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How Much of a Socialist Legacy? The Reemergence of Entrepreneurship in the East German Transformation to a Market Economy¹

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Abstract

The 40 years of socialist regime in East Germany were characterized by a massive anti-entrepreneurship policy. We investigate the reemergence of entrepreneurship in East Germany during its transformation to a market economy following the collapse of the East German state in 1989. It took about 15 years until self-employment levels in East Germany reached those of West Germany. Despite this catch up, we find a number of peculiarities in East German self-employment that appear to be a continuing legacy of the socialist period. In particular, older and better-educated East Germans have a relatively low propensity for starting an own business. Moreover, East German workers tend to have a lower variety of skills than their West German counterparts, which could explain a lower propensity for start up in the early years after reunification. Despite this socialist imprint, we also find considerable continuity in the levels of self-employment in the 1920s and those after transition to a market economy, suggesting the existence of a long-lasting regional entrepreneurship culture.

Keywords: Entrepreneurship, self-employment, new business formation, transformation, East Germany

JEL classification: L26, O11

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1. The East German Transformation Process

After the collapse of the socialist East German state, the German Democratic Republic (GDR), in 1990, the region experienced a turbulent transformation process to a market economy. Because of the abrupt changes in framework conditions—for example, the ready-made formal institutional framework of West Germany was adopted practically overnight—this transformation process can be characterized as a “shock treatment” (see, e.g., Brezinski and Fritsch, 1995; Hall and Ludwig, 1995). Introduction of a market economic system that replaced the centrally planned economy induced massive structural change accompanied by an almost complete replacement of incumbent firms. Between 1989 and 1991, the share of manufacturing employment in East Germany dropped from 48.7 percent to 16.0 percent (Hall and Ludwig, 1995) and unemployment rose from virtually zero in 1989 to more than 15 percent in 1992 (Burda and Hunt, 2001).

This paper analyzes the emergence of new business formation and entrepreneurship during East Germany’s transformation from a socialist system to a Western-type market economy. Our main interest is in discovering to what extent the socialist legacy influenced this development. New business formation and entrepreneurship in transitional East Germany is of particular interest because the socialist GDR regime perceived entrepreneurship as a bourgeois anachronism and strongly favored collectivist values (e.g., Pickel, 1992; Thomas, 1996). Hence, the socialist government adopted a rigorous anti-entrepreneurship strategy and made numerous attempts to eradicate entrepreneurship and private-sector firms. This included massive socialization of private enterprises and intensive control, if not suppression, of the few remaining private-sector activities that were officially tolerated (for details, see Brezinski, 1987; Pickel, 1992). Even in light of the GDR’s massive anti-entrepreneurship policy, however, in 1989, 1.8 percent of the population aged between 18 and 64 years

were self-employed (Statistik der Deutschen Demokratischen Republik, 1990). This was about 20 percent of the West German level at that time (Fritsch, Kritikos, and Rusakova, 2012).

In the remainder of this paper, we first describe development of the overall level of self-employment in East Germany (Section 2). Based on the overall picture, we then analyze individual determinants of self-employment in East and West Germany (Section 3). Section 4 deals with regional differences. Finally, we draw conclusions and suggest some promising and important avenues for further research (Section 5).

2. New Business Formation and Self-Employment in East and West Germany During the Transformation Process

The opening of markets and the switch to a market economic system in 1990 induced a start-up boom in East Germany that clearly demonstrated the willingness of many East Germans to be self-employed. According to the German Micro-Census,² the self-employment rate—the share of self-employed persons over the working population aged between 18 and 65 years—rose from about 1.8 percent at the end of the socialist period in 1989 to more than 5 percent in 1991 (Figure 1).³ During the 1990s, the self-employment rate in East Germany grew rapidly and reached the West German level in 2004. Indeed, shortly after the turn of the century, the start-up rate (share of founders over the working population) in East Germany was higher than that of West Germany (Figure 2). One explanation for the persistent high level of new business formation in East Germany could be the relatively high level of unemployment there that may have resulted in

² The German Micro-Census, conducted by the Federal Statistical Office, has a general sampling fraction of 1 percent of the total population living in Germany, providing information about 820,000 individuals in each wave (Statistisches Bundesamt, 2009).

³ This rise in the self-employment rate is a slight overestimation caused by the decreasing employment that is the denominator of the self-employment rate.

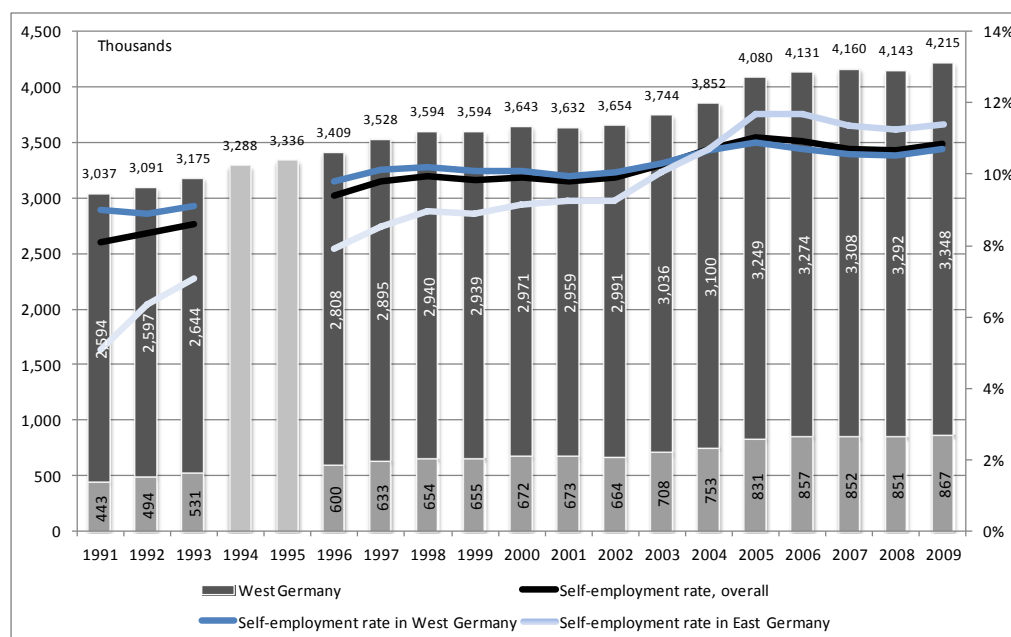


Figure 1: Self-employed individuals, absolute numbers and self-employment rates, 1991–2009 (Source: own calculations based on the German Micro-Census)

