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Susanne Prantl
Alexandra Spitz-Oener

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Susanne Prantl
Social Science Research Center Berlin (WZB)
and IFS

Alexandra Spitz-Oener
Humboldt-University Berlin,
IAB, CASE and IZA

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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ABSTRACT

How Does Entry Regulation Influence Entry into Self-Employment and Occupational Mobility?*

We analyze how an entry regulation that imposes a mandatory educational standard affects entry into self-employment and occupational mobility. We exploit the German reunification as a natural experiment and identify regulatory effects by comparing differences between regulated occupations and unregulated occupations in East Germany to the corresponding differences in West Germany after reunification. Consistent with our expectations, we find that entry regulation reduces entry into self-employment and occupational mobility after reunification more in regulated occupations in East Germany than in West Germany. Our findings are relevant for transition or emerging economies as well as for mature market economies requiring large structural changes after unforeseen economic shocks.

JEL Classification: J24, J62, K20, L11, L51, M13

Keywords: entry regulation, self-employment, occupational mobility

Corresponding author:

Alexandra Spitz-Oener
Department of Economics
Humboldt-University Berlin
Spandauer Strasse 1
10178 Berlin
Germany
E-Mail: alexandra.spitz-oener@wiwi.hu-berlin.de

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1. Introduction

Firms face entry regulation in many countries and industries, and in various forms. New firms must often bear multiple and sizable administrative costs before they can operate legally. Other forms of entry restrictions are geographical entry restrictions, for example commercial zoning regulation, or educational standards that are mandatory for individuals who want to start new firms. Entry regulation can have effects on entry decisions, competition, factor reallocation, employment, innovation, and economic growth and it can lead to inefficiencies. Despite a broad theoretical literature on this,[1] there has been little evidence using micro-data.

In this paper we make two contributions to advance the empirical body of the literature on entry regulation. First, we provide empirical evidence on the causal link between entry regulation and individuals' decisions to start new businesses after 1989, exploiting the German reunification as a natural experiment. Second, we investigate how entry regulation affects occupational mobility after 1989.

The entry regulation under scrutiny here is imposed by the German Trade and Crafts Code that roots back to the nineteenth century. The West German version of the law was extended to East Germany in July 1990.[2] The law requires that individuals who want to start a legally independent firm in one of the regulated markets fulfill a mandatory educational standard; that is, a master certificate in a relevant occupation is needed.[3] Acquiring a master certificate requires several years of basic vocational training, collecting work experience and passing several examinations, in addition there are direct costs like course fees. Accordingly, the mandatory educational standard is a substantial restriction to entry in all occupations covered by the law. These regulated occupations might not represent a random sample from the population of occupations. Systematic, omitted factors could drive both regulation and entry into self-employment or occupational mobility.

To identify the effects of entry regulation on entry into self-employment and occupational mobility after reunification we exploit the German reunification. It unified two regions that differed considerably with respect to their economic situation. West Germany represented a

[1] See, for example, Acemoglu et al. (2006), Blanchard and Giavazzi (2003), Dixit and Stiglitz (1977), Ebell and Haefke (2003), Fonseca et al. (2001), Mankiw and Whinston (1986), and Parente and Prescott (1994).

[2] Not only the West German Trade and Crafts Code, but the West German product market regulation more generally was quickly extended to East Germany after reunification. There were essentially no region-specific modifications allowed for that could be of practical relevance in our context. In addition, labor and financial market regulation as well as bankruptcy laws are set at the national level in Germany. This is important to stress since Aghion et al. (2008), Fiori et al. (2007) and Griffith et al. (2007) show, for example, interaction effects between product market or liberalization reforms and labor market institutions.

[3] See Section 2 for details.

mature market economy with relatively stable incumbent industry structures. East Germany, instead, started its transition from a planned to a market economy where new entrepreneurial activities, firm entry, industry restructuring, factor reallocation and occupational mobility were suddenly needed to an unusually high extent. In addition, East Germans were restricted in their educational choices under the planned economy system before reunification. While being different in these respects, the East German and West German economies were subject to the same entry regulation imposed by the German Trade and Crafts Code after reunification. As a result, we observe two regions in which the regulatory rules vary in the same way across occupations but that differ considerably with respect to the economic context the regulation applies to.

We expect that entry regulation reduces entry into self-employment and occupational mobility more in the regulatory context of the East German transition economy after reunification than in the context of the mature West German market economy. Relying on this argument, we estimate the average effects of the change in the regulatory context by comparing the difference between an average outcome in regulated occupations and unregulated occupations in East Germany after reunification to the corresponding difference in West Germany.

Our findings suggest that entry regulation slows down entry into self-employment more in regulated occupations in the East German transition context after reunification than in the mature West German context. These regulatory effects are stronger among individuals who should be more constrained than others by the imposed entry costs. We also show that entry regulation reduces occupational mobility among workers more in the regulated occupations in East than in West Germany after reunification. Our explanations for this result follow from entry regulation hampering entry and competition more in regulated occupations in East than in West Germany. Overall, our findings are particularly relevant for transition or emerging market economies, and for mature market economies confronted with sudden, substantial technological change or other unforeseen economic shocks that require large structural changes.

Our work is related to several strands of the literature. First, it relates to a number of empirical studies that explore effects of other forms of entry regulation.[4] Bertrand and Kramarz (2002), for example, investigate commercial zoning regulation relevant to retailing in France since 1974 and implemented via regional zoning boards. They instrument board

[4] Here we focus on empirical analyses that are based on micro data. Studies using more aggregate data are, for example, covered by Djankov (2008) or Schiantarelli (2008).

approval measures using the regional distribution of electoral votes across political parties and find that more intense deterrence of entry by the boards increases concentration as well as prices in the retail sector and reduces retail employment growth.[5] Klapper et al. (2006) exploit variation in the responsiveness of industries to identify effects of country-level entry cost measures from Djankov et al. (2002). They report that higher entry costs in a country lowers entry of limited-liability firms, increases the average size of these entrants and slows down their average labor productivity growth more in industries with naturally high entry than in others.[6] Kaplan, Piedra and Seira (2007) and Bruhn (2008) study a recent policy reform in Mexico that has simplified business registration differentially across municipalities and time since 2002. They report that the reform increased the number of registered businesses and provide more detailed explanations for this result.

Second, there is also a literature on how other forms of product market regulation and liberalization reforms affect industry dynamics and labor market outcomes. Bertrand et al. (2007) argue that the French banking deregulation of 1985 decreased barriers to entry into the non-financial sector of the economy. Most important in our context, they report positive effects of this country-level shock on the reallocation of assets and jobs at the industry level, with effects arising mainly at the extensive margin via entry and exit of firms. Aghion et al. (2009) report that EU-wide as well as UK-specific policy reforms, which liberalized product markets and reduced entry costs, have led to more greenfield foreign firm entry in the UK between 1986 and 1992. Kugler and Sauer (2005) investigate the returns to occupational licensing.[7] Using specific features of the re-licensing requirement the Israel Ministry of Health imposed on Soviet immigrant physicians to identify the effects, they find that occupational licensing leads to excess wages and negative selection for license status. Eslava et al. (2009) focus on labor and capital adjustments in response to factor and product market reforms in an emerging country, namely in 1990 in Columbia. Interestingly in our context,

[5] Sadun (2008) follows a similar approach to study the consequences of entry restrictions for large retailers on smaller independent stores in the UK.

[6] Fisman and Sarria-Allende (2004) and Ciccone and Papaioannou (2007) provide related evidence. Schaumans and Verboven (2008) or Griffith and Harmgard (2008) take a different methodological approach based on the entry literature in empirical industrial organization. Schaumans and Verboven (2008) analyze the interaction between geographical entry regulation and mark-up regulation in Belgian health care professions. Griffith and Harmgard (2008) investigate the effects of planning regulation on entry of large format supermarkets in the grocery retail sector in the UK.

[7] Occupational licensing regulates the entry into an occupation by imposing standards of practice and minimum qualification requirements on all individuals working in the occupation (see, for example, Stiglitz, 1971, and Kleiner, 2000). This kind of regulation is different from ours, where individuals can work in an occupation with entry regulation without having a master craftsman degree, and even without having a vocational training certificate.

they find stronger effects of the reforms on labor adjustment, especially on the job destruction side, than on capital adjustment.

While some of these papers investigate effects of entry and other product market regulation in mature market economies, some use micro data on transition or emerging economies. We contribute, instead, an empirical analysis that relies on the unique German reunification quasi-experiment where a mature and a transition economy can be observed at the same time under the same regulatory framework.

