context (McMillan and Woodruff, 2002).

Regional differences in the emergence of entrepreneurial activity are thus possibly related to, first, the appropriateness for reuse of generic assets and resources and, second, the presence of potential entrepreneurs able to reuse them. In a sense, the quality of the initial structural configuration and the entrepreneurial ability and alertness to opportunities of the local population should have a positive influence on the surge in new business formation after transition. Given a high quality of assets and resources, purposefully deviating actors (Garud and Karnøe, 2001) may more easily have disengaged from these structures via detecting an entrepreneurial opportunity.

The question might arise as to whether the (re)-emergence of start-up activity in a highly unstructured transition environment is an outcome of random “historical accidents” or driven by systematic conditions that became favorable after the switch to a market economy. Intuitively, the “usual suspects” in stable market economies are a good starting point for developing hypotheses in this regard. These “usual suspects,” or “factors,” include regional industry structure, regional knowledge base, population density, and entrepreneurial culture (see Bosma et al., 2008; Sternberg, 2009; Stam, 2010). The following section explains in more detail how these factors matter during the institutional upheaval of transition.

2.2 Regional initial conditions

One driver of entrepreneurship in established market economies is the regional knowledge base. The knowledge spillover theory of entrepreneurship argues that knowledge and, particularly, the regional “sticky” knowledge base, is an important conduit for start-ups. According to the theory new firms are a crucial channel for commercializing spillovers from regional institutions of knowledge production like universities (e.g., Acs et al., 2009). Empirical evidence indicates that the regional stock of knowledge has indeed a signifi-

cant positive effect on the regional level of start-up activity (e.g., Armington and Acs, 2002; Fritsch and Mueller, 2007).¹

However, socialist countries followed different technological paths than those taken by the Western world. They implemented peculiar systems of knowledge and innovation production (e.g., Bentley, 1992; Radosevic, 1999; Kattel et al., 2009; Stokes, 2000). For example, under socialism, the transformation of technology into products was organized by a linear model. The knowledge origin and diffusion followed the top-down principle, and public institutions and companies were the main drivers of research and development (R&D) and innovation activity. The reorganization of knowledge production and innovation activity after the breakdown of socialism was accompanied by a massive reduction in financial and other resources. In the first years after transition, R&D employment decreased on average to 50 to 20 percent of what it had been under socialism (Meske, 2000). Thus, effect of knowledge spillovers on entrepreneurship or as means for the development of new business ideas can be largely ruled out. Nevertheless, regional knowledge as measured by the share of highly-qualified workers might be some indication of the number of potential entrepreneurs with an above-average ability to detect entrepreneurial opportunities.

It is true that during the transition knowledge about markets and how to serve them (Shane, 2000) barely existed and a great deal of work-related human capital acquired in socialism depreciated (e.g., Bird et al., 1994; Gathmann, 2005; Wyrwich, 2013). Nevertheless, people with a higher level of formal education might be more likely to detect entrepreneurial opportunities during the course of transition since formal human capital in general enhances entrepreneurial judgment and is associated with a higher ability to detect viable entrepreneurial opportunities (e.g., Brüderl et al., 1992; Davidsson and Honig, 2003; Parker, 2009, 113–119). Thus, despite their lack of market knowledge, highly educated persons might have been more likely to recognize the “window of opportunity” for starting a firm during the period of transi-

¹ One of the reviewers correctly pointed out that the total number of start-ups might not be an ideal measure for knowledge-spillover-relevant entrepreneurship. Thus, one might not necessarily find an effect like in the cited studies.

tion and been more willing to take the risk of starting their own venture than other workers.

Highly skilled entrepreneurs might have started firms under socialism had the formal institutional framework been more inviting. According to survey evidence from the early 1990s, highly skilled East German entrepreneurs claimed retrospectively that they would have started their venture under the old regime if they had had the opportunity (Thomas, 1996; Koch and Thomas, 1997). Thus, the change in the formal institutional framework motivated these people to opt for an entrepreneurial career. These survey data also suggest that formal technical knowledge was helpful in recombining and re-using existing generic resources. However, higher-qualified individuals also might have started promising firms in sectors that did not require much in the way of technical knowledge, but looked rewarding when the window of opportunity opened (e.g., private-sector services, retailing). Thus, assuming that formal education enhances an innate ability to judge viable entrepreneurial opportunities, a high share of highly skilled workers should have a positive effect on start-up activity.

H1: The initial share of highly qualified workforce has a positive effect on start-up activity in the first years after transition.

Given that the role of knowledge spillovers and the accumulated regional stock of knowledge are parsimonious at best, the transition context allows measuring the importance of alternative mechanisms of entrepreneurship, such as the geography of individual human capital, that are confounded by other knowledge mechanisms in established market economies.

In addition to its share of people with above-average ability to detect entrepreneurial opportunities, the alertness to entrepreneurial opportunities exhibited by a region's population will have an impact on the amount of entrepreneurial talent directed toward new firm formation after a change in formal framework in favor of entrepreneurship. In general, this alertness is determined by the degree to which entrepreneurship is socially accepted (Etzioni, 1987). Recently, Wyrwich (2012) showed that the share of self-

employed people just before the fall of the Iron Curtain is an indicator of entrepreneurial culture that has a positive effect on start-up activity in East Germany as long as 10 years after transition. The share of self-employed people under socialism is an appropriate indicator because evidence shows that this share is related to the pre-socialism entrepreneurial traditions of regions (Fritsch and Wyrwich, 2012). Moreover, it reflects regional variation in the share of people who chose private economic activity even when they lived in an environment hostile toward entrepreneurship (De Soto, 1995) and marked by decades of anti-capitalist indoctrination. In short, not only is it hard to imagine a system more hostile toward entrepreneurship than socialism (Earle and Sakova, 2000), it is also hard to imagine a system in which it could be more obvious that opting for self-employment reflects a pronounced entrepreneurial attitude (for more details, see Wyrwich, 2012). Therefore, this entrepreneurial residue matches the common definition of entrepreneurial culture as a collective trait in favor of entrepreneurship (Beugelsdijk, 2007).