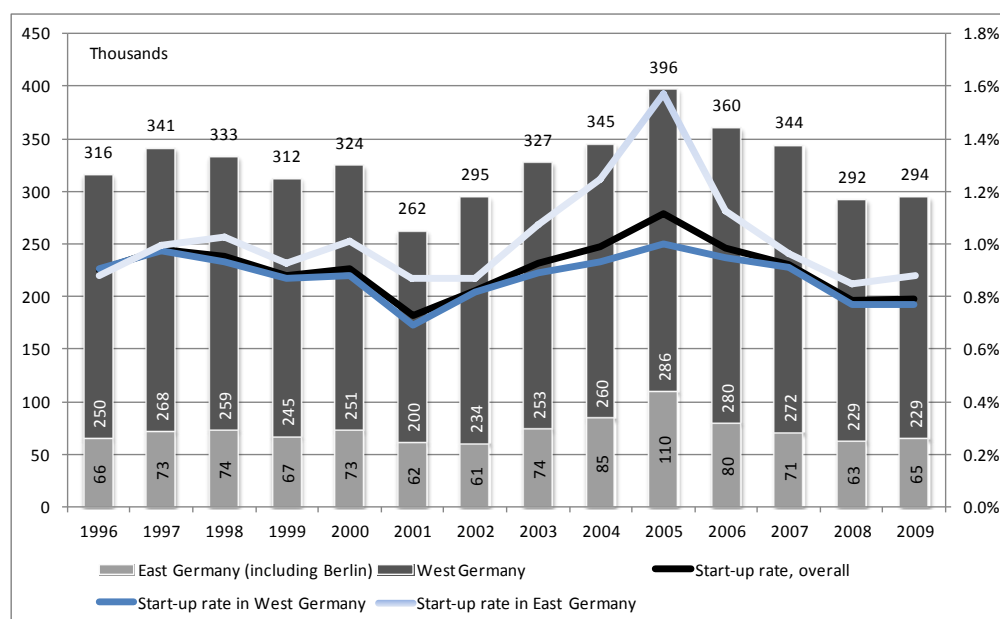


Figure 2: Entries into self-employment, absolute numbers and start-up rates, 1996–2009 (Source: own calculations based on the German Micro-Census)

many businesses being started up “out of need” (necessity entrepreneurship). One indication that unemployment was indeed having this effect is the peak of new business formation around the year

2005 that is presumably due to the labor market reforms and the massive extension of public support for startups by unemployed persons (for details, see Caliendo and Kritikos, 2010).

Although there was a relatively large number of start-ups in East Germany during this period, the new firms were on average smaller (for details, see IWH, 2010) and less successful compared to their West German counterparts (Brixey and Grotz, 2004). It is also remarkable that a relatively high share of the newly emerging businesses in East Germany were in industries such as retailing or hotels and restaurants, which are characterized by low entry barriers in terms of financial resources and required qualifications (for details, see Fritsch, Kritikos, and Rusakova, 2012).

3. Differences in Personal Determinants of Startups in East and West Germany

There are good reasons to assume that East Germany's socialist legacy negatively affected its people's attitudes toward entrepreneurship and their willingness and ability to start an own firm. One source of such a negative effect is the sharp decrease in entrepreneurship during the socialist regime, which implies reduced opportunities for contact with entrepreneurial role models. Second, the anti-capitalistic propaganda, particularly indoctrination during education, may have resulted in entrepreneurship being viewed negatively, thereby reducing the willingness of East Germans to become self-employed (Bauernschuster et al., 2009; Fritsch and Rusakova, 2012). Third, since East Germans had relatively few incentives or opportunities to accumulate capital, they have on average much fewer available resources than their West German counterparts. Fourth, people who have been educated and have worked in a socialist centrally planned economy may lack a number of skills that are necessary for or at least conducive to successful entrepreneurship. Thus, there might be differences between East and West Germans with respect to the individual determinants of becoming self-employed.

Table 1: The impact of personal variables on the probability of start-up in East and West Germany, 1999–2009

	East Germany	West Germany
Years of formal education	0.713** (0.285)	0.214** (0.097)
Years of formal education, squared	-0.022** (0.009)	-0.004 (0.004)
Age	0.074* (0.040)	0.068*** (0.019)
Age, squared	-0.001** (0.001)	-0.001*** (0.0002)
Male (1 = yes, 0 = no)	0.418*** (0.118)	0.347*** (0.064)
Married (1 = yes, 0 = no)	-0.098 (0.115)	-0.074 (0.058)
Non-German nationality (1 = yes, 0 = no)	0.498 (0.761)	0.119 (0.091)
Gross labor income (t-1)	-0.00004 (0.0001)	-0.0002*** (0.00003)
Experienced years of unemployment	0.086*** (0.033)	0.034* (0.019)
Intercept	-100.348*** (20.233)	-60.597*** (0.832)
Rho	0.566 (0.081)	0.564 (0.047)
Log likelihood	-882.711	-3,251.113
Wald Chi ²	64.12***	181.91
Number of observations	21.973	68.786
<i>Notes:</i> Dependent variable: 1 = startup; 0 = dependently employed. Random effects probit regression for panel data. Standard errors in parentheses. ***: statistically significant at the 1 percent level; **: statistically significant at the 5 percent level; *: statistically significant at the 10 percent level. For descriptive statistics see Table A1 in the Appendix.		

We use data from the German Socio-Economic Panel (SOEP), a representative yearly household survey in Germany (for a description of the data, see Wagner, Frick, and Schupp, 2007), in our investigation of the differences between East and West Germans with regard to their decision to start an own business or not. This database provides information on self-employment regardless of the size of the business

and therefore includes solo entrepreneurs who do not have any employees. Our analysis is based on the waves 1999 to 2009 of the SOEP, a period of relative tranquility compared to the pronounced turbulence of the first phase of the transition process.