The paper is organized as follows. In section 2, we discuss the relevant background on entry regulation and German reunification. In section 3, we present the empirical model. A brief description of the data and our main variables follows in section 4. In section 5, we present the empirical results and section 6 concludes.

2. Background Discussion

After the breakdown of the German Democratic Republic (GDR), East Germany underwent rapid structural changes. Burda and Hunt (2001) document the extent of changes between 1989 and 1990: GDP declined by about 30 percent and employment by about 35 percent. On a similar scale, joblessness (registered unemployment plus hidden unemployment generated by early retirement schemes, involuntary part-time work, and so on) increased from officially zero to about 33 percent.[8] While structural changes were particularly rapid during the first years after the fall of the Berlin Wall, they continued to be pronounced during the rest of the 1990s.[9]

In Graph 1 we document the evolution of self-employment as a fraction of the population in East Germany between 1991 and 2000 using aggregate data of the Federal Statistical Office ("Statistisches Bundesamt Deutschland"). The graph also includes the figures for West Germany since 1980. In East Germany, self-employment as a fraction of the population rose from 2.2 percent in 1991 to 3.6 percent in 2000; that is by 64 percent. Self-employment accounted for about 4 percent of the population in West Germany up to the 1990s, during the 1990s this figure rose by about 15 percent. Overall, the graph documents an impressive catching-up of self-employment in the region of the former GDR.

Upon closer inspection, however, it turns out that there is systematic heterogeneity in the evolution of self-employment across occupations and across regions. The pattern depends, in particular, on whether occupations are subject to the entry restriction of the German Trade

[8] For earlier accounts, see Akerlof et al. (1991) or Sinn and Sinn (1992).
[9] See, for example, Burda (2006).

and Crafts Code or not. In Table 1 we use survey data which we describe in greater detail in Section 4 to show self-employment as a fraction of employment by survey wave, region, entry regulation and the time period of entry into self-employment. Note that our survey data includes information on the current employment status of survey participants. For self-employed people it also indicates the year they had started that activity.

The East German survey data for 1991/92 indicates a higher share of self-employment in activities that had started after reunification in occupations without entry regulation (4.3 percent) than in regulated occupations (3.1 percent). In West Germany, a similar pattern arises, but on a lower level: 1.4 percent in unregulated occupations and 0.8 percent in regulated ones. Consistent with what we expect for a transition economy relative to a mature market economy, newly started self-employment in East Germany is exceptionally high shortly after reunification. In the survey data for 1998/99, the fractions of self-employment started after 1989 in regulated occupations are relatively similar in East and West Germany (4.8 and 4.0 percent). In unregulated occupations, the East German fraction is nearly twice as high (10.8 percent) as the West German one (6.0 percent). Overall, Table 1 documents large variations in self-employment shares across region and across occupations with and without entry regulation.

The entry regulation we are looking at follows from the German Trade and Crafts Code. The law that was in effect in the Federal Republic of Germany in West Germany before reunification was extended to East Germany in July 1990.[10] The roots of the law go back to times long before World War II. In 1897, parts of the historical guild system in Germany became institutionalized as a first counter reaction to the introduction of the freedom of trade ("Gewerbefreiheit") in the German Reich in 1871. In 1908 the master certificate was imposed on individuals who wanted to train apprentices in one of the regulated occupations ("Kleiner Befähigungsnachweis"), and its relevance was substantially extended in 1935: the master certificate in a regulated occupation then gained the role of a mandatory educational standard imposed on all individuals who want to be registered so that they can start a legally independent business in that occupation ("Großer Befähigungsnachweis"). This entry

[10] See the Handwerksordnung (HWO) and the Ergänzende Vorschriften zur Handwerksordnung (1953) and its minor updates up to the end of the 1990s. See also the Gesetz über die Inkraftsetzung des Gesetzes zur Ordnung des Handwerks (Handwerksordnung) der Bundesrepublik Deutschland in der Deutschen Demokratischen Republik (1990) and the Vertrag zwischen der Bundesrepublik Deutschland und der Deutschen Demokratischen Republik über die Herstellung der Einheit Deutschlands (1990), Anlage I, Kapitel V, Sachgebiet B, Abschnitt III.

regulation was confirmed in the post-war version of the West German Trade and Crafts Code of 1953.[11]

The set of occupations to which the law applies covers many occupations that were organized as guilds in the Middle Ages and various later additions (Boyer, 1990; Deregulierungskommission, 1991). Examples of regulated occupations include carpentry and plastering, printing and bookbinding, glassblowing, smiths and locksmith trades, textile processing, baker and butcher trades, as well as hairdressing. In contrast, copy and paper production, plate glass production, textile refinement, ice-cream production and fishing or beautician services do not fall under this regulation. The examples of regulated occupations indicate that these are in various fields such as building and interior finishing, printing, glass production, metalworking, clothing and textiles, food, body care, or cleaning.

The examples also make clear that regulated and unregulated occupations can be closely related, such as bakers (regulated) and ice-cream production (unregulated) or hairdressing (regulated) and beautician services (unregulated). There is, however, the concern that regulated occupations might not represent a random sample from the population of occupations. Systematic, omitted factors could drive both regulation and our outcome variables, entry into self-employment and occupational mobility. The fact that the entry regulation goes back many decades or even centuries, might mitigate the problem. More importantly though, we choose an empirical approach to estimate average regulatory effects that compares differences between regulated occupations and unregulated occupations in East Germany to the corresponding differences in West Germany. Thereby, we allow for unobserved effects on our outcome variables that may differ systematically across occupations while being constant across regions (see section 3 for details).

The master craftsman certificate is an educational degree that a person can acquire after several stages of training, collecting work experience, and examination. First, the individual needs a basic vocational training degree in a relevant occupation; this typically involves two or three years of apprenticeship ("Lehre und Lehrabschluss"). Second, the individual needs several years of work in the occupation and a related journeyman degree ("Gesellenzeit und -brief"). This represents the formal requirement for admission to the

[11] See § 1 and § 7 HWO. Exceptions are possible for individuals with skills that are considered to be adequate, but such exceptions were rarely granted during the 1990s. Decisions on exceptions are taken by the public administration with involvement of the Trade and Crafts Chamber ("Handwerkskammer") in charge (§8 HWO, Monopolkommission, 1998 und 2001). In addition, there exist some educational degrees that are considered as equivalent to the master degree by law, but are similarly time-consuming to acquire (§7 HWO). Non-incorporated firms can be registered if a fully liable owner holds a relevant master certificate, in case of incorporated firms the managing director ("Betriebsleiter") has to fulfill the requirement (see § 7 HWO).

master examination ("Meisterprüfung"). To prepare for this examination private institutions offer courses that take one to three years and can be taken part- or full-time. The master exam has both occupation-specific parts and general components; these include, for example, law, book-keeping, controlling, marketing and human resource management. A regional committee of five members examines the master candidate and the examination is not public. Three members of the committee are incumbents holding a master certificate from the same occupation as the candidate (and potential entrant). During the 1980s, the candidates in about 25 percent of all exams failed (Deregulierungskommission, 1991). Altogether, there is substantial time investment needed to get a master certificate, not only direct costs, like course fees, are involved.

Proponents of the entry regulation in the German Trade and Crafts Code argue the regulated markets would work inefficiently or fail without that regulation due to information asymmetries and external effects. Among the regulatory benefits they name are high quality of produced goods and services including consumer protection[12] and training activities providing skilled workers for other sectors of the economy. The German monopoly commission and several other German or EU institutions have long criticized this view (Deregulierungskommission, 1991; Monopolkommission, 1998 and 2001). At first, they argue that many of the goods that are produced in the regulated markets are standard experience goods. In addition, reputation effects and private training incentives of firms, besides others, should work towards efficient market outcomes regarding product quality and training activities. Entry regulation is expected to come with the drawbacks of higher product prices and lower production quantities. In addition, entry and industry dynamics, competition, job creation, innovation and economic growth in the regulated markets should be lower than they would be without that entry regulation.

After the foundation of the GDR in 1949, the GDR government fostered the creation of socialist production companies. Over time their number grew to several thousands. They were often involuntary associations of companies that had been private beforehand. As a consequence, the number of private companies and self-employed people declined tremendously. According to Zimmermann et al. (1985), private companies and self-employed people were most likely to be permitted in the GDR whenever the expected gains from letting these contribute to meeting the demand for goods and services were higher than the gains from socializing these private entities.