However, what effect do these remnants of entrepreneurial culture have on emerging entrepreneurship in the face of transition and over time? To answer this, it is helpful to consider the conceptual framework developed by Andersson and Koster (2011). In their conceptualization, the amount of new firm formation across regions over time is modeled as an outcome of slowly changing (structural) features of the regional milieu and individual response mechanisms finding their root in previous start-up activities, namely, role model and peer effects.

The microeconomic foundation of the latter trigger mechanism is that entrepreneurial role models reduce ambiguity about entrepreneurship because, by observing others, potential entrepreneurs acquire information and entrepreneurial skills. Having an entrepreneurial role model increases the likelihood of becoming an entrepreneur oneself. Thus, current entrepreneurship has a positive effect on further start-up activity. Therefore, entrepreneurship becomes self-reinforcing over time, resulting in an increasing number of entrepreneurs in the region and a positive regional entrepreneurial attitude (e.g., Fornahl, 2003; Westlund and Bolton, 2003; Minniti, 2005). The reduction of ambiguity and “learning by example” might have been even more important in the extremely unstructured transition environment. Thus, people

might be particularly prone to seek out for role models when searching for a strategy to cope with the challenge of transition.

Similarly, the initial share of self-employed people in 1989 not only reflects social acceptance of entrepreneurship and a higher alertness to entrepreneurial opportunities, but also indicates the number of people who may have been perceived as role models. Therefore, a positive effect of the entrepreneurial residual in 1989 on start-up activity after transition is expected. The emerging level of start-up activity, in turn, might then positively affect follow-up start-up activity due to self-reinforcing effects of entrepreneurial culture.

H2: The self-employment rate in 1989 has a significant positive effect on start-up activity.

H3: Previous start-up activity has a positive influence on current start-up activity.

The regional structural conditions in which entrepreneurs are embedded and the opportunities they provide also play a role in the allocation of entrepreneurial talent. Thus, an investigation of population density in the transition context could provide some insight into the topic at hand. In established market economies, density generally has positive effects, for example, diversity and availability of specialized inputs, as well as access to larger markets (e.g., Armington and Acs, 2002; Glaeser, 2007). Urbanization fosters new ideas and serendipitous meetings of people with diverse educational and professional backgrounds, which increases the likelihood of entrepreneurial opportunities (Jacobs, 1969). Cities also attract creative people. Cultural creativity and social diversity result in a milieu that attracts other talented individuals, which in turn spurs other forms of creativity, such as entrepreneurship (e.g., Lee et al., 2004; Audretsch et al., 2010). Nevertheless, there can be negative effects of urbanization, too, such as increased competition for scarce resources, which might negatively affect entry (Arauzo-Carod and

Teruel-Carrizosa, 2005). Most studies find a positive effect of urbanization on start-up activity (e.g., Reynolds et al., 1994; Armington and Acs, 2002; Fritsch and Falck, 2007).

However, urban areas in socialist countries on the eve of transition were vastly different than their Western counterparts due to ill-devised socialist urban planning policies. This, in turn, was felt by tremendous urban adjustment processes such as suburbanization and industrial relocation processes from inner-cities to the urban hinter-land took place in post-socialist countries. Moreover, by the time of transition, the physical infrastructure of cities was in disrepair (e.g., Berentsen, 1992; Andrusz et al., 1996; Häussermann, 1996; Ott, 2001; Stanilov, 2007). Such a situation was not conducive to the proper working of positive urbanization externalities. Further, by definition, the market-mediated linkages that foster such externalities were nearly absent in a centrally planned economy. In other words, density in a socialist system is not the same and does not have the same effects as it does in a market economy environment. Indeed, due to urban adjustment processes, it is expected that density in post-socialist environments is negatively related to entrepreneurship. Since these processes should become less over time and positive externalities slowly begin to emerge, the negative effect observed should become smaller over time.

H4: Population density is negatively related to start-up activity in the first years after transition.

H5: The relationship between population density and start-up activity becomes less negative over time.

In summary, the allocation of entrepreneurial talent might be driven by the regional entrepreneurial culture, the regional share of highly qualified workers, and population density. Certainly, there are other factors that might affect the emergence of entrepreneurship, such as initial industry structure, that

should be assessed in an empirical analysis. To this end, the following section outlines an empirical strategy to test the hypotheses.

3 Institutional upheaval: an empirical assessment

3.1 The case of East Germany

The empirical analysis focuses on East Germany, the former socialist German Democratic Republic (GDR), which is especially well-suited for an analysis of the role of initial conditions for entrepreneurship. In contrast to other transition countries, a ready-made institutional framework was transferred to the region (Brezinski and Fritsch, 1995). This exogenous transition shock rules out influences of endogenously evolving institutional effects on start-up activity. Entrepreneurship in East Germany just before transition was comparable to that in other countries of the socialist bloc (Acs and Audretsch, 1993). There were only 184,600 self-employed individuals (approximately 1.8 percent of the working-age population), who were mainly producing for the private consumer market in 1989 (for details, see Pickel, 1992). After the fall of the Berlin Wall, entrepreneurial opportunity increased radically and start-up activity was extremely high in the early 1990s, although there were pronounced regional differences (Fritsch, 2004; Welter, 2007; Schindele, 2010).

3.2 Data and measurement

Data on start-up activity are from the Firm Foundation Panel (ZEW, 2009) of the Centre for European Economic Research (ZEW). The panel is based on data provided biannually by Creditreform, the largest German credit-rating agency (for more details, see Almus et al., 2000). The data contain virtually all entries in the German Trade Register and are available from 1990 onward.² Data on regional conditions stem from a unique dataset that contains information on East German NUTS 3 regions (counties) in regard to industry structure, employment qualification, population structure, and the number of self-employed people. All data come from the GDR Statistical Offices (for a description of the original data, see Rudolph, 1990; Kawka, 2007). Unfortu-

² Marginal start-ups that do not apply for capital and are not included in the trade register are not reported. Since the analysis is interested in viable start-ups, this underreporting is not problematic.

nately, some data for East Berlin are lacking. However, it is not appropriate for this analysis due to its merging with West Berlin. Any effects of proximity to Berlin on adjacent East German NUTS 3 regions are captured in the analysis by a location marker.