We find several differences between East and West Germans with regard to the propensity to set up an own business (Table 1). One significant difference is that the effect of formal education (measured in years) on the propensity to become a business founder is rather linear in West Germany but is inversely u-shaped among East Germans, indicating a relatively high propensity of East Germans with a medium level of education to found an own business. A possible reason for the relatively low willingness of highly educated East Germans to set up an own business could be that higher education in the GDR system included massive anti-capitalistic indoctrination that may have had an enduring negative effect on entrepreneurial attitudes (see Fritsch and Rusakova, 2012). A second reason could be that the rather high level of unemployment in East Germany had an especially strong effect of forcing those with low and medium level qualifications into necessity entrepreneurship, whereas people with high levels of human capital had comparatively better chances of finding work as dependently employed. This second argument is supported by our finding that having experienced unemployment has a significantly stronger effect on the probability of starting a firm in East Germany than in West Germany. However, there are also some similarities among East and West Germans, such as the inversely u-shaped relationship between age and start up indicating that in both regions the highest propensity for starting a firm is among middle-aged persons. Also true of both parts of the country is that men are significantly more likely to start an own business than are women.

In a next step, we investigate the determinants of self-employment in East Germany using SOEP data for the year 2004. This year was chosen because self-employment in East Germany had reached the

Table 2: Analyses of determinants of self-employment with and without co-workers (marginal effects)

	Solo Self-Employed (1 = yes, 0 = no)			Self-Employed with Co-Workers (1 = yes, 0 = no)		
	18-64	18-44	45-64	18-64	18-44	45-64
East German origin (1 = yes, 0 = no)	0.0040 (0.0069)	0.0120** (0.0061)	-0.0035 (0.0098)	-0.0072 (0.0047)	0.0023 (0.0049)	-0.0162*** (0.0060)
Age	0.0250*** (0.0088)	0.0304 (0.0401)	0.0949 (0.0896)	0.0179*** (0.0052)	0.0331 (0.0351)	-0.0833* (0.0466)
Age, squared	-0.0011** (0.0005)	-0.0015 (0.0027)	-0.0042 (0.0041)	-0.0007** (0.0003)	-0.0020 (0.0025)	0.0040* (0.0021)
Years of formal education	0.176*** (0.0614)	0.182** (0.0796)	0.167** (0.0778)	0.0109 (0.0339)	-0.0010 (0.0355)	0.0282 (0.0422)
Years of formal education, squared	-0.0263** (0.0107)	-0.0275** (0.0139)	-0.0245* (0.0132)	0.00135 (0.0060)	0.0022 (0.0065)	-0.0005 (0.0071)
Male (1 = yes, 0 = no)	0.0186** (0.0075)	0.0100 (0.0082)	0.0294** (0.0145)	0.0403*** (0.0055)	0.0319*** (0.0057)	0.0497*** (0.0100)
Married (1 = yes, 0 = no)	-0.0163 (0.0108)	-0.0099 (0.0111)	-0.0257* (0.0138)	-0.00522 (0.0042)	0.0028 (0.0042)	-0.0189** (0.0082)
Non-German nationality (1 = yes, 0 = no)	-0.0016 (0.0168)	0.0059 (0.0173)	-0.00905 (0.0326)	-0.00508 (0.0058)	0.0026 (0.0105)	-0.0130* (0.0076)
Experienced years of unemployment	-0.0118 (0.0108)	-0.0051 (0.0095)	-0.0180 (0.0144)	-0.0749*** (0.0144)	-0.0651*** (0.0133)	-0.0857*** (0.0243)
Log likelihood	-1084,003	-536,067	-544,281	-1013,579	-445,898	-559,035
Wald Chi ²	267.43***	408.60***	198.69***	147.46***	1917.49***	104.85***
Pseudo R ²	0.035	0.032	0.041	0.120	0.103	0.136
Number of observations	5424	2877	2547	5716	2995	2721

Notes: Robust standard errors in parentheses. ***: statistically significant at the 1 percent level; **: statistically significant at the 5 percent level; *: statistically significant at the 10 percent level. For descriptive statistics see Table A2 in the Appendix.

West German level by that time (see Section 2), so that the effect of a transition-specific catching-up process with regard to self-employment should be relatively modest as compared to earlier years. We run logit regressions for the pooled sample of East and West German respondents and distinguish between solo self-employment and entrepreneurs having at least one employee or co-worker.⁴ The latter

⁴ Since the SOEP contains only the information about the number of persons working in the respective firm, we cannot distinguish here between firms with dependent

ventures are larger than those of the solo self-employed and are more likely to have started up in response to a perceived opportunity (as opposed to being started due to necessity). Restricting the analysis to individuals who were at least 45 years old in 2004 reveals a significant negative effect for respondents of East German origin on the probability of operating such a venture.

It is particularly remarkable that the probability of operating a business with at least one employee or co-worker is significantly lower for older East Germans compared to their West German counterparts (Table 2). There are several possible explanations for this. A main reason that may particularly apply to older East Germans could be their socialization under the socialist regime, during which they were exposed to massive anti-capitalistic propaganda. Working in a centrally planned economic system would have given them little knowledge about the functioning of a market economy and, quite frequently, a considerable part of the knowledge that they had acquired under socialism turned out to be useless in the newly emerging system (Bird, Schwarze, and Wagner, 1994; Gathmann, 2005; Wyrwich, 2012b). Moreover, older West Germans had more time to recognize and act on entrepreneurial opportunities, as well as to accumulate the resources necessary for starting an own firm. It is also remarkable that younger East Germans are more likely to be solo self-employed than their West German peers. Since solo self-employment is frequently motivated by necessity, the main reason behind this observation could involve the relatively poor labor market prospects in East Germany.⁵ This interpretation is consistent with the significantly negative relationship between the years of experienced unemployment and the propensity to run a firm with at least one co-worker (Table 2).

employees and those that have several founders who are actively involved in running the business.

⁵ The results of the control variables in the models of Table 2 cannot be compared to those in Table 1 since there was no distinction between different kinds of self-employment in Table 1.

Analyses of the survival of new businesses in East and West Germany show a higher risk of failure for start-ups in East Germany (Brixy and Grotz, 2004). Moreover, the surviving East German start-ups in which West Germans are involved tend to grow more than other East German start-ups (Wyrwich, 2010). This could be an indication that the relevant entrepreneurial abilities of many East German founders are comparatively low.

Analyzing the qualification of workers and self-employed with regard to the diversity and structure of their skills, we find pronounced differences between East and West Germany. According to the theory of “balanced skills” (Lazear, 2004, 2005), successful entrepreneurship requires a variety of skills. Furthermore, the skills should be “balanced” because the success of a firm may depend on whether the weakest skill becomes a bottleneck. The observation that many founders have worked in small firms before starting a business (Wagner, 2004; Parker, 2009) suggests that there is a connection between firm size and the skill balance of employees. With regard to measuring skill balance, it is often assumed that an increase in the number of skills implies an increase in skill balance. However, if a person already has acquired skills in a number of fields, an additional skill may be of limited value as there might be a maximum number of necessary skills. For this reason, we define a maximum number of skills for the measurement of skill balance. If this maximum number of skills is reached, a skill set is regarded as balanced.