[12] In conjunction, entry regulation is argued to prevent cut-throat competition that would drive high quality producers out of the market.

The socialistic government tried, however, to fully integrate all economic activities, including those of private companies and self-employed people, into the planned economy system. Direct and indirect sanctions were both used to achieve this goal. Socialist production cooperatives were, for example, exempt from taxes and were given priority treatment in the assignment of input material. In contrast, private entities were not allowed to employ more than 10 employees during the 1980s and had to pay high taxes. In addition, they were directly under control of the local planning authorities who decided not only on entry, but also on the allocation of labor, the access to other inputs, the type and amount of goods and services produced, delivery times, opening hours and customer service. Altogether, it is important to note that those entities that were considered as having a "private" status in the former GDR were considerably restricted in their decision making. Thus, they differ substantially from private companies or self-employed people in the West German market economy.

In Table 1 we show, among others, the share of employed individuals in East Germany who were self-employed and had entered before reunification, that is, up to 1989. For the occupations falling under the entry regulation of the German Trade and Crafts Code after reunification the share is 6 percent in the survey data of 1991/92. In the occupations without that entry regulation, the corresponding figure is about 1.5 percent. We will get back to this in Section 5.3 when investigating the robustness of our main empirical findings.

While the GDR regime effectively regulated the number of private entities in all occupations via decisions on trade applications ("Gewerbeanmeldung"), a master certificate was also needed in some occupations (Deregulierungskommission, 1991). This reflects the fact that the GDR planned economy system formally kept an entry regulation derived from the German Trade and Craft Code before World War II and also kept the relevant educational degrees.[13] Owing to the same historical origins, the set of covered occupations is similar to the one of the West German Trade and Crafts Code. As all educational degrees obtained in the former GDR were acknowledged by the reunification contract, East Germans with a master certificate met the formal requirement relevant for running a business in the respective regulated occupation right after reunification. This is important in the context of our empirical analysis; if no East German had fulfilled the entry requirement during the first years of reunification we would see even larger effects of the regulation than the ones we report in Section 5.

[13] See Gesetzesblatt der DDR, Teil I Nr. 78 (23.12.1957) and Gesetzesblatt der DDR, Teil I Nr. 9 (20.2.1975).

3. Empirical Approach

To identify the effects of entry regulation on entry into self-employment and occupational mobility we exploit a natural experiment which consists of a substantial change in the regulatory context. This change arises due to German reunification.

The geographical scope of the West German Trade and Crafts Code that imposes the entry regulation under scrutiny here was extended to East Germany in July 1990. In the course of the extension neither the elements of the West German Code that regulate firm entry nor their interpretation underwent relevant region-specific adaptations. In particular, entry is regulated in the same set of occupations in both German regions after reunification.

While the same law applies, the economic context differs fundamentally across regions. In the years after German reunification, West Germany represented a mature market economy. Market structures were relatively stable and firm entry mostly contributed to the constantly ongoing process of replacing exiting incumbents and adapting market structures in response to regular demand fluctuations or incremental technological change. In addition, the pool of West Germans holding the relevant educational degrees to fulfill the entry requirement in regulated occupations after reunification consisted of people who decided freely on their education. They had the chance to consider information on existing entry regulation when making their educational decisions.

In contrast, East Germany started an unanticipated transition from a planned to a market economy after reunification. First, industry production quickly collapsed and the GDR capital stock was found to be largely obsolete. New entrepreneurial activities, firm entry, industry restructuring, factor reallocation and occupational mobility were suddenly needed to an unusually high extent. Second, the pool of East Germans holding the relevant educational degrees to fulfill the entry requirement in regulated occupations after reunification was dominated by people who received their degrees during GDR times (see also section 2). The GDR's planned economy system restricted individuals' training choice in various respects.[14] Aside from that, the event of German reunification was unforeseen, as well as the options for entrepreneurial activity arising after reunification and their regulation.

Due to these differences, we expect that entry regulation based on the Trade and Crafts Code reduces entry into self-employment and occupational mobility more in the regulatory

[14] The constitution of the GDR established that everybody had not only the right but also the duty to get a vocational degree either through the vocational training system or through technical college. Education was considered as one of the means to increase societal equality; children and parents, for example, should not have the same occupation. In addition, the central planning system determined the occupations where in future more people should work in and where young people should therefore be trained in.

context of the East German transition than in the context of the mature West German market economy. The same regulatory rules should be more binding in East than in West Germany for the following two reasons: (1) the unexpected economic transition necessitates substantial industry and labor dynamics and (2) the pool of people fulfilling the entry requirement in regulated occupations depends on decisions taken under the GDR's planned economy system.

We are interested in the average effects of the shift in the regulatory context on entry into self-employment and occupational mobility in the regulated occupations. To estimate such an effect we compare the difference between the relevant average outcome in regulated occupations and unregulated occupations in East Germany to the corresponding difference in West Germany after reunification. The equation that we run on data from repeated survey cross-sections is as follows:

$$Y_{iorw} = \beta_0 + \beta_1 R_o + \beta_2 E_r + \beta_3 R_o \bullet E_r + X_{iw}^{'}\delta + u_{iorw} . \qquad (1)$$

The variable that we want to explain is *Y*. It is coded one if individual *i* reports being self-employed at the time of the survey and having started that activity after 1989 (or being employed in an occupation changed to after 1989), zero otherwise. Entry regulation is indicated by *R* and the East German region by *E*. Index *o* refers to occupations, *r* indexes regions, and *w* indexes survey waves. The error term is *u*; β_0 to β_3 and δ indicate the regression coefficients. The vector *X* covers a survey-wave indicator and the individual characteristics age, gender and education.

Our main interest is in β_3, the coefficient of the interaction between entry regulation *R* and East Germany *E*. From our exposition above, it follows that we expect β_3 to be negative; it reflects the average effect of the change in the regulatory context in the regulated occupations. Our approach is similar to a standard difference-in-difference approach in two respects (Blundell and MaCurdy, 1999; Blundell and Costa Dias, 2008).[15] We allow for additive unobserved effects on outcome *Y* that may differ systematically across regulated and unregulated occupations while being constant across regions. In addition, we allow for additive unobserved region-specific macro shocks on outcome *Y* that are common to both groups of occupations.

[15] The standard difference-in-difference setting involves comparing two groups before and after a policy change. One group is affected by the policy change and the other group is not. Assuming parallel time trends in both groups and stable composition of each group across time, the difference between the average outcome in the treated group over time minus the corresponding difference in the comparison group identifies the average effect of the policy change in the treated group. The average treatment effect on the treated is equivalent to the population average treatment effect if individuals' responses to the policy change are homogeneous or if individuals with heterogeneous responses are assigned at random to treatment.

Since systematic variation in the occupational composition of the group of regulated occupations or the group of unregulated occupations across regions would influence our estimates, we include occupation effects in our preferred specifications. To also account for variation across survey waves we let these vary over time. The estimation equation is:

$$Y_{iorw} = \beta_0 + \gamma_{ow} + \beta_2 E_r + \beta_3 R_o \bullet E_r + X_{iw}^{'}\delta + u_{iorw} . \qquad (2)$$

The survey-wave-specific occupation fixed effects are denoted by γ_{ow}. They account for unobserved occupation-specific determinants of *Y* that can vary over time. When using such a specification, the full set of survey-wave-specific occupation effects replaces the level effect of entry regulation averaged across all regulated occupations (equivalent to β_1 in equation 1).

To estimate these equations we apply the linear probability model despite the discrete nature of our dependent variables. There are several reasons for doing so (Wooldridge, 2002). First, our main explanatory variables are discrete. In a basic saturated specification with dummies for entry regulation and East Germany and their interaction as only explanatory variables these three variables determine four mutually exclusive and exhaustive categories; the fitted probabilities are simply the average outcomes in the four cells and these can't fall outside the unit interval. Second, in our preferred specifications we include a large vector of wave-specific occupation indicators which is not possible in a standard non-linear discrete choice model. Third, we are interested in estimating partial effects of the main explanatory variables on the response probabilities that are averaged across the distribution of the vector of explanatory variables and, therefore, some predicted values that are outside the unit interval may be less relevant. In section 5.1, we also compare linear probability estimates to average marginal effects computed from non-linear probit estimates following Ai and Norton (2003) and Norton, Wang and Ai (2004). The comparison indicates that our main findings are invariant to the choice of method.

In all regressions, observations are weighted to account for the sampling design and to readjust to the structure of the population sampled from (Wooldridge, 2002). Displayed standard errors allow for correlation between individuals within the same occupation.