Using these data, proxies for the regional knowledge base, population density, and entrepreneurial culture are constructed. Population density is measured by dividing the population in 1989 by area size. Similar to previous accounts, the residue of entrepreneurial culture is measured by the share of self-employed persons in 1989 (Wyrwich, 2012). The stock of regional knowledge in 1989 is measured by the share of employees with a tertiary degree within the total workforce (for definitions, see Table A.1). These people are regarded as possessing higher innate ability to detect entrepreneurial opportunities and judge their viability.

Knowledge spillovers from R&D activity are unlikely to have taken place because the entire system of knowledge production was in disarray, as was also the case in other transition economies (Mayntz, 1995). Nevertheless, highly educated people might have been more likely to recognize the “window of opportunity” wherever it opened. Thus, focusing on a knowledge-intensive subsample of start-ups would overlook entrepreneurial activity engaged in by people with an above-average ability to detect viable opportunities. Nevertheless, it might be that positive effects of regional human capital on start-up activity are confounded by regional differences in “pure” necessity start-ups, and thus this is controlled for in the econometric analysis.

3.3 Descriptive insights

The employment share of highly skilled workers, as well as extent of entrepreneurial residue, varies substantially among regions (see Table 1). Start-up activity is negatively correlated with population density, which, in turn, is highly correlated with the amount of regional human capital, reflecting that knowledge workers are concentrated in urban areas (see Table 2). This suggests that the effect of knowledge and density on start-up activity are confounded, a possibility that requires careful empirical assessment.

Table 1: Initial regional conditions: Summary statistics

	Mean	S.D.	Min	Max
Start-Ups	1,005.795	661.137	230	5.234
Start-Up Rate	12.074	3.120	5.181	27.607
Population Density (log)	5.288	1.099	3.775	8.069
Regional Human Capital	0.054	0.027	0.018	0.176
Entrepreneurial Culture	0.018	0.006	0.004	0.034
Population (20–64) (log)	11.227	0.405	10.347	12.789

Table 2: Initial regional conditions: Correlation matrix

	[1]	[2]	[3]	[4]	[5]
[1] Start-Ups					
[2] Start-Up Rate	0.414***				
[3] Population Density	0.273***	-0.224**			
[4] Regional Human Capital	0.289***	-0.027	0.651***		
[5] Entrepreneurial Culture	0.214**	0.336***	-0.272***	-0.378***	
[6] Population [20-64]	0.837***	0.088	0.210**	0.198**	0.189**

Notes: Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Figure 1 reveals that start-up activity in East Germany was extraordinarily intense in the early 1990s, indicating the presence of a “window of opportunity.” The figure shows the start-up rate as measured by the number of start-ups in 1990 divided by the regional workforce in 1989. In 1990, just after the fall of the Berlin Wall, regional differences in start-up rates are pronounced. Figure 2 shows that there are some clusters of high start-up activity around Berlin and in the southwest of the former GDR (state of Thuringia). The region around Berlin might have benefited from proximity to the largest German city. There is no similar effect for regions adjacent to West German states. Regions in the southwest have a comparatively high pre-socialist entrepreneurial tradition (Wyrwich, 2012). Whether there is a systematic relationship between initial conditions and start-up activity is tested by regression analysis.

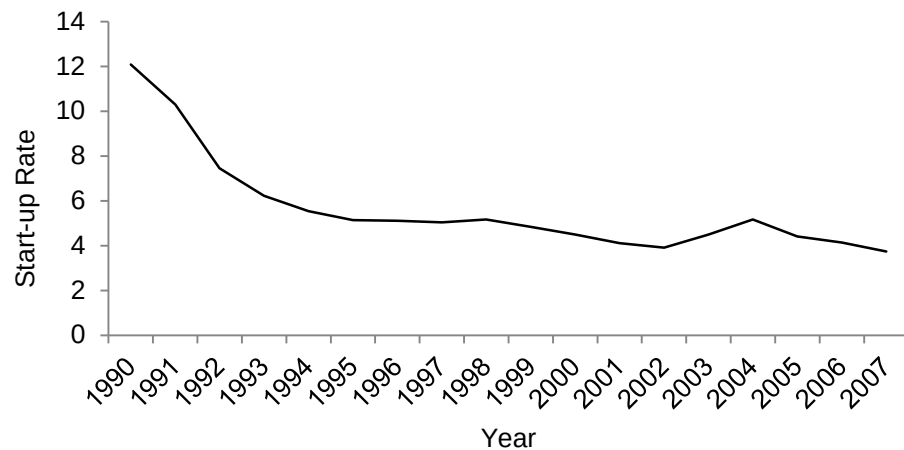


Figure 1: Start-up activity in East Germany over time (1990–2007)

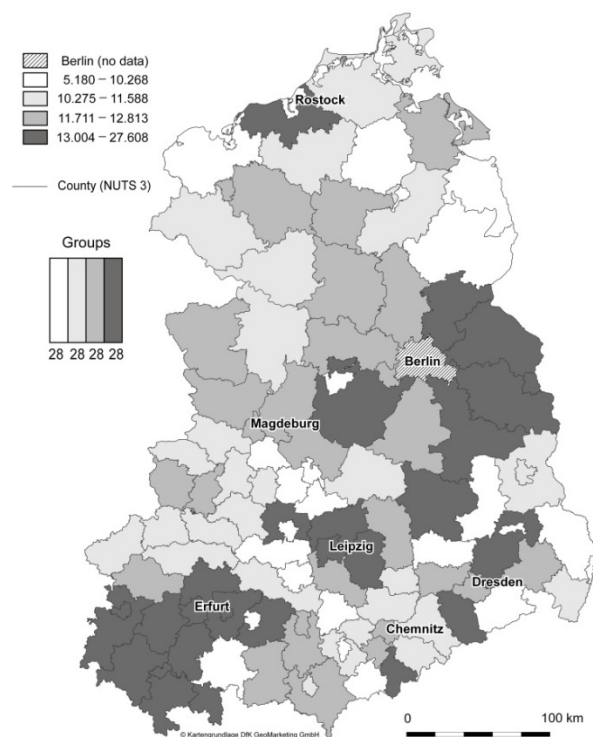


Figure 2: Regional distribution of start-up rates in 1990 (number of start-ups/1,000 people)

4 Results

The dependent variables employed in this analysis are the number of start-ups and the start-up rate. The level of start-up activity after transition is primarily explained by initial conditions in 1989. For the number of start-ups, a negative binomial approach is employed. The assumption of a negative bi-

nomial approach is that the counts result from a stochastic Poisson-type process (Hilbe, 2007). The problem of zero inflation can be ignored because every region had at least one start-up. The results are compared to those from standard OLS models on the start-up rate.