We use data from the BIBB/BAuA employment survey 2006⁶ in analyzing the factors that may determine the skill balance in East and West Germany. This survey contains information on a representative sample of about 20,000 dependently employed and self-employed people. The indicator for skill balance is the number of expert skills that

⁶ The survey was conducted by the Federal Institute for Vocational Education and Training (BIBB) and the Federal Institute for Occupational Safety (BAuA) in 2005 and 2006.

Table 3: Determinants of the number expert skills applied on the job

Self-employed (1 = yes, 0 = no)	0.233*** (0.0455)
<i>Business size</i>	
- 1–19 employees	0.113*** (0.0315)
- 20–49 employees	0.103*** (0.0344)
- 50–249 employees	0.0815*** (0.0281)
- 250–999 employees	0.0477* (0.0276)
- 1,000 or more employees	Reference
Vocational training (1 = yes, 0 = no)	0.331*** (0.0582)
Tertiary education (1 = yes, 0 = no)	0.571*** (0.0622)
Master craftsman (1 = yes, 0 = no)	0.615*** (0.0628)
Continuing education during the last two years (1 = yes, 0 = no)	0.0275 (0.0232)
Work experience in years (log)	0.0530 (0.0699)
Work experience in years, squared	-0.0119 (0.0140)
Gender (1 = female, 0 = male)	-0.390*** (0.0298)
East Germany (1 = yes, 0 = no)	-0.126*** (0.0258)
Constant	0.680*** (0.232)
Number of observations	5.665
Log likelihood	-10,040

Notes: Negative binomial regressions with robust standard errors in parentheses. ***: statistically significant at the 1 percent level, **: statistically significant at the 5 percent level, *: statistically significant at the 10 percent level. Dummies for occupational field and industry are included. Descriptive statistics for the Variables are displayed in Table A3 in the Appendix.

are applied on the job. The independent variables include an individual's education level, participation in continuing education, years of work experience, gender, and firm size. Moreover, we include a variable indicating location in East Germany. The results (Table 3) show that employees in small firms have, on average, a higher number of

expert skills than employees in larger firms (for details, see Bublitz and Noseleit, 2011). East Germans have on average a significantly lower number of expert skills than their West German counterparts.

There are at least two possible explanations for the relatively strong specialization of workers in East Germany. First, the fact that a large number of East German firms are branches of West German companies might turn these establishments into “extended work benches” where workers need relatively few skills. Second, studies show (see, e.g., Wagner, 1993) that in the past, employees in the East German economy rarely changed jobs and thus needed relatively few skills. Since the skill balance in terms of the number of expert qualifications has a positive effect on the success of start-ups, a low diversity of skills could be another explanation for the relatively low economic success of East German firms and the relatively low start-up rate right after reunification.

4. Regional Differences in Entrepreneurship

Looking at the regional distribution of self-employment, we find significant differences, indicating that region-specific factors play a prominent role. In fact, even in September 1989, after 40 years of socialist regime and just before the East German transition to a market economic system, large regional differences are observed with regard to the share of self-employed in the GDR. At that time, the self-employment rate varied between 0.4 and 3.2 percent (Figure 3). Specifically, regions in the southern part of the GDR, such as Chemnitz, Zwickau, and Dresden, had a considerably above average level of self-employment, whereas self-employment rates were especially low in regions with a high employment share in agriculture and in those areas where local industry was strongly shaped by socialist industrial policy and regional planning (e.g., Bitterfeld, Eisenhüttenstadt, Hoyerswerda,

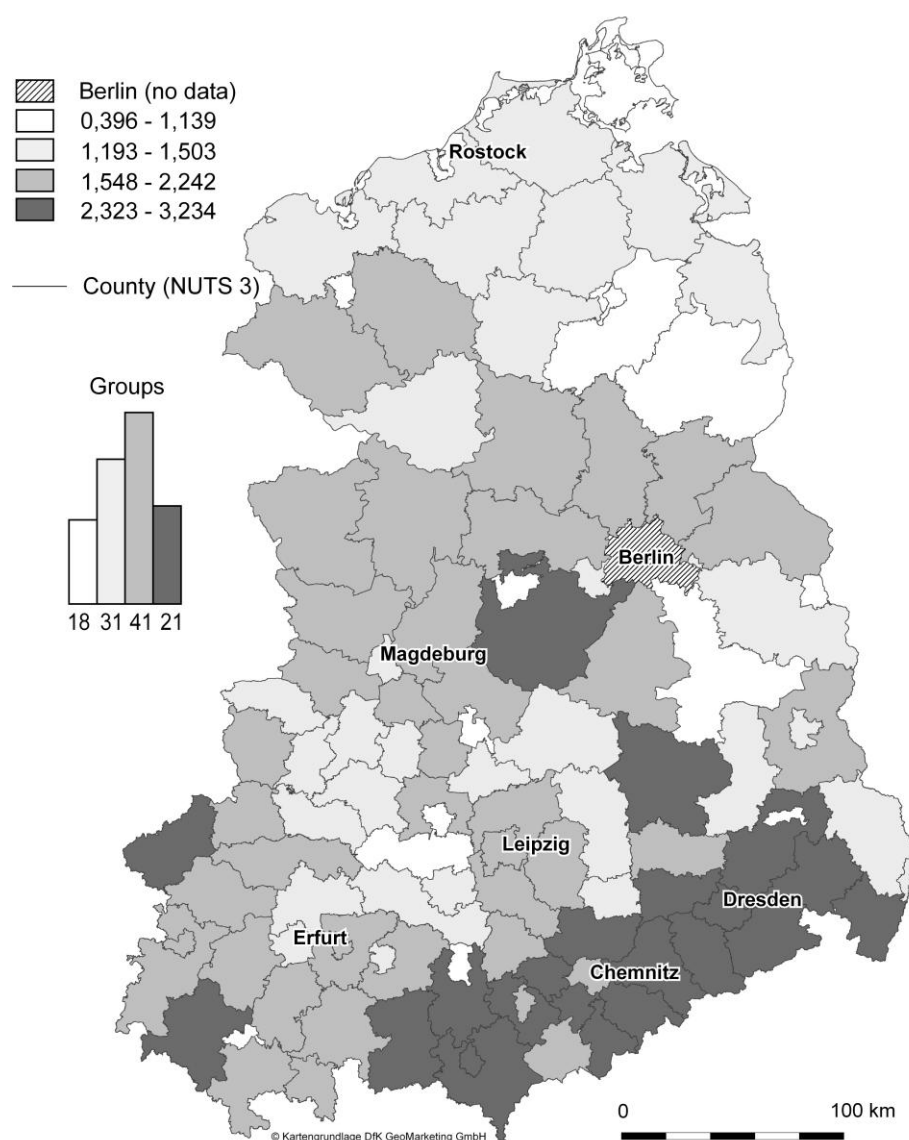


Figure 3: Regional differences of self-employment in the GDR in 1989 (Source: own calculations on the basis of official GDR statistics (*Statistik der Deutschen Demokratischen Republik, 1990*))