4. Data

The data for our empirical analysis come from the "Qualification and Career Survey", which is a survey carried out by the German Federal Institute for Vocational Training ("Bundesinstitut für Berufsbildung, BIBB") and the Research Institute of the Federal

Employment Service ("Institut für Arbeitsmarkt- und Berufsforschung, IAB"). We use three survey waves launched in 1985/86, 1991/92 and 1998/99, each covering about 30,000 employed individuals, both men and women. Most important for our purposes are the two survey waves carried out after German reunification (1991/92 and 1998/99) since these include information on East and West Germany. Data for West Germany from the survey wave before German reunification (1985/86) becomes relevant when we investigate the robustness of our main findings.[16]

In our empirical analysis, we first explore the probability of entry into self-employment after the fall of the Berlin Wall in November 1989. The dependent variable in this part of our analysis is coded one for individuals who are self-employed at the time of the survey and who started that activity after 1989. Then, we investigate the probability of occupational mobility after reunification. Here, the dependent variable is a dummy variable equal to one for individuals who are working in a different 3-digit occupation at the time of the survey than the occupation in which they were initially trained, and who report an occupational change after 1989. The occupational information in our survey data follows the 3-digit classification of occupational titles of the Federal Employment Bureau ("Bundesanstalt für Arbeit, BA") in the 1988 version.

Our main explanatory variables are dummy variables for entry regulation, East Germany and their interaction (*R*, *E*, and *R*E* in equations 1 and 2). Entry regulation is coded one for occupations with entry regulation and else zero. The encoding is based on information in the German Trade and Crafts Code as it was in force during the 1990s and on our survey data on the occupation an individual currently works in. The dummy variable for East Germany indicates current residence in East Germany.

We use the following demographic and educational variables to capture influences of individual heterogeneity on decisions regarding entry into self-employment or occupational mobility: age in years, gender (coded one for males, zero for females), and three indicator variables for education categories. We classify individuals with a degree from a university or a technical college as being highly educated. Survey participants reporting a vocational training degree either from the dual system of apprenticeship or a vocational school are in the medium-education category. The low-education category covers individuals holding neither a vocational training degree nor a higher educational degree. Appendix Table A.1 shows descriptive statistics of the variables described above and all others that we use in regression analyses.

[16] Please see the data appendix and Spitz-Oener (2006) for further details on the data that we use.

Our main sample for the empirical analysis on entry into self-employment includes survey participants in 1991/92 and 1998/99 that are 20 to 59 years old, work from 10 to 75 hours per week, have German nationality, and report all the information relevant to us.[17] We exclude the public sector: occupations and industries that were primarily in the public sector in Germany during the 1990s (education, postal services, railways, utilities), civil servants, and other employees in public administration. We also eliminate employees in non-profit organizations (churches, parties, associations) and the mining and quarrying sector. Next, we select all individuals working in occupations that are accredited by the Federal Ministry of Education and Research and the BIBB ("Anerkannte Ausbildungsberufe") and covered by the dual system of apprenticeship.[18] This is our population of interest, since the German Trade and Crafts Code regulates firm entry in some of the accredited occupations, but not in others. Accredited occupations account for about 61 percent of the employed individuals in the raw data of the survey waves 1991/92 and 1998/99. Entry regulation applies to about 32 percent of these.

Residents of Berlin are excluded since working in one part of Germany, but living in the other one, is particularly common in Berlin. We also eliminate migrants who are living in East or West Germany and have German nationality but grew up either in a foreign country or in the other part of Germany than they currently live in. About 65 percent of these migrants among the employed individuals in our raw data came to West Germany from East Germany or Eastern European transition countries. We prefer to exclude migrants from our main sample because their labor supply decisions probably also depend on the economic environment in which they grew up, and not only on the one of their current main residence.

5. Empirical Results

5.1 Entry into self-employment after reunification

In this section we investigate effects of the entry regulation in the German Trade and Crafts Code on entry into self-employment after reunification. Table 2 shows estimates of linear probability models for the main sample of employed individuals as described in section 4. In column 1 we use a model specification with the level terms of the indicators for entry regulation and East Germany only, besides the constant and a survey-wave indicator. This

[17] In addition to the main sample, we introduce several sample variants in sections 5.2, 5.3 and 5.4.

[18] The main characteristic of the German dual system of apprenticeship is that acquisition of human capital consists of both on-the-job training in companies and training in schools, thereby providing a combination of firm-specific and general skills. See Harhoff and Kane (1997), and reference cited there, for a detailed description of the dual system of apprenticeship.

indicator accounts for any aggregate influence on the outcome variable that is specific to one of the survey waves. In column 2, we add the main variable of interest: the interaction between entry regulation and East Germany. Then we expand the vector of explanatory variables with individual characteristics to account for potential effects of individual heterogeneity on self-employment decisions. Finally, in column 4, we also include wave-specific occupation indicators to capture determinants that are specific to occupations and time periods. Examples are factors such as market size or growth.

For our main variable of interest, the interaction between entry regulation and East Germany, we find negative and significant coefficient estimates in columns 2 to 4 of Table 2. All estimates indicate a negative average effect of the shift in the regulatory context in regulated occupations. Due to entry regulation, the probability of being self-employed in an activity started after reunification is between 5.4 and 5.7 percentage points lower for employed individuals in regulated occupations in East Germany than for those in West Germany. The finding is in line with our expectation that the entry regulation in the German Trade and Crafts Code is more binding in East than in West Germany due to the unexpected need for substantial industry and labor dynamics during transition and the relevance of decisions from GDR times for the pool of people fulfilling the entry requirement in regulated occupations after reunification.

With regard to the level effects of the indicators for entry regulation and East Germany the results are as follows. The estimates for the coefficient of East Germany are positive, highly significant and economically large in columns 1 to 4 of Table 2: the probability of self-employment started after reunification is between 4.8 and 7.3 percentage points higher for East than for West German employed individuals. This finding coincides with our expectation that economic transition in East Germany involves an exceptionally high level of industry and labor dynamics. The coefficient estimates for entry regulation in columns 1 to 3 of Table 2 are negative and significant at about the 10 percent level. While a negative level effect would be consistent with the hypothesis that entry regulation slows down entry into self-employment, note that it could simply reflect unobserved factors that influence self-employment decisions in regulated occupations.

The coefficient estimates for the demographic and educational characteristics in columns 3 and 4 of Table 2 are in line with our expectations and the findings of related literature. We find, for example, a concave relationship between age and the probability of self-employment started after reunification and see a higher probability for men than for

women. Employed individuals with a high education have a higher probability of self-employment started after reunification than those with a medium education.

As discussed in Section 3, we prefer to show estimates from a linear probability model. Since our dependent variable is discrete, however, we also estimate a corresponding non-linear probit model and calculate average marginal effects for the interaction term of main interest (Entry Regulation*East Germany) from these estimates (Ai and Norton, 2003; Norton, Wang and Ai, 2004). In the model specification in column 2 of Table 2, the average marginal effect based on probit estimates is -0.0538** *(standard error: 0.0228)*. In the specification in column 3, the estimate is -0.0608** *(standard error: 0.0243)*.[19] Overall, comparing these average marginal effect estimates to those from the linear probability model in Table 2 shows that our main estimation results and conclusions are invariant to the choice of method.

5.2 Robustness checks

One concern with our empirical approach is that our regulatory effect estimates could be driven by occupation-specific industry and labor dynamics in the mature West German economy triggered by reunification. The West German region that we rely upon for comparison was hit by a positive demand shock after the opening of the border to the collapsing GDR. At that time, the 16 million consumers of the GDR focused strongly on products and services of Western quality standards – a demand shock that may have been differential across occupations. In particular, it may have driven up entry into self-employment in regulated occupations in West Germany to the extent that it contributes to the negative coefficient on the interaction term between entry regulation and East Germany that we observe.

To explore this possibility, we take advantage of the fact that we have an additional survey wave that was conducted in West Germany a few years before reunification (in 1985/86). We estimate a specification that is similar to the one in column 4 of Table 2 but we now use an expanded sample that includes observations from the survey wave 1985/86. The West German part of this sample is about 60 percent larger than the West German part of our main sample. We redefine the dependent variable such that it now indicates self-employment started after 1984 in West Germany and after 1989 in East Germany. The results are shown in Table 3, column 1; we again find a negative and significant coefficient on the interaction term

[19] Including the full set of survey-wave-specific occupation controls that we use in the model specification in column 4 of Table 3 into a standard non-linear discrete choice model is not feasible.

between entry regulation and East Germany, and a similar size of the coefficient. Hence, there is no empirical support for the view that occupation-specific, reunification-induced demand changes in West Germany account for the negative average effect of the shift in the regulatory context in regulated occupations that we have reported so far.