The regression analysis is threefold. First, it is focused on the year 1990, the year after the fall of the Berlin Wall in November 1989. Second, the period between 1990 and 1994 is analyzed, which can be regarded as the initial stage of transition during which the main privatization and restructuring activities took place³ and when start-up activity was extremely intense (see Figure 1). This analysis assesses the dynamic character of entrepreneurship. The initial transition period is the focus of the empirical analysis. In a final step, an analysis of start-up activity for later years is presented as an extension showing how regional conditions affected start-up activity after general framework conditions and the annual level of start-up activity stabilized.

4.1 1990: Start-up activity in the face of disruptive change

In the first models the effect of initial regional conditions in the year 1989 on entrepreneurship in 1990 is investigated (see Table 3). This model controls for industry structure, which is crucial since a high share of highly qualified employees might simply reflect that the industrial activity of a region required a certain amount of knowledge. Such a region might have good-quality generic assets that entrepreneurs could reuse and recombine via spin-offs. Such reallocation of capital and labor from former state-owned enterprises to new start-ups was a central mechanism of structural change (Jurada and Terrell, 2003). The role of industry structure is captured by the employment shares of eight industries. The distinction might appear crude, but it is a reasonable one since many of the former state-owned enterprises had a high de-

³ Most of the privatization of former state-owned enterprises took place during this period.

gree of vertical integration (e.g., Johnson and Loveman, 1995), making it difficult (if not meaningless) to apply a more detailed classification.⁴

Controlling for industry structure also captures the risk of becoming unemployed. Specifically, some industries were more competitive than others and therefore had better survival prospects during the course of transition (Rudolph, 1990). Assessing initial industry structure also addresses concerns that the entrepreneurial residue in 1989 might be a reflection of entry conditions in regional industries just before transition, albeit this is rather unlikely from a conceptual point of view (Wyrwich, 2012).

Regional economic integration (with West Germany) is also controlled for by employing a dummy variable that indicates whether a region shares a border with West Germany and a dummy variable indicating a border with Berlin. Differences in regional policies, for instance, political interference in the privatization process of state-owned assets are captured by state-fixed effects.

The results for start-up activity in 1990 reveal a pronounced negative effect of population density, whereas there is no effect of regional knowledge (see Table 3, Column I/II). As previously mentioned, the correlation between knowledge and density is high. Therefore, in additional model specifications the share of knowledge is not considered. This does not affect the significant negative effect of density.⁵ However, the coefficient of density is larger, which suggests that controlling for the regional stock of knowledge mediates the negative effect to some degree.⁶ In an alternative specification, instead of density a dummy variable indicating whether the NUTS 3 region is a district-free city (an area comprised of a city but no rural communities) is introduced. This is a more direct measure of the adjustment processes of (post)-socialist cities. This variable reflects a positive effect of knowledge. Models without

⁴ No distinction can be made between the private sector and the state sector of for service industries with the dataset at hand. However, only 2.3 percent of the total employment in 1989 worked in the private service sector (Statistical Yearbook of the GDR, 1990). Many services were directly integrated into state-owned manufacturing enterprises or served by separate units, which were most often also state-owned (e.g., hotels, most restaurants, and even vineyards). The first private vineyard was founded on July 1, 1990 in the south of Saxony-Anhalt.

⁵ Alternative models reveal that the density effect remains negative when omitting controls for industry structure. Results are available upon request.

⁶ The high degree of correlation does not allow for meaningful results of interaction effects of knowledge and density.

the city regions yield similar results (see Table A.2). Correlating the start-up rate in 1990 with the share of knowledge workers in the upper part of the distribution of population density reflects a highly significant positive correlation (see Table A.3).

The results for the year 1990 suggest that there is some positive effect of regional human capital that is confounded by negative effects of density. Further, the effect of entrepreneurial culture is significant and positive. Unreported tests confirm that this finding is not sensitive to controlling for industry structure. Thus, regions with large remnants of entrepreneurial culture had an edge over other regions in the matter of level of entrepreneurship. However, in contrast to what is suggested by Figure 2, regions did not particularly benefit from co-location with East Berlin, which is another indication of the less favorable influence urbanization had on start-up activity. There is also no effect for regions adjacent to West German states.⁷

4.2 Start-up activity over time

To analyze start-up activity in the initial stage of transition between 1990 and 1994, the data are pooled. Additionally, year fixed effects are considered. The denominator of the start-up rate is kept fixed. Using the number of the workforce of the respective years would create two problems. First, the denominator itself might be affected by initial regional conditions. Second, using the initial number overcomes the theoretical problem that founders have typically lived in the region for quite some time, allowing them to build network relationships and/or achieve access to local resources (e.g., Stam, 2007; Micchelaci and Silva, 2007).⁸ In the analysis, the workforce in 1989 is used as an indicator based on the assumption that people do not move to a region for the purpose of starting a firm there. This 1989 workforce is also used as independent variable in the count data models.⁹

⁷ The same results emerge when controlling for clustered robust standard errors (control for spatial autocorrelation) and when relating the proxies of entrepreneurial culture and regional knowledge to the total regional employment in 1989 instead of to the population aged between 20 and 64 years.

⁸ One of the rare studies on regional differences of entrepreneurship that discusses these issues is Boente et al., (2009).

⁹ The results do not change when taking the actual workforce as denominator. However, model fit and significance levels for the variables of interest are lower. Results are available upon request.