Schwedt, and regions around Leipzig; for details, see Wyrwich, 2012a).⁷ Since the rigid anti-entrepreneurship policy of the GDR largely prevented any new entries of private firms, the regional variation in private-sector activity in 1989 must be regarded as mainly a result of

⁷ The data used to create Figure 3 were obtained from official GDR statistics (for details, see Kawka, 2007) and have been adjusted to the current definition of regions.

variation in private initiative or of different levels of resistance to political attempts to abolish private firms. Hence, on the eve of the transition to a market economy, there was considerable variation across East German regions with regard to entrepreneurial culture.

Table 4: Regression analysis on self-employment rates across East German regions in 1989

	I	II	III
	<i>Self-employment rate 1989 (log)</i>		
Share of self-employed (including home workers) in total employment 1925	0.521** (0.215)	-	-
Share of self-employed (including home workers) in manufacturing in total employment 1925	-	0.615*** (0.086)	-
Share of self-employed (excluding home workers) in manufacturing in total employment 1925	-	-	0.923*** (0.272)
Share of manufacturing employment 1989	0.602*** (0.108)	0.286*** (0.100)	0.498*** (0.113)
Dummies for region type (n = 7)	***	***	***
Constant	-1.808*** (0.487)	-1.199*** (0.342)	0.0425 (0.847)
R ² adj.	0.298	0.434	0.328
F-value	13.08***	30.63***	15.74***

Notes: OLS regressions. Robust standard errors in parentheses. ***: statistically significant at the 1 percent level; **: statistically significant at the 5 percent level. NUTS 3 regions (districts = Kreise, n = 112). Data on self-employment in the year 1925 are available only at the planning-region level. The dummy for the type of region represents a classification based on the settlement structure (urbanization and centrality) provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Planning (BBSR); all core cities have been aggregated to one spatial category. All continuous explanatory variables are employed as log values. For descriptive statistics of the variables see Table A4 in the Appendix.

High self-employment rates on the eve of the East German transition to a market economy appear to have historical roots. A comparison of these rates with the respective shares of self-employment in 1925⁸ shows a high degree of correspondence. Specifically, the regions in the south of East Germany with high levels

⁸ Own calculations based on the official statistics (Statistik des Deutschen Reichs, 1927).

of self-employment in 1989 also had high self-employment rates more than 60 years earlier, in 1925. Regression models for explaining the regional level of self-employment in East German regions in 1989 that control for regional conditions such as population density and share of manufacturing employment reveal a significant positive effect of the self-employment rate in 1925 (Table 4). This result clearly suggests that a number of severe historical shocks, such as World War II and separation of the country into an eastern and a western part, as well as four decades of socialism, could not completely eradicate the regional culture of entrepreneurship that existed in the presocialist period.

The effect of self-employment in 1925 is even more pronounced when restricting the measure to the manufacturing sector and it is even stronger if home workers are excluded (Table 4). The stronger effect of manufacturing self-employment can be explained with the on average larger firm size in this sector, which may require a higher level of entrepreneurial ability to overcome entry barriers compared to, for example, a business in small-scale services.⁹ Thus, self-employment in manufacturing might be an especially well-suited indicator of the historical geography of entrepreneurial talent and culture. We conclude that self-employment has survived the socialist period especially in those regions that had an entrepreneurial tradition in the manufacturing sector before the socialist GDR regime came into existence.

The level of new business formation in East Germany during the transition process also shows great variation across regions (Figure 4). Particularly high levels of new business formation can be found in regions adjacent to Berlin and in larger cities such as Dresden, Chemnitz, Leipzig, and the like. Start-up rates tend to be rather low in rural regions and in places strongly shaped by socialist economic

⁹ Particularly home workers, an occupational status that was widespread in the 1920s in certain sectors such as the textile industry, can be regarded as occupying a kind of intermediate position between being an employee and being the owner of a manufacturing firm.