In East Germany after reunification, there could be heterogeneity in the need for restructuring across occupations that impacts our regulatory effect estimates. In particular, more expansion or contraction may take place during transition if the size of an East German occupation after reunification differs greatly to the size of the corresponding occupation in the mature West German economy. To capture potential heterogeneity in the need of occupations to restructure, we use employment data from the first survey wave after reunification (1991/92) and calculate the deviation of the employment share per occupation in the region from the corresponding West German share, divided by the West German share. Note that the variable is zero for all observations in West Germany. We include it as an additional explanatory variable in our preferred model specification.

The estimation results are reported in Table 3, column 2. We see our previous results for the interaction between entry regulation and East Germany confirmed.[20] The coefficient estimate for the variable that measures the need for restructuring in East German occupations during transition is negative and statistically significant. This indicates a lower probability for self-employment started after 1989 in occupations that are larger shortly after reunification compared to the relevant West German occupation.

Another possibility is that our regulatory effect estimates reflect dynamics that are related to incumbent self-employment structures. In occupations with many incumbents, profit expectations of potential entrants are ceteris paribus likely to be lower than in occupations with only a few incumbents. Table 1 indicates, for both survey waves, that East Germany has a higher share of self-employment that was started before reunification in regulated occupations than in occupations without entry regulation. In West Germany, these shares are more similar across the two groups of occupations. Thus, we set out to explore the potential relevance of variation in incumbent self-employment across occupations and regions for self-employment started after reunification.

To measure incumbent self-employment, we calculate the occupation- and region-specific employment share of self-employment started before 1985 as reported in the survey wave 1991/92. Then, we interact it with the indicators for East and West Germany,

[20] We come to similar conclusions if we compare the employment share per occupation in East Germany in 1991/92 to the corresponding West German share in 1985/86 instead of in 1991/92. The respective estimation results are available upon request as are all other results that we discuss elsewhere in Section 5 but don't report.

respectively, and add both variables to our estimation equation. Most importantly, the results in Table 3, column 3, confirm our previous findings of a negative and significant coefficient for the interaction between entry regulation and East Germany.[21]

For the additional explanatory variable indicating incumbent West German self-employment, we find a negative and significant coefficient in line with the expected effect on profit expectations of potential entrants that we noted above. The corresponding coefficient for incumbent East German self-employment is, in contrast, small and insignificant. This result is consistent with the fact that self-employment permitted in the planned economy system of the former GDR was of a rather restricted form. Self-employment that was started before 1985 in the former GDR and continued until 1991/92 is neither directly comparable to incumbent entrepreneurial activity in the West German market economy nor did these self-employed incumbents adapt quickly after reunification to exert similar effects on profit expectations of potential entrants as those in West Germany.

In a next step, we explore whether our regulatory effect estimates are influenced by industry heterogeneity that is not captured by wave-specific occupation effects. Hence, we augment our preferred specification from column 4 of Table 2 by allowing for wave-specific 2-digit industry effects. In addition, there could be variation in the skill structure across industries and across regions that impacts our regulatory effect estimates. We calculate the industry- and region-specific employment share of highly-educated employed individuals as a proxy for the industry skill structure. We use the 1991/92 survey wave for these calculations, and we consider the interaction terms of this skill variable with the indicators for East and West Germany, respectively, as explanatory variables.

Again, the estimation result for the interaction term between entry regulation and East Germany is very similar to our previously reported results. The coefficient estimates for both the additional explanatory variable are positive, they do not differ significantly from each other and the one for West Germany is significantly different from zero.[22]

In the last column of Table 3, we explore how our regulatory effects change over time by allowing the coefficients on our main explanatory variables to vary across survey waves. For 1998/99, we find a negative and significant interaction effect between entry regulation

[21] The same result follows from estimating an augmented specification where we include our measure of incumbent self-employment directly as a regressor, not interacted with region indicators. Our findings are, for example, also robust to using the wave-specific employment share of self-employment started before 1985 or the employment share of self-employment started before 1989 as calculated from the 1991/92 data.

[22] Our main finding for the interaction between entry regulation and East Germany remains robust if we use the wave-specific share of skilled employed individuals interacted with the indicators for East and West Germany or if we use the skill structure measure based on 1991/92 data directly as a regressor, not interacted with region indicators.

and East Germany on the probability of self-employment started after reunification. The corresponding effect for 1991/92 is also negative but smaller and just fails to pass the 10 percent significance level. Altogether, we find stronger and more precise effect estimates when using data from the survey wave 1998/99 on self-employment that was started during the 1990s, than from the 1991/92 data.

Finally, we check the robustness of our main findings to the following sample changes. First, we inspect the sensitivity of our findings when re-estimating the model specification from column 4 of Table 2 to include migrants and residents of Berlin. The estimation results (Table A.2, column 1) are robust to this change. Second, we use a sample without self-employed individuals that started before 1990 and find that these observations do not drive our estimation results (Table A.2, column 2). Third, we re-estimate the equation explaining entry into self-employment after reunification with a sample where we use all occupations, including those that are not accredited by the Federal Ministry of Education and Research and the BIBB (Table A.2, column 3).[23] Results are robust to this sample variation.

5.3 Self-employment decisions and entry costs

In this section we explore more directly the link between self-employment decisions and the entry costs imposed by the German Trade and Crafts Code. As discussed previously, individuals who want to start an independent firm in one of the regulated markets need a master certificate in a relevant occupation. Getting a master certificate requires completing a basic vocational training of two to three years, collecting work experience for several years, acquiring the journeyman degree in the respective occupation, and passing the master examination. In addition, there are direct costs like course fees.

To investigate the relevance of these entry costs in greater detail, we explore how our main regression results vary across two groups of individuals: employed individuals who received their initial training degree in the same 3-digit occupational class as they currently work in and those who changed the occupational class at some point after their initial training.[24] Employed individuals who are still in the occupation they were initially trained in had ceteris paribus more time to acquire occupation-specific educational degrees than the

[23] As an additional robustness check we excluded individual 3-digit occupations and federal states one by one. Our main findings are not sensitive to this kind of sample variation.

[24] For this part of the analysis we use information on the 3-digit occupation in which survey participants received their first training degree. Consequently we have to impose additional exclusion restrictions on the main sample described in section 4: we eliminate all observations where data on the 3-digit occupation of the initial occupational training degree are not available, thus excluding all individuals with low education, by definition, they never completed a vocational or higher educational training. The reduced sample covers 23,659 individuals.

others. Since the formal requirements for the master examination are time-consuming to fulfill, the mandatory educational standard in regulated occupations should constrain decisions on self-employment after reunification less among employed individuals who are still active in their initial occupation. We expect to see less pronounced regulatory effects for these than for those who changed the occupation after receiving their initial training degree.

Table 4 displays estimates of our preferred model specification from column 4 in Table 2 on three different samples. In Column 1, we use the sub-sample of employed individuals who are currently in a different occupation than they were initially trained in; in column 2, we use the sub-sample of employed individuals who are still in their initial occupation. In line with our expectations, we find a negative and significant coefficient of similar magnitude as before for the interaction between entry regulation and East Germany in column 1, and a negative but small and insignificant one in column 2. For comparative purposes, column 3 provides the results when replacing the main sample used in Table 2 with the sample that we get after applying the additional exclusion restrictions relevant to our analysis here (see footnote 24). We see similar results as in column 4 of Table 2.

Altogether, the evidence in Table 4 suggests that the entry regulation based on the German Trade and Crafts Code strengthens the relevance of long-term decisions for the formation of the pool of people who fulfill the entry requirement. As a consequence, we see strongly binding effects of the regulation during the unexpected economic transition in East Germany involving substantial industry and labor restructuring. Similar situations arise when industries need to adapt due to sudden, drastic technological change, or when economies need to restructure after other unforeseen, substantial economic shocks.

5.4 Occupational mobility after reunification

In the last part of our analysis, we take a broader view and investigate regulatory effects on occupational mobility among workers after reunification. In Table 5, we use regression specifications that are similar to those in Table 2 up to the dependent variable. This is now a dummy variable equal to one for individuals who are working in a different 3-digit occupation at the time of the survey than the occupation in which they were initially trained, and who report an occupational change after 1989.[25]

[25] The regression results that we show are for a sample derived from the main sample by applying two additional exclusion restrictions: we eliminate individuals who are either self-employed or for which data on the 3-digit occupation of the initial occupational training degree are not available. The reduced sample covers 21,192 individuals.