The results for the pooled data reveal that the negative effect for population density is lower than for the year 1990 when assessing the years 1990 to 1992 and lowest when extending the period of analysis to 1994 (see Table 3, Columns III–VI). The effect of regional human capital is clearly positive in this time period. Further, sharing a border with Berlin now has a positive effect. Thus, these findings indicate that the adverse effects of urban adjustment processes decrease with time. Another finding is that the effect of the entrepreneurial residue remains significant. Surprisingly, sharing a border with West German states has a negative effect on start-up activity.¹⁰ The results and trends are similar when separate regressions are run for each year instead of pooled cross-sections (not reported). An extension of this analysis to the period 1990 to 2006 shows that the initial level of regional human capital and entrepreneurial culture have an enduring long-term effect (see Table A.4). The effect of the latter becomes stronger over time, suggesting that there is a self-reinforcing effect of entrepreneurial culture, for instance, via start-up activity (see also next paragraphs on dynamic assessment).

One problem with the above analyses is that short-term and long-term effects of initial regional conditions may have not only a continuing influence on start-up activity but also affect regional conditions. Thus, regions with favorable initial conditions might have restructured in a favorable way, which, in turn, might have been conducive to start-up activity. This possibility can be addressed with dynamic panel data approaches.

¹⁰ It could be that for people in these areas starting a firm was less attractive since the opportunity costs of entrepreneurship were higher due to the availability of better paid jobs within commuting distance in West Germany.

Table 3: Start-up activity in the initial stage of transition (1990–1994)

	I	II	III	IV	V	VI
	1990		1990-92		1990-94	
	NegBin	OLS	PNegBin	POLS	PNegBin	POLS
Regional Human Capital	0.0778 (0.0637)	0.0979 (0.0657)	0.0916*** (0.0309)	0.104*** (0.0307)	0.125*** (0.0262)	0.142*** (0.0261)
Entrepreneurial Culture	0.206** (0.103)	0.247** (0.111)	0.219*** (0.0493)	0.250*** (0.0489)	0.233*** (0.0375)	0.267*** (0.0373)
Population Density	-0.0915*** (0.0278)	-0.0843*** (0.0305)	-0.0624*** (0.0144)	-0.0574*** (0.0139)	-0.0474*** (0.0111)	-0.0417*** (0.0107)
Population (20–64)	1.077*** (0.0590)	- -	1.049*** (0.0283)	- -	1.063*** (0.0219)	- -
Border	-0.00785 (0.0584)	-0.0252 (0.0597)	-0.0470 (0.0287)	-0.0575** (0.0268)	-0.0400* (0.0212)	-0.0474** (0.0198)
Berlin	0.0269 (0.0767)	0.0421 (0.0771)	0.0682* (0.0410)	0.0770* (0.0404)	0.120*** (0.0335)	0.132*** (0.0330)
Observations	112		336		560	
WaldChi ² /F-Value	889.03***	3.98***	4549.82***	49.34***	9367.93***	131.13***
Pseudo R ² / R ²	0.145	0.408	0.176	0.722	0.191	0.825

Notes: Robust standard errors in parentheses/ *** p<0.01, ** p<0.05, * p<0.1. The constant is suppressed. Dummies for the Federal States and the controls for industry structure are not reported in the interests of brevity. The pooled models also include unreported year dummies. All continuous variables are in log-form.

For the dynamic panel analysis, this paper follows the strategy of Andersson and Koster (AK) (2011) in their investigation of start-up rates in Sweden. An Arellano-Bond two step system GMM estimator is applied (for econometric details, see AK, 2011; Arellano and Bond, 1991). To avoid pseudo-correlation with independent variables (Fritsch and Falck, 2007), the denominator of the start-up rate is, again, the 1989 workforce.¹¹

The initial regional conditions—entrepreneurial culture, regional human capital, and population density—are introduced into this model as exogenous initial-level effects. Changes in population density are captured by a population change control that is specified as endogenous. Like in AK, lagged start-up rates are employed to capture the self-reinforcing nature of entrepreneurial culture. The self-employment rate in 1989 is regarded as the initial level of culture in this model. Unfortunately, there is no information on the development of the number of highly skilled workers and no reliable regionally stratified data on industry structure during the course of transition. So, like in AK, information on sector structure is reduced to one endogenous

¹¹ Using the actual workforce in the respective years changes the results only slightly.

indicator.¹² This is the actual share of manufacturing employment. In addition, annual employment change is controlled for, which captures regional employment prospects of regions, thus indicating the risk of becoming unemployed. This measure is not necessarily less accurate than unemployment rates based on official data since virtually every job was put at risk during the course of transition. Thus, unemployment data, which do not exist in a reliable form for the early transition period anyway, would certainly underestimate the role of necessity in a transition economy. There are also no data on GDP earlier than for 1992 but it is likely that the level and growth of GDP are a result of favorable initial conditions (for empirical evidence, see Kawka, 2007). The same is certainly true for the emergence of unemployment, which, as previously mentioned, officially did not exist under socialism.

Table 4 presents two models; one with the lagged start-up rate and one without. As in AK's analysis, the Hansen overidentification test has acceptable values for both models and the number of instruments is lower than the number of groups (regions). Thus, overfitting of endogenous variables is not an issue. The results reveal that the effect of regional human capital and the initial level of entrepreneurial culture have a positive effect regardless of controlling for lagged start-up rates. However, the negative effect of population density is only weakly significant when introducing lagged start-ups. This change in significance level is similar to AK's model when it took previous start-up activity into account. The lagged start-up rate has a significant positive effect, suggesting the presence of a self-reinforcing mechanism of entrepreneurial culture even in a highly unstructured transition environment. The results of the two-step GMM estimations are contrasted with pooled OLS and negative binomial regressions. The direction of effects is similar for the main variables of interest.¹³

The results of the static and dynamic analysis suggest that a strong regional knowledge base in conjunction with an entrepreneurial culture explains why regions are entrepreneurial jump-starters during the process of recovery and adaptation after a severe historical shock. Thus, the hypothe-

¹² Introducing the initial industry shares as exogenous variables hardly changes the results.