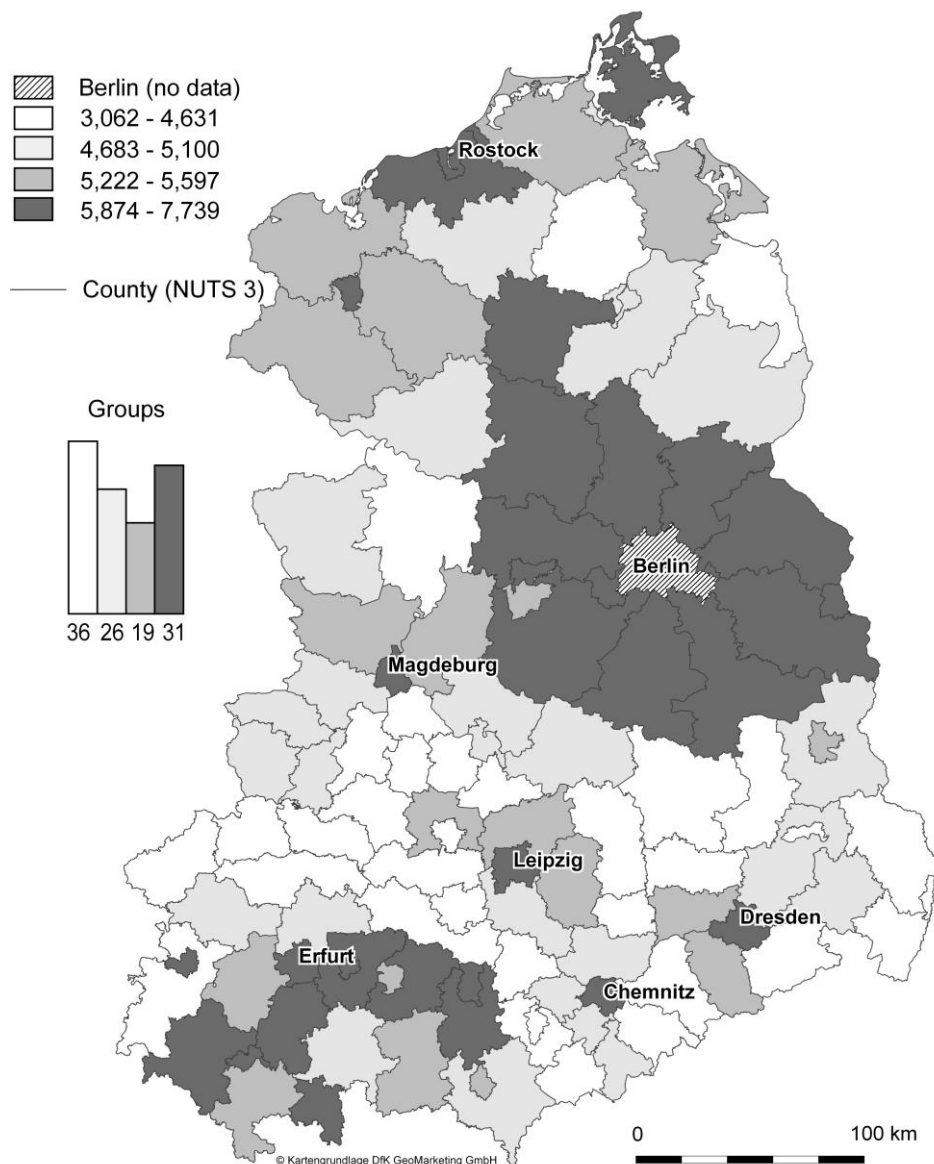


Figure 4: Average number of startups between 1990 and 2008 per 1,000 inhabitants between 18 and 64 years old

policies, such as Bitterfeld and Hoyerswerda.¹⁰ The high self-employment rates in the north (e.g., in the area of Rostock and on the

¹⁰ Data on start-up activity are obtained from the Foundation Panel of the Centre for European Economic Research (Zentrum für Europäische Wirtschaftsforschung, ZEW) in Mannheim (for details, see Almus, Engel, and Prantl, 2002). This dataset provides the most reliable information on East German start-up activities in the early 1990s on a regional basis. Very small startups are underreported in this data source. Hence, many necessity startups (e.g., startups due to unemployment) are not included in the data.

island of Ruegen) are presumably due to the privatization of the formerly state-owned tourism industry.¹¹

Table 5: Regression analysis on the effect of self-employment rates in the past and the regional stock of knowledge on the number of start-ups in East Germany

	I	II	III	IV	V	VI
	<i>Number of start-ups</i>					
	1991	1999	2007	1991	1999	2007
Share of self-employed (excluding home workers) in manufacturing in total employment 1925	0.512** (0.234)	0.695** (0.345)	0.880** (0.353)	-	-	-
Self-employment rate 1989	-	-	-	0.338*** (0.0662)	0.403*** (0.103)	0.450*** (0.0957)
Share of highly skilled workforce 1989	0.672*** (0.050)	0.632*** (0.063)	0.620*** (0.075)	0.656*** (0.039)	0.611*** (0.052)	0.597*** (0.059)
Employmentshare in manufacturing	-0.318*** (0.102)	-0.446** (0.185)	-0.329*** (0.124)	-0.358*** (0.093)	-0.563*** (0.191)	-0.386*** (0.119)
Dummies for region type (n = 7)	***	***	***	***	***	***
Borders West Germany (1 = yes)	-0.048 (0.062)	0.005 (0.085)	0.113 (0.088)	-0.082 (0.056)	-0.012 (0.078)	0.106 (0.084)
Borders Berlin (1 = yes)	0.392*** (0.098)	0.596*** (0.121)	0.622*** (0.136)	0.268*** (0.090)	0.430*** (0.113)	0.414*** (0.117)
Constant	1.952** (0.812)	1.842* (1.112)	2.204* (1.252)	1.957*** (0.416)	1.463** (0.577)	1.542*** (0.582)
Ln alpha	-3.309*** (0.186)	-2.849*** (0.180)	-2.695*** (0.190)	-3.472*** (0.195)	-2.977*** (0.181)	-2.823*** (0.186)
Log likelihood	-717.121	-655.980	-626.721	-708.310	-649.111	-619.899
Wald-Chi2	7,733.45***	774.44***	999.51***	1,218.55***	5,361.41***	3,059.92***
Pseudo R ²	0.1238	0.1181	0.1094	0.1345	0.1273	0.1191

Notes: Negative binomial regressions. Robust standard errors in parentheses. ***: statistically significant at the 1 percent level; **: statistically significant at the 5 percent level. NUTS 3 regions (Kreise, n = 112). Data on self-employment in 1925 are available only at the planning-region level. The region type dummies represent a classification based on the settlement structure (urbanization and centrality) and are provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Planning (BBSR); all core cities have been aggregated to one spatial category. All continuous explanatory variables are employed as log values. For descriptive statistics of the variables see Table A4 in the Appendix.

¹¹ Since founders tend to start their firms in industries in which they have work experience (Fritsch and Falck, 2007), the regional industry structure plays an important role in explaining regional variation in new firm formation. Regions with a high share of service-sector employment, for instance, have a high level of start-up activity because market entry barriers in this sector are low. Therefore, industry structure should be controlled for in empirical analyses.

Regression analyses with the number of regional start-ups as the dependent variable reveal two effects of regional conditions in 1989 on start-up activity (Table 5). First, the self-employment rate in 1989 as well as the share of self-employed in manufacturing industries in total employment in 1925 have a significant positive effect on start-up rates after the transition even when industry structure and further potential influences (e.g., common border with Berlin or West Germany, share of highly-skilled workforce) are controlled for (for details, see Wyrwich, 2012a). This clearly indicates that regions with a long tradition in self-employment have higher start-up rates in the 1990–2007 period. Interestingly, the effect of past self-employment becomes stronger over time. This might be explained by “transition noise” and turbulence in start-up activity in the early 1990s, which might interfere with the positive long-term effect of the historic entrepreneurial culture. A second main finding is that the share of employees with a tertiary degree in 1989 has a significant positive effect on start-up activity in all regression models. This suggests that regional knowledge is an important factor in explaining new business formation (Acs et al., 2010) even when this knowledge was acquired under socialism.