As for entry into self-employment, our focus is on the interaction between entry regulation and East Germany in the model specifications in columns 2 to 4 of Table 5. As discussed before, these specifications come with the methodological advantage of allowing for region-constant unobserved differences between the group of regulated occupations and the group of unregulated occupations as well as group-constant macro shocks that might differ across regions. Consistent with what we see in the self-employment equations, the coefficient estimates on the interaction term are all negative and precisely estimated. This is the case in column 2 of Table 5, where we also include the level terms of the indicators for entry regulation and East Germany as well as the constant and a survey wave indicator; in column 3, where we add individual characteristics, and in column 4, where we also allow for occupation-wave fixed effects. The findings indicate that the probability of being employed in an occupation changed to after reunification is between 5.7 and 6.9 percentage points lower for East than for West German employees in regulated occupations due to entry regulation. With regard to the level effects of the indicators for entry regulation and East Germany the results are as follows. We find positive, highly significant and economically large coefficient estimates on East Germany in columns 1 to 4 of Table 5: the effect is between 13.2 and 15.6 percentage points higher for East than for West German employees. The coefficient estimates on entry regulation are negative and highly significant.[26]

Why should entry regulation affect occupational mobility? And why should the effect be larger in the East German transition economy? In what follows, we provide several explanations for this finding.

We first have to take into account that the sample of workers includes those who want to get self-employed in the long run. This fact can have an impact on mobility decisions for workers in the regulated occupations and particularly so in East Germany; they need to stick to their occupation if they want to acquire the educational degrees relevant for the mandatory educational standard imposed by the German Trade and Crafts Code. Thus, entry regulation should ceteris paribus reduce the probability of reacting to short-run opportunities of occupational mobility that arise during economic transition in East Germany for those workers who expect high returns from starting self-employment in the long run in their initially chosen occupation. However, since the group of individuals actively preparing for later self-employment is unlikely to represent a large share of all workers, this explanation is presumably not the only one.

[26] Without discussing them in detail, we report the results of robustness checks in Table A.2, columns 4 and 5, and Table A.3. We use all model specifications that correspond to those for the model of entry into self-employment in Section 5.2.

The following additional mechanisms may also be at work: Our findings in Sections 5.1 to 5.3 suggest that entry regulation slows down entry into self-employment more in regulated occupations in East than in West Germany, and this is consistent with the view that competition is hampered more.

One consequence of less entry and less competition may be less employment growth and job creation (Bertrand and Kramarz, 2002). This, in turn, would result in employers having a larger pool of potential workers to choose from, longer job queues for scarce jobs and more job competition. Consequently, employers in East Germany have a better chance of finding workers with occupation-specific training degrees because of the entry regulation, which makes it less attractive for workers to switch into a regulated occupation.[27]

In addition, entry regulation that slows down entry and competition more in regulated occupations in East than in West Germany implies less pressure on firm rents. The existence of rents, however, is associated with business practices that firms cannot pursue otherwise. Discrimination is one such practice. Becker (1957) argues that discriminatory behavior is costly and therefore difficult for firms to maintain when they are not able to capture rents; a theoretical argument that has been supported in empirical studies.[28] In our context, firms might base their discriminatory behavior on the educational background of workers, that is, favor workers with occupation-specific educational degrees. Firms in regulated East German occupations might be able to discriminate more due to the rent effect of entry regulation in line with the pattern of occupational mobility that we observe.

6. Conclusions

Entry regulation is widespread across countries and industries, and it arises in various forms. Restrictions to entry can have effects on firm entry, competition, factor reallocation, employment, innovation, and economic growth and can lead to inefficiencies. In this study, we analyze the consequences of an entry regulation imposing a mandatory educational standard on individuals' decisions to start new businesses and on their mobility across occupations after German reunification.

For identification, we rely on the fact that after German reunification, East and West Germany – while being subject to the same law – were in very different economic situations.

[27] The arguing is in line with Okun (1982) who shows that the skill-intensity of production increases when employers increase their hiring standard as job queues lengthen. Thurow (1975) presents a similar result for the case where employers' hiring standards remain unchanged. For an incorporation of these classical studies in the more recent literature of matching functions see van Ours and Ridder (1995).

[28] See, for example, Black and Strahan (2001) and Black and Brainerd (2004).

We argue that entry regulation should reduce entry into self-employment and occupational mobility more in the regulatory context of the East German transition economy than in the context of the mature West German market economy. Building on this argument, we estimate the average effects of the change in the regulatory context by comparing the difference between an average outcome in regulated occupations and unregulated occupations in East Germany after reunification to the corresponding difference in West Germany.

Our estimation results suggest that entry regulation slows down entry into self-employment more in regulated occupations in East than in West Germany after reunification. The effects are stronger among individuals who should be more constrained than others by the imposed entry costs. We also show that entry regulation reduces occupational mobility among workers more in regulated occupations in East than in West Germany after reunification. Overall, our findings are particularly relevant for transition or emerging market economies, and for mature market economies confronted with sudden, substantial technological change or other unforeseen economic shocks that require large structural changes.

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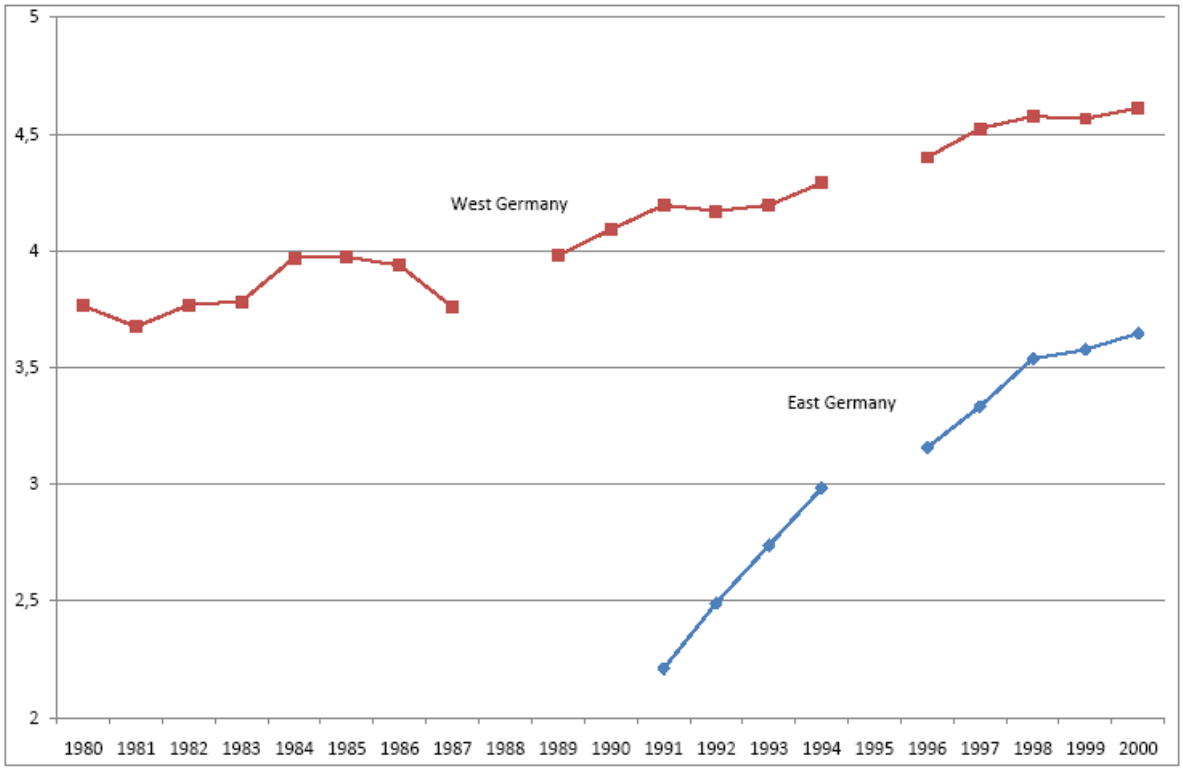
Figures and Tables

Graph 1

Self-employment as a Fraction of the Population



Note: Data for 1988 and 1995 are not available. Data source: Statistisches Bundesamt Deutschland, Statistische Jahrbücher, all years from 1981 to 2001.