¹³ However, the control variables are not robust across specifications apart from the significant positive effect of sharing a border with Berlin.

ses are confirmed. The extension of the analysis presented in the following section focuses on the effect of initial conditions in later years when the environment and level of start-up activity had become relatively stable and considers aspects of the regional milieu that emerged throughout the transition process (e.g., unemployment rates).

Table 4: Dynamic analysis of start-up activity in the initial stage of transition (1990–1994)

	I PNegBin	II POLS	III GMM	IV PNegBin	V POLS	VI GMM
Lagged Start Ups (t-1)				0.0002*** (0.00005)	0.637*** (0.0471)	0.341*** (0.0968)
Regional Human Capital	0.144*** (0.0269)	0.149*** (0.0267)	0.242*** (0.0435)	0.123*** (0.0262)	0.0678*** (0.0195)	0.156*** (0.0383)
Entrepreneurial Culture	0.220*** (0.0313)	0.242*** (0.0346)	0.181** (0.0808)	0.189*** (0.0307)	0.0979*** (0.0237)	0.132*** (0.0417)
Population Density	-0.0229** (0.00961)	-0.0201** (0.0101)	-0.0436*** (0.0166)	-0.0291*** (0.00907)	-0.00228 (0.00670)	-0.0218* (0.0127)
Manufacturing (Share)	-0.171*** (0.0343)	-0.174*** (0.0354)	0.0206 (0.116)	-0.137*** (0.0335)	-0.0670** (0.0263)	-0.0228 (0.0489)
Population Change	2.311** (1.056)	2.416** (1.081)	-0.0375 (1.126)	1.948* (1.033)	1.009 (0.865)	0.892 (1.251)
Employment Change	-0.00185 (0.100)	-0.00237 (0.110)	-0.160** (0.0738)	-0.0390 (0.0933)	0.0439 (0.0638)	-0.128 (0.0863)
Berlin	0.188*** (0.0316)	0.187*** (0.0324)	0.217*** (0.0571)	0.168*** (0.0306)	0.0969*** (0.0222)	0.152*** (0.0382)
Border	-0.0640*** (0.0180)	-0.0635*** (0.0183)	-0.0385 (0.0389)	-0.0617*** (0.0169)	-0.0245 (0.0161)	-0.0253 (0.0221)
Population (20–64)	1.036*** (0.0193)			0.891*** (0.0471)		
AR(1) (p-value)	-	-	0.00	-	-	0.00
AR(2) (p-value)	-	-	0.92	-	-	0.37
Hansen test (p-value)	-	-	0.34	-	-	0.21
Number of instruments	-	-	31	-	-	45
Number of groups	112	112	112	112	112	112
Number of observations	448	448	448	448	448	448
Wald Chi ² /F-value	7454.21***	131.43***	2928.85***	6139.36***	209.97***	3224.36***
R ²	0.204	0.799		0.209	0.895	

Notes: Robust standard errors in parentheses/ *** p<0.01, ** p<0.05, * p<0.1. The constant is suppressed. Dummies for the Federal States and the controls for industry structure are not reported for the sake of brevity. The pooled models also include unreported year dummies. All continuous variables are in log-form. In the two-step GMM estimation, the standard errors are calculated in accordance with the Windmeijer correction procedure. AR(1): Test on first-order autocorrelation; AR(2): Test on second-order autocorrelation. Hansen test: test of overidentification restriction. All test statistics are unproblematic. IV-style (exogenous) variables: Berlin, Border, State and Year Dummies, Initial conditions (Regional Human Capital, Entrepreneurial Culture, Population Density). The other variables are treated as endogenous. Only the lagged levels of t-1 are used as instruments. Increasing the number of lags yields a severe overidentification problem.

4.3 Extension: Start-up activity in a later phase of transition

It is not tenable to apply the previous model specification to an analysis of later transition periods. For example, the initial share of highly qualified workers might not be a suitable indicator for the regional pool of people with above-average entrepreneurial propensity for periods starting later than five years after transition. At the same time, the change in this share might be endogenous to migration of highly skilled workers in response to regional labor market prospects that, in turn, are affected by other regional conditions such as the initial industry mix. Another issue is possible changes in the interplay between urbanization and knowledge. Therefore, regional knowledge is treated as an endogenous variable.¹⁴ It also might be interesting to investigate how aspects of the regional milieu that emerged throughout the initial stage of transition influence start-up activity. To this end, the role of unemployment and GDP growth are considered. Reliable data for the employed regional stratification are available consistently from the late 1990s onward.¹⁵ Therefore, the models focus on start-up activity after the year 2000. The endogenous regional knowledge is measured by the change in highly qualified workforce in order to avoid multicollinearity. Employment change is no longer controlled for since data on unemployment are available from the late 1990s onward. This allows constructing a start-up rate that refers to the total number of employees and unemployed people, which is a more common measure of the labor market approach (Audretsch and Fritsch, 1994).

¹⁴ Including the initial level of regional human capital as an exogenous variable yields an insignificant effect. In conjunction with the long-term effect of the initial endowment shown in Table A.4, this finding suggests that regions with high human capital restructured in a particular way that, in turn, favors start-up activity.

¹⁵ GDP data are available on a yearly basis since 1994; data on unemployment since 1996. The latter are not adjusted to territorial changes in the regional units analyzed; thus the data can be used only from 1999 onward.