Against the background of the significant positive effect of self-employment rates in 1925 and 1989 on start-up activity after the transition, it is not surprising that there is also a positive relationship with regional self-employment rates after reunification (Table 6). Regions with high self-employment in the past show a remarkable increase in self-employment during the early stage of the transition process. The actual self-employment rate results from the difference between market entries and exits. Thus, a comparatively strong increase in self-employment in a region indicates that a relatively high share of the entries survived market competition for a longer period of time. That the share of highly skilled employees has only a relatively weak effect in these estimates corresponds to the low propensity to start a business that we found for East Germans who hold a university degree (Section 3).

Table 6: Regression analyses on the effect of self-employment rates in the past and regional stock of knowledge on self-employment rates in East Germany

	I	II	III	IV	V	VI
	<i>Self-employment rate (log)</i>					
	1991	1999	2007	1991	1999	2007
Share of self-employed (excluding home workers) in manufacturing in total employment 1925	0.625*** (0.184)	0.465*** (0.142)	0.485*** (0.155)	-	-	-
Self-employment rate 1989	-	-	-	0.321*** (0.057)	0.239*** (0.038)	0.198*** (0.043)
Share of highly skilled workforce 1989	0.064 (0.039)	0.014 (0.023)	-0.009 (0.025)	0.053* (0.032)	0.004 (0.020)	-0.015 (0.025)
Employment share manufacturing	0.169* (0.087)	0.054 (0.083)	-0.001 (0.075)	0.144** (0.072)	0.009 (0.070)	-0.004 (0.069)
Dummies for region type (n = 7)	n.s.	***	***	***	***	***
Location at the border of West Germany (1 = yes)	0.027 (0.111)	0.107*** (0.0399)	0.089* (0.048)	-0.125 (0.099)	-0.00962 (0.024)	-0.022 (0.033)
Location at the border of Berlin (1 = yes)	0.369*** (0.110)	-0.060 (0.067)	-0.008 (0.074)	0.453*** (0.098)	-0.00814 (0.071)	0.046 (0.088)
Constant	-1.885*** (0.596)	-1.424*** (0.440)	-0.921* (0.498)	-2.578*** (0.324)	-1.955*** (0.181)	-1.644*** (0.228)
F-value	56.08***	8.47***	27.72***	15.65***	17.21***	35.12***
R ² adj.	0.359	0.340	0.377	0.476	0.469	0.430

Notes: OLS regressions. Robust standard errors in parentheses. ***: statistically significant at the 1 percent level; **: statistically significant at the 5 percent level; n.s.: not significant at the 10 percent level. NUTS 3 regions (Kreise, n = 112). Data on self-employment in 1925 are available only at the planning-region level. The region type dummies represent a classification based on the settlement structure (urbanization and centrality) and were provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Planning (BBSR); all core cities have been aggregated to one spatial category. The calculation of self-employment rates is based on data provided by the Working Committee "Labor Market Development" of the Federal Statistical Office. All continuous explanatory variables are employed as log values.

Altogether, the analyses show that a comparatively high level of self-employment can endure tremendous ruptures of the economic and political environment, such as World War II, German separation, four decades of a socialist regime, and the shock of transitioning to a market economic system. This suggests the presence and persistence of a regional entrepreneurial culture or of regional entrepreneurship capital (Audretsch and Keilbach, 2004). What makes this culture strong

enough to survive disruptive change and historical shocks? Three different mechanisms are highlighted in the literature (for an overview, see Andersson and Koster, 2011):

- *First*, entrepreneurs act as role models, which triggers the adoption of entrepreneurial behavior by other local actors (e.g., Fornahl, 2003; Minniti, 2005). Several empirical investigations find that the presence of entrepreneurs in a region has a positive effect on decisions to start a firm (e.g., Mueller, 2006). A common explanation for this result is that observing entrepreneurs in the local environment provides an opportunity to learn about entrepreneurship and the type of personal attributes necessary for success. In other words, social interaction with entrepreneurs may allow potential founders to assess their own ability to start and operate a venture (Bosma et al., 2012).
- *Second*, it can be presumed that a high level of self-employment in a region indicates high social acceptance and legitimacy of entrepreneurial behavior in that region (Etzioni, 1987). This should have a positive effect on entrepreneurial choice and the aggregate level of start-up activity.
- *Third*, high levels of start-up activity can lead to an infrastructure supportive of entrepreneurship (e.g., consulting and finance services) that enhances the overall entrepreneurial climate of a region.

The results of our analyses of self-employment in the GDR suggest that in some areas individuals were more resistant to the anti-entrepreneurship policies of the socialist government than in others. This implies that in some regions, the regime's albeit limited tolerance for private-sector economic activity was taken advantage to a greater degree than in other regions. Data on the proportion of craftsmen who joined socialist handicraft cooperatives (Produktionsgenossenschaften des Handwerks = PG) do indeed show lower shares in regions with a pronounced entrepreneurial tradition (Wyrwich, 2012a). Furthermore, empirical evidence indicates that there was a considerable degree of

intergenerational continuity in self-employment in the GDR (Pickel, 1992). Thus, entrepreneurial attitudes might have been passed on from generation to generation, which then explains the persistence of self-employment and the survival of entrepreneurial culture.

5. Summary and Conclusions

Our analyses of self-employment in East Germany after 40 years of a socialist regime lead to several remarkable results. After having been suppressed for a long period of time, self-employment and entrepreneurship in East Germany seem to have recovered. However, it took 15 years for the self-employment rate in East Germany to reach that of West Germany. Forty years of socialism as well as the subsequent shock transformation to a market economy left their marks on East Germany, as evidenced by the propensity of East Germans to start an own business. Socialization under and work experience in a centrally planned socialist economy had a negative effect on the propensity to found an own business and on being self-employed, especially for older and better-educated East Germans. We also find that East Germans tend to have a fewer skills than their West German counterparts, which could have a negative affect on the propensity to found a start-up and possibly also on the success of a newly founded businesses. There is also strong indication that the high unemployment rate during the East German transformation to a market economy led to a relatively high share of start-ups, especially of firms without any co-workers (solo entrepreneurship), where a necessity motivation played a significant role. These results indicate that the socialist legacy, as well as the shock transformation to a market economy, resulted in a specific kind of regional growth regime in East Germany (Audretsch and Fritsch, 2002; Fritsch, 2004). Hence, the drivers of growth in this region have been and may still be different from those in the western part of the country.