Table 1

Self-Employment as a Fraction of Employment

		1991/92		1998/99	
Occupation Group	Type of Self-Employment	East Germany	West Germany	East Germany	West Germany
Entry Regulation	Entry up to 1989	6.01	9.63	4.49	7.40
	Entry after 1989	3.10	0.78	4.81	4.01
	Sum	9.10	10.41	9.30	11.41
No Entry Regulation	Entry up to 1989	1.47	8.23	1.14	4.30
	Entry after 1989	4.34	1.41	10.81	6.01
	Sum	5.82	9.64	11.95	10.31

Notes: The table shows self-employment as a fraction of employment by survey wave, region, entry regulation and the time period of entry into self-employment. The weighted descriptive statistics are for the raw sample of 66,236 employed individuals in the survey waves 1991/92 and 1998/99.

Table 2
Entry into Self-employment after Reunification
Linear Probability Estimates

Explanatory Variables:	Dependent Variable: Entry into Self-employment after 1989			
East Germany	0.0480***	0.0702***	0.0676***	0.0730***
	(.0140)	(0.0217)	(0.0213)	(0.0236)
Entry Regulation	-0.0264	-0.0133	-0.0232*	
	(0.0160)	(0.0121)	(0.0131)	
Entry Regulation* East Germany		-0.0543**	-0.0546**	-0.0566**
		(0.0225)	(0.0227)	(0.0248)
Age			0.0076***	0.0080***
			(0.0020)	(0.0024)
Age squared			-0.0001***	-0.0001***
			(0.00002)	(0.00002)
Male			0.0313***	0.0371***
			(0.0118)	(0.0091)
High Education			0.0454**	0.0200
			(0.0184)	(0.0128)
Low Education			0.0024	0.0146*
			(0.0084)	(0.0080)
Constant	0.0682***	0.0636***	-0.0866***	-0.1280**
	(0.0188)	(0.0171)	(0.0272)	(0.0511)
Survey-wave Effects	Yes	Yes	Yes	No
Occupation-wave Effects	No	No	No	Yes

Notes: The table displays linear probability estimates of the model explaining entry into self-employment after reunification. The dependent variable is coded one for individuals who are self-employed at the time of the survey and started that activity after 1989, else zero. Estimates are for the main sample of 26,661 individuals from the survey waves 1991/92 and 1998/99 that are 20 to 59 years old, work from 10 to 75 hours per week, have German nationality, and report all relevant information. Excluded are residents of Berlin, migrants, occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB, the public sector, employees in non-profit-maximizing organizations and the mining and quarrying sector. Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** denote $p<0.01$, ** denote $p<0.05$, * denotes $p<0.1$.

Table 3
Entry into Self-employment after Reunification, Robustness Checks
Linear Probability Estimates

	Dependent Variable: Entry into Self-employment after…				
Explanatory Variables:	1984 (West)/ 1989 (East)	1989	1989	1989	1989
East Germany	0.0442**	0.0690***	0.0502***	0.0539*	
	(0.0187)	(0.0227)	(0.0160)	(0.0326)	
Entry Regulation*East Germany	-0.0522**	-0.0478**	-0.0559***	-0.0552**	
	(0.0202)	(0.0230)	(0.0201)	(0.0235)	
Normalized Deviation of the Employment Share by Occupation and Region from West German Share in 1991/1992		-0.0347*** (0.0111)			
Incumbent Self-employment Share by Occupation and Region in 1991/92 (Entry<1985)*West Germany			-0.2857* (0.1612)		
Incumbent Self-employment Share*East Germany			-0.0050 (0.1174)		
Share of Highly Educated by Industry and Region in 1991/92*West Germany				0.4595* (0.2500)	
Share of Highly Educated*East Germany				0.4758 (0.4156)	
East Germany*1991/92					0.0594*** (0.0203)
East Germany*1998/99					0.0856*** (0.0284)
Entry Regulation*East Germany*1991/92					-0.0354 (0.0230)
Entry Regulation*East Germany*1998/99					-0.0783*** (0.0303)
Individual Characteristics	Yes	Yes	Yes	Yes	Yes
Occupation-wave Effects	Yes	Yes	Yes	Yes	Yes
Industry-wave Effects	No	No	No	Yes	No
Number of Observations	39,464	26,661	26,661	26,661	26,661

Notes: The table shows linear probability estimates of the model explaining entry into self-employment after reunification. The dependent variable is coded one for individuals who are self-employed at the time of the survey and started that activity after 1989, else zero. Estimates in columns 2 to 5 are for the main sample of 26,661 individuals from the survey waves 1991/92 and 1998/99 that are 20 to 59 years old, work from 10 to 75 hours per week, have German nationality, and report all relevant information. Excluded are residents of Berlin, migrants, occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB, the public sector, employees in non-profit-maximizing organizations and the mining and quarrying sector. The sample in column 1 covers 39,464 individuals as observations from the survey wave 1985/86 are added to the main sample. All specifications include the individual characteristics age, age squared, gender, high education, low education, and a constant. In all regressions, the coefficient estimates on these variables are identical in sign and similar in size and significance to those reported in column 4 of Table 2. Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** denote $p<0.01$, ** denote $p<0.05$, * denotes $p<0.1$.

Table 4
Self-employment Decisions and Entry Costs
Linear Probability Estimates

Explanatory Variables:	Dependent Variable: Entry into Self-employment after 1989		
East Germany	0.0751***	0.0196	0.0736***
	(0.0274)	(0.0131)	(0.0263)
Entry Regulation*East Germany	-0.0602**	-0.0110	-0.0586**
	(0.0302)	(0.0154)	(0.0277)
Individual Characteristics	Yes	Yes	Yes
Occupation-wave Effects	Yes	Yes	Yes
Number of Observations	10,779	12,880	23,659

Notes: The table shows linear probability estimates of the model explaining entry into self-employment after reunification. The dependent variable is coded one for individuals who are self-employed at the time of the survey and started that activity after 1989, else zero. Estimates in column 3 are based on the main sample used in Table 2 (see also section 4) with the additional restriction that individuals without information on the 3-digit occupation of their initial occupational training degree are excluded (23,659 observations). In column 1, the estimates are based on the sub-sample of individuals that changed the occupation after their initial training (10,779 observations). In column 2, the estimates are based on a sub-sample of individuals that did not change the occupation after their initial training (12,880 observations). All specifications include the individual characteristics age, age squared, gender, high education, and a constant. In all regressions, the coefficient estimates on these variables are identical in sign and similar in size and significance to those reported in column 4 of Table 2, up to the coefficient of high education that is close to zero and insignificant in column 1. Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** denote $p<0.01$, ** denote $p<0.05$, * denotes $p<0.1$.

Table 5
Occupational Mobility after Reunification
Linear Probability Model

Explanatory Variables:	Dependent Variable: Occupational Mobility after 1989			
East Germany	0.1323***	0.1564***	0.1552***	0.1537***
	(0.0159)	(0.0180)	(0.0172)	(0.0185)
Entry Regulation	-0.0772***	-0.0629***	-0.0776***	
	(0.0153)	(0.0151)	(0.0225)	
Entry Regulation* East Germany		-0.0560**	-0.0566**	-0.0692***
		(0.0269)	(0.0266)	(0.0262)
Age			0.0082***	0.0074***
			(0.0026)	(0.0023)
Age squared			-0.0001***	-0.0001***
			(0.00004)	(0.00003)
Male			0.0363**	0.0192
			(0.0193)	(0.0141)
High Education			0.0576	0.0652*
			(0.0367)	(0.0347)
Constant	0.1531***	0.1479***	0.0207	-0.0283
	(0.0187)	(0.0191)	(0.0473)	(0.0430)
Survey-wave Effects	Yes	Yes	Yes	No
Occupation-wave Effects	No	No	No	Yes

Notes: The table shows linear probability estimates of the model explaining occupational mobility among workers after reunification. The dependent variable is coded one for individuals who work in a different 3-digit occupation at the time of the survey than they were initially trained in and report an occupational change after 1989, else zero. Estimates are for the sample of 21,192 individuals from the survey waves 1991/92 and 1998/99 that are 20 to 59 years old, are not self-employed, work from 10 to 75 hours per week, have German nationality, and report all relevant information including the 3-digit occupation of their initial occupational training degree. Excluded are residents of Berlin, migrants, occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB, the public sector, employees in non-profit-maximizing organizations and the mining and quarrying sector. Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** denote $p<0.01$, ** denote $p<0.05$, * denotes $p<0.1$.