Table 5: Dynamic analysis of start-up activity in later stage of transition

	I PNegBin	II POLS	III GMM	IV PNegBin	V POLS	VI GMM
Lagged Start-Ups (t-1)				0.0006*** (0.0000)	0.722*** (0.0372)	0.475*** (0.0735)
Entrepreneurial Culture	0.199*** (0.0352)	0.198*** (0.0356)	0.325*** (0.0760)	0.154*** (0.0314)	0.0576** (0.0252)	0.169*** (0.0464)
Population Density	-0.0870*** (0.00944)	-0.0920*** (0.00920)	-0.0661** (0.0266)	-0.0878*** (0.00881)	-0.0300*** (0.00928)	-0.0372** (0.0150)
Manufacturing (Share)	-0.231*** (0.0376)	-0.222*** (0.0362)	-0.226** (0.0995)	-0.162*** (0.0338)	-0.0793*** (0.0300)	-0.141** (0.0618)
Population Change	6.371*** (1.476)	5.195*** (1.411)	0.616 (1.849)	3.513*** (1.348)	1.312 (0.981)	1.034 (1.358)
Growth of Knowledge	-0.00160 (0.155)	0.00650 (0.158)	0.195 (0.190)	-0.0483 (0.142)	-0.171 (0.116)	0.0217 (0.170)
GDP Growth	-0.430* (0.233)	-0.409* (0.235)	-0.0886 (0.169)	-0.381* (0.217)	-0.185 (0.158)	-0.0275 (0.153)
Unemployment Rate	-0.282*** (0.0545)	-0.306*** (0.0545)	0.00128 (0.164)	-0.294*** (0.0497)	-0.116*** (0.0432)	0.00167 (0.111)
Berlin	0.204*** (0.0424)	0.211*** (0.0426)	0.370*** (0.113)	0.127*** (0.0376)	0.0404 (0.0302)	0.183*** (0.0677)
Border	-0.0886*** (0.0237)	-0.0932*** (0.0245)	-0.0217 (0.0549)	-0.0958*** (0.0217)	-0.0326* (0.0194)	-0.0271 (0.0331)
Number of Employees and Unemployed	0.967*** (0.0207)			0.696*** (0.0329)		
AR(1) (p-value)	-	-	0.00	-	-	0.00
AR(2) (p-value)	-	-	0.54	-	-	0.12
Hansen test (p-value)	-	-	0.29	-	-	0.33
Number of instruments	-	-	89	-	-	104
Number of groups	112	112	112	112	112	112
Number of observations	560	560	560	560	560	560
Wald Chi ² / F-value	4448.36***	49.86***	736.84***	4588.57***	128.36***	1251.64***
Pseudo R ² / R ²	0.195	0.602		0.21	0.792	

Notes: Robust standard errors in parentheses/ *** p<0.01, ** p<0.05, * p<0.1. Data restrictions allow an analysis only of the period from 2002 to 2006. The constant is suppressed. Dummies for the Federal States and the controls for industry structure are not reported for the sake of brevity. The pooled models also include unreported year dummies. All continuous variables are in log-form. In the two-step GMM estimation, the standard errors are calculated in accordance with the Windmeijer correction procedure. AR(1): Test on first-order autocorrelation; AR(2): Test on second-order autocorrelation. Hansen test: test of overidentification restriction. All test statistics are unproblematic. IV-style (exogenous) variables: Berlin, Border, State and Year Dummies, Initial conditions (Regional Human Capital, Entrepreneurial Culture, Population Density). The other variables are treated as endogenous. The lagged levels of t-1 and t-2 are used as instruments. Using more instruments weakens the Hansen test on instrument validity.

The results show that the effect of population density is still negative, similar to findings for a similar time period by Wyrwich (2012), who uses an alternative set of control variables and obtains start-up data from a different

source.¹⁶ Similarly, the effect of the initial level of entrepreneurial culture is significant and positive. The self-reinforcing effect of culture is indicated by the highly significant effect of the lagged value of the start-up rate.¹⁷ The unemployment rate has a negative effect in the pooled OLS and negative binomial regressions but not in the dynamic panel data approach. GDP and knowledge growth play no role.¹⁸ The employment share in manufacturing has a robust negative effect on start-up activity.

The extended analysis suggests that the positive effect of entrepreneurial culture and the negative density effect endure. However, for statistical and conceptual reasons, it is difficult to compare the results with the models for the early transition period. Nevertheless, findings from the empirical analysis have important implications that are discussed in the final section of this paper.

5 Summary and implications: What can be learned?

Historically informed theorizing about and assessment of institutional context is common in case study work on entrepreneurial hotspots but rare in analyses of entrepreneurial differences across space since the focus is usually on short time periods in stable institutional environments. However, a new zeitgeist in multi-regional analyses of entrepreneurship or a historical turn has the potential to reveal fresh insight, as the analysis in this paper of emerging regional differences in entrepreneurship after a significant institutional shock reveals.

The empirical results show a systematic effect of certain regional conditions on entrepreneurship in the highly unstructured environment of a transition from a socialist centrally planned to a market economy. Specifically, an

¹⁶ Using density as an endogenous variable hardly changes the results. Running the models with the lagged values of the population aged between 20 and 64, as was done in the models for the early transition period, yields an insignificant effect of density. The effects for entrepreneurial culture hardly change.

¹⁷ Endogenizing the actual self-employment rate instead of the lagged start-up rate presumably will not capture the trigger mechanism of observing what peers are doing start their ventures since the task profile of those self-employed who have been in the market for longer is expected to be much different. However, such people are included in the stock variable self-employment rate.

¹⁸ The results hardly change when using the share of highly qualified workers in the 2000s.

analysis of East German data reveals that the share of highly skilled employees had a significant positive effect on the level of start-up activity after transition. Unlike in established market economies, this measure of regional knowledge does not reflect knowledge spillovers or the existence of a pool for generating business ideas, but is instead the share of people who, on average, are more likely to detect entrepreneurial opportunities. The findings also suggest a negative relationship between population density and start-up activity, albeit one that becomes smaller over time. This reflects the crucial role of context for positive density effects. The resilience of informal institutions in the face of disruptive change in the formal institutional framework can be shown by the positive and self-reinforcing effect of entrepreneurial culture; it seems to be a truly place-specific resource that endures.

In summary, an entrepreneurial rebound after adverse disruptive change appears to be most likely and most pronounced in regions characterized by an abundance of people able to detect opportunities and a comparatively high social acceptance of entrepreneurship. However, note that the measure for regional human capital might capture favorable structural conditions other than those controlled for in the empirical analysis. Further, some people might be better at recognizing entrepreneurial opportunities even without a great deal of formal education; perhaps they have other advantages not captured here, for example, past political clout (e.g., Rona-Tas, 1994).