Another important finding from our analyses was that regional differences in the level of self-employment seem to be persistent over time. In particular, we show a significant positive relationship between the current regional self-employment rate, the self-employment level at the end of the GDR in 1989, and the level of self-employment prior to World War II. This indicates a long-term regional imprinting that may be regarded as a regional entrepreneurial culture.

Our analyses raise a number of questions that should be investigated by future research. For example, it is highly important to better understand the regional culture of entrepreneurship. What creates such a culture? How does it begin and then evolve? How is it transferred across generations? Do different entrepreneurial cultures have different degrees of persistence and, if so, why? A particularly important question has to do with the effect of entrepreneurship and, particularly, a long-persistent culture of entrepreneurship on economic development. We show that regions with high levels of self-employment at the end of the GDR regime and those that had high levels prior to World War II also experienced a quick recovery of entrepreneurship during the transformation process so that they tend to have high levels of self-employment today. This might be an indication that these entrepreneurial regions also managed the challenges of the transformation process quite well (Kawka, 2007). However, further research is necessary before we can definitively answer this important question. Fortunately, past and continuing developments in East and West Germany provide many opportunities for further analyses of such questions.

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Appendix

Table A1: Descriptive statistics for Table 1

	Mean	Median	Minimum	Maximum	Standard deviation
<i>East Germany</i>					
Start-up	0.007	0	0	1	0.085
Years of formal education	12.802	12	7	18	2.407
Age	42.023	43	18	65	10.892
Male (1 = yes, 0 = no)	0.515	1	0	1	0.500
Married (1 = yes, 0 = no)	0.624	1	0	1	0.484
Foreigner (1 = yes, 0 = no)	0.002	0	0	1	0.045
Gross labor income (t-1)	1,874	1,718	312	5,500	933
Experienced years of unemployment	0.653	0	0	16	1.383
<i>West Germany</i>					
Start-up	0.009	0	0	1	0.093
Years of formal education	12.161	11.5	7	18	2.633
Age	41.573	42	18	67	10.820
Male (1 = yes, 0 = no)	0.536	1	0	1	0.499
Married (1 = yes, 0 = no)	0.636	1	0	1	0.481
Foreigner (1 = yes, 0 = no)	0.104	0	0	1	0.305
Gross labor income (t-1)	2,249	2,185	312	5,500	1,174
Experienced years of unemployment	0.439	0	0	24	1.225
Number of observations in East Germany: 21,973; West Germany: 68,786.					

Table A2: Descriptive statistics for Table 2

	Mean	Median	Minimum	Maximum	Standard deviation
<i>East Germany</i>					
Solo self-employed	0.054	0	0	1	0.227
Self-employed with co-workers	0.035	0	0	1	0.184
Years of formal education	12.444	11.5	7	18	2.258
Age	42.652	43	19	65	10.702
Male (1 = yes, 0 = no)	0.532	1	0	1	0.499
Married (1 = yes, 0 = no)	0.626	1	0	1	0.484
Foreigner (1 = yes, 0 = no)	0.01	0	0	1	0.1
Experienced years of unemployment	1.74	0.5	0	15	2.625
<i>West Germany</i>					
Solo self-employed	0.105	0	0	1	0.307
Self-employed with co-workers	0.057	0	0	1	0.231
Years of formal education	12.303	11.5	7	18	2.597
Age	44.517	44	20	65	10.332
Male (1 = yes, 0 = no)	0.493	0	0	1	0.5
Married (1 = yes, 0 = no)	0.727	1	0	1	0.445
Foreigner (1 = yes, 0 = no)	0.059	0	0	1	0.236
Experienced years of unemployment	0.514	0	0	24	1.547
Number of observations in East Germany: 1,475; West Germany: 4,241.					

Table A3: Descriptive statistics for Table 3

	Mean	Median	Minimum	Maximum	Standard deviation
Number of expert skills	2.409	2	0	9	1.879
Self-employed (1 = yes, 0 = no)	0.029	0	0	1	0.169
Business Size					
- 1-19 employees	0.217	0	0	1	0.412
- 20-49 employees	0.127	0	0	1	0.333
- 50-249 employees	0.246	0	0	1	0.431
- 250-999 employees	0.203	0	0	1	0.402
Vocational training (1 = yes, 0 = no)	0.635	1	0	1	0.481
Tertiary education (1=yes, 0 = no)	0.190	0	0	1	0.392
Master craftsman (1=yes, 0 = no)	0.100	0	0	1	0.301
Continuing education during the last two years (1=yes, 0 = no)	0.148	0	0	1	0.355
Work experience in years (log)	2.862	2.996	0	3.989	0.646
Work experience in years, squared	8.609	8.974	0	15.912	3.259
Gender (1=female, 0 = no))	0.270	0	0	1	0.444
East Germany (1=yes, 0 = no)	0.161	0	0	1	0.368
Number of observations: 5,665.					

Table A4: Descriptive statistics for Table 4 to 6

	Mean	Median	Minimum	Maximum	Standard deviation	Number of observations
<i>1925</i>						
Share of self-employed (including home workers) in total employment 1925	0.147	0.144	0.114	0.182	0.019	22
Share of self-employed (including home workers) in manufacturing in total employment 1925	0.055	0.047	0.037	0.104	0.019	22
Share of self-employed (excluding home workers) in manufacturing in total employment 1925	0.044	0.044	0.035	0.054	0.005	22
<i>1989</i>						
Self-employment rate 1989	0.018	0.017	0.004	0.034	0.006	112
Share of manufacturing employment 1989	0.459	0.473	0.195	0.684	0.113	112
Share of highly skilled workforce 1989	0.051	0.042	0.017	0.168	0.026	112
<i>1991</i>						
Self-employment rate	0.034	0.034	0.018	0.052	0.006	112
Number of start-ups	833.259	737	259	3538	492.844	112
Employment share in manufacturing	0.399	0.406	0.207	0.672	0.095	112
<i>1999</i>						
Self-employment rate	0.053	0.053	0.038	0.069	0.007	112
Number of start-ups	390.42	331	98	1993	269.821	112
Employment share in manufacturing	0.309	0.320	0.139	0.456	0.071	112
<i>2007</i>						
Self-employment rate	0.071	0.071	0.053	0.093	0.01	112
Number of start-ups	275.411	239	77	1398	186.31	112
Employment share in manufacturing	0.267	0.275	0.073	0.431	0.082	112