Appendix
Data Appendix

The "Qualification and Career Survey" is a survey carried out by the German Federal Institute for Vocational Training and the Research Institute of the Federal Employment Service. It includes three cross-sections for the 1980s and 90s: 1985/86, 1991/92 and 1998/99. Each survey wave has about 30,000 observations; men and women are covered.

The sampling frame of the survey is the German population of employed individuals aged 16 to 65. The selection of the sample follows a random-route process which is done on the household level. The targeted person in the household was personally interviewed; in later survey years, the interviews were done using a computer-assisted personal interview method (CAPI).

In order to guarantee the representativeness of the survey data, the data set includes several weighting factors. One weighting factor accounts for the fact that the sampling probability in random-route processes depends on household size. Another weighting factor allows the adjustment of the sample to the population according to the characteristics gender, age, occupational status, state, and size of the municipality (the reference statistics come typically from the German micro census, a 1 percent random sample of the German population). We use both weighting factors in the empirical analysis at hand.

Our data provides information on the current occupation and the training occupation of a survey participant according to the occupational classification (version: 1988) of the German Federal Employment Agency ("Bundesagentur für Arbeit") and the Federal Statistical Office ("Statistisches Bundesamt Deutschland"). Occupations are classified into 334 3-digit classes. Our raw data on 66,236 employed individuals in the survey waves 1991/92 and 1998/99 covers 328 occupation classes, among these are 195 accredited occupations. Our main sample with 26,661 employed individuals covers 183 accredited occupations and the German Trade and Crafts Code regulates firm entry into 96 of these.

Table Appendix

Appendix Table A1
Definitions of Variables and Descriptive Statistics

Variable	Definition	Mean/Share (Std. Dev.)
Entry into Self-employment after 1989	Dummy equal to one for individuals who report being self-employed with an activity started after 1989, else zero.	0.0489
Occupational Mobility after 1989	Dummy equal to one for individuals who report being employed in a different 3-digit occupation as they were initially trained in and changed the occupation after 1989, else zero.	0.1150
Entry Regulation	Dummy equal to one for occupations with entry regulation according to the German Trade and Crafts Code, else zero.	0.3507
East Germany	Dummy equal to one for residency in East Germany, else zero.	0.2060
Occupational Change	Dummy equal to one for individuals who report being employed in a different 3-digit occupation as they were initially trained in, else zero.	0.5121
Age	Age of the individual at the survey date.	38.62 (10.27)
Male	Dummy equal to one for males, zero for females.	0.5963
Low Education	Dummy variable equal to one for individuals with no vocational training degree, else zero.	0.1015
Medium Education	Dummy variable equal to one for individuals with a vocational training degree either through the dual system of apprenticeship or through a vocational school, else zero.	0.8438
High Education	Dummy variable equal to one for individuals with a degree from a university or a technical college, else zero.	0.0548
Normalized Deviation of the Employment Share by Occupation and Region from West German Share in 1991/1992	Deviation of the employment share per occupation in region from the corresponding West German share in 1991/92, divided by the West German share.	0.0201 (0.3560)
Incumbent Self-employment Share by Occupation and Region in 1991/92 (Entry<1985)	Occupation- and region-specific employment share of self-employment started before 1985 as reported in 1991/92.	0.0678 (0.1214)
Share of Highly Educated by Industry and Region in 1991/92	Industry- and region-specific employment share of employed individuals with a high level of education as reported in 1991/92.	0.0879 (0.0773)

Notes: The table provides non-weighted descriptive statistics for the main sample of 26,661 individuals from the survey waves 1991/92 and 1998/99 that are 20 to 59 years old, work from 10 to 75 hours per week, have German nationality, and report all relevant information. Excluded are residents of Berlin, migrants, occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB, the public sector, employees in non-profit-maximizing organizations and the mining and quarrying sector.

Appendix Table A2
Self-employment and Occupational Mobility Started after Reunification, Robustness Checks Using Different Samples
Linear Probability Estimates

Explanatory Variables:	Dependent Variable: Entry into Self-employment after 1989			Occupational Mobility after 1989	
East Germany	0.0664***	0.0640***	0.0556***	0.1328***	0.1363***
	(0.0212)	(0.0230)	(0.0163)	(0.0189)	(0.0171)
Entry Regulation* East Germany	-0.0507**	-0.0476**	-0.0392**	-0.0615**	-0.0507**
	(0.0221)	(0.0241)	(0.0180)	(0.0247)	(0.0252)
Individual Characteristics	Yes	Yes	Yes	Yes	Yes
Occupation-wave Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	29,983	25,172	35,737	23,702	27,929

Notes: The table displays linear probability estimates of the models explaining entry into self-employment (columns 1 to 3) and occupational mobility among workers (columns 4 and 5) after reunification. The dependent variable in columns 1 to 3 is coded one for individuals who are self-employed at the time of the survey and started that activity after 1989, else zero. The dependent variable in column 4 is coded one for individuals who work in a different 3-digit occupation at the time of the survey than they were initially trained in and report an occupational change after 1989, else zero. Estimates in column 1 are based on the main sample used for Table 2 (see also section 4) extended for residents of Berlin and migrants (29,983 observations), estimates in column 2 are based on the main sample excluding individuals that are self-employed with an activity started before 1990 (25,172 observations), and estimates in column 3 are based on the main sample extended by occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB (35,737 observations). Estimates in column 4 are based on the sample used for Table 5 (see also section 5.4) extended for residents of Berlin and migrants (23,702 observations), estimates in column 5 are based on the sample used for Table 5 extended by occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB (27,929 observations). All specifications of the self-employment model include the individual characteristics age, age squared, gender, high education, low education, and a constant. In case of the occupational mobility model the same individual characteristics are used up to low education. In the regressions in columns 1 to 3 (columns 4 and 5), the coefficient estimates on these variables are identical in sign and similar in size and significance to those reported in column 4 of Table 2 (5). Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** denote $p<0.01$, ** denote $p<0.05$, * denotes $p<0.1$.

Appendix Table A3
Occupational Mobility after Reunification, Robustness Checks
Linear Probability Estimates

	Dependent Variable: Occupational Mobility after…				
Explanatory Variables:	1984 (West)/ 1989 (East)	1989	1989	1989	1989
East Germany	0.0673**	0.1481***	0.1439***	0.1092***	
	(0.0293)	(0.0159)	(0.0197)	(0.0278)	
Entry Regulation*East Germany	-0.0162	-0.0566**	-0.0746***	-0.0657***	
	(0.0343)	(0.0252)	(0.0265)	(0.0252)	
Normalized Deviation of the Employment Share by Occupation and Region from West German Share in 1991/1992		-0.0529***			
		(0.0203)			
Incumbent Self-employment Share by Occupation and Region in 1991/92 (Entry<1985)*West Germany			-0.0990		
			(0.1478)		
Incumbent Self-employment Share*East Germany			0.2129		
			(0.1710)		
Share of Highly Educated by Industry and Region in 1991/92*West Germany				0.8018***	
				(0.2079)	
Share of Highly Educated*East Germany				0.9367**	
				(0.3927)	
East Germany*1991/92					0.1143***
					(0.0192)
East Germany*1998/99					0.1923***
					(0.0372)
Entry Regulation*East Germany*1991/92					-0.0589**
					(0.0249)
Entry Regulation*East Germany*1998/99					-0.0734
					(0.0487)
Individual Characteristics	Yes	Yes	Yes	Yes	Yes
Occupation-wave Effects	Yes	Yes	Yes	Yes	Yes
Industry-wave Effects	No	No	No	Yes	No
Number of Observations	29,859	21,192	21,192	21,192	21,192

Notes: The table shows linear probability estimates of the model explaining occupational mobility among workers after reunification. The dependent variable is coded one for individuals who work in a different 3-digit occupation at the time of the survey than they were initially trained in and report an occupational change after 1989, else zero. Estimates in columns 2 to 5 are for the sample of 21,192 individuals from the survey waves 1991/92 and 1998/99 that are 20 to 59 years old, are not self-employed, work from 10 to 75 hours per week, have German nationality, and report all relevant information including the 3-digit occupation of their initial occupational training degree. Excluded are residents of Berlin, migrants, occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB, the public sector, employees in non-profit-maximizing organizations and the mining and quarrying sector. The sample in column 1 covers 29,859 individuals as observations from the survey wave 1985/86 are added. All specifications include the individual characteristics age, age squared, gender, high education, and a constant. In all regressions, the coefficient estimates on these variables are identical in sign and similar in size and significance to those reported in column 4 of Table 5. Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** denote p<0.01, ** denote p<0.05, * denotes p<0.1.