Nevertheless, the findings have two important implications. First, institutional stability is not necessarily a prerequisite for systematic effects of regional conditions on start-up activity. Second, a change of institutions at the national level can have varied results and reactions across the specific regions affected and these can be manifested as differences in start-up activity. The case of East Germany as analyzed in this paper is further evidence that history and how it shapes regional characteristics plays an enormous role in entrepreneurship, and that future research needs to give this relationship serious consideration.

Such work should try to integrate chance events in regional development and instability in the institutional framework into conceptual thinking to

arrive at a more comprehensive understanding of which conditions will be conducive to entrepreneurial and, by extension, economic rebound. There are practical benefits of such an exercise in the sense that “fortune favors the prepared region” (Feldman and Francis, 2003, 765). For example, the revealed resilience of entrepreneurial culture suggests that promoting an entrepreneurial climate might be a viable strategy for insulating regions against unforeseeable shocks. The prospects are intriguing and exciting, but a great deal more research is needed before we will fully understand entrepreneurship across space and beyond stable environments.

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Appendix

Table A.1: Definition of variables

Variable	Operational Definition	Data Source
Initial Stage of transition (1990-1994)		
Start-Ups	Number of start-ups	ZEW Foundation Panel/ GDR Statistics
Start-Up Rate	Number of start-ups ÷ population 20 to 64 years old in 1989	
Regional Human Capital	Share of employees with university degree aged between 20 and 64 years in 1989	GDR Statistics
Entrepreneurial Culture	Share of self-employed aged between 20 and 64 years in 1989	
Population Density	Total population in 1989 divided by area size	
Berlin	Dummy = 1 if NUTS 3 region shares a border with Berlin	Official Federal German Statistics
Border	Dummy = 1 if NUTS 3 region shares a border with West German states	
Industry structure	Employment shares of manufacturing industries (n=8) in 1989	
Manufacturing (Share)	Share of employees in manufacturing industries	Official Federal German Statistics
Population Change	Population in t ÷ population in t-1	
Employment Change	Employment in t ÷ employment in t-1	
Later stage of transition (Post-2000)		
Start-Up Rate	Number of start-ups ÷ number of employees and unemployed	ZEW Foundation Panel/ German Social Insurance Statistics
Manufacturing (Share)	Share of employees in manufacturing industries	Social Insurance Statistics
Growth of Knowledge	Share of employees with university degree in t ÷ Share of employees with university degree in t-1	
Unemployment Rate	Official unemployment rate as reported by the Federal Employment Agency	Official Federal German Statistics
GDP Growth	Level of GDP in t ÷ level of GDP in t-1	
Notes: Log-values of continuous independent variables and for start-up rate are employed. Own calculations have been applied. Variables for the later stage of transition are presented here only if the definition had changed or the variables were not been applied in the early transition analysis.		

Table A.2: Alternative models for start-up activity in 1990

	I	II	III	IV
	NegBin	OLS	NegBin	OLS
Regional Human Capital	0.123* (0.0685)	0.143** (0.0662)	0.166** (0.0794)	0.103 (0.0873)
Entrepreneurial Culture	0.203* (0.104)	0.224** (0.109)	0.307*** (0.0930)	0.246** (0.112)
Town	-0.246*** (0.0770)	-0.247*** (0.0807)		
Population Density	-	-	-0.0548 (0.0518)	-0.0864 (0.0555)
Population (20–64)	1.047*** (0.0583)		0.755*** (0.102)	
Border	0.00180 (0.0570)	-0.0133 (0.0587)	-0.0117 (0.0590)	-0.0279 (0.0656)
Berlin	0.0272 (0.0751)	0.0381 (0.0765)	0.196*** (0.0658)	0.150** (0.0715)
Observations	112	112	86	86
R-squared		0.406		0.400
Observations	112	112	86	86
WaldChi ² /F-Value	869.55***	3.92***	445.31***	3.63***
Pseudo R ² /R ²	0.144	0.406	0.111	0.400

Notes: Robust standard errors in parentheses/ *** p<0.01, ** p<0.05, * p<0.1. The constant is suppressed. Dummies for the Federal States and the controls for industry structure are not reported for the sake of brevity. The pooled models also include unreported year dummies. All continuous variables are in log-form.

Table A.3: The correlation of regional human capital in 1989 and start-up rates

	Obs	1990	1990-92	1990-94
Cities I	n=26	0.201	0.196*	0.171**
Cities II	n=17	0.632***	0.423**	0.423**

Notes: Significance levels: *** p<0.01, ** p<0.05, * p<0.1. Cities reflect the upper part of the density distribution. Cities I comprises all city regions. Cities II comprises only those city regions that do not belong to regions with extreme values (5% per tail) with regard to regional human capital and start-up rates in the overall distribution of 1990. The extreme values presumably are related to peculiarities of the local industry structure (e.g., mono-industrialization).

Table A.4: Start-up activity and initial conditions 1990–2006

	I	II	III	IV
	1995–2000		2001–2006	
	PNegBin	POLS	PNegBin	POLS
Regional Human Capital	0.213*** (0.0258)	0.222*** (0.0261)	0.150*** (0.0309)	0.157*** (0.0307)
Entrepreneurial Culture	0.378*** (0.0343)	0.382*** (0.0342)	0.462*** (0.0391)	0.473*** (0.0404)
Population Density	0.00103 (0.0105)	0.00214 (0.0107)	-0.0163 (0.0113)	-0.0137 (0.0118)
Population (20–64)	1.030*** (0.0211)		1.028*** (0.0233)	
Border	-0.0886*** (0.0200)	-0.0860*** (0.0204)	-0.103*** (0.0231)	-0.100*** (0.0237)
Berlin	0.362*** (0.0353)	0.378*** (0.0346)	0.391*** (0.0416)	0.408*** (0.0430)
Observations	672	672	672	672
WaldChi ² /F-value	8519.45***	48.27***	6743.06***	54.04***
Pseudo R ² /R ²	0.181	0.497	0.173	0.567

Notes: Robust standard errors in parentheses/ *** p<0.01, ** p<0.05, * p<0.1.
The constant is suppressed. Dummies for the Federal States and the controls for industry structure are not reported for the sake of brevity. The pooled models also include unreported year dummies. All continuous variables are in log-form.