The Impact of Firm Entry Regulation on Long-living Entrants

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Abstract

What is the impact of firm entry regulation on sustained entry into self-employment? How does firm entry regulation influence the performance of long-living entrants? In this paper, I address these questions by exploiting a natural experiment in firm entry regulation. After German reunification, East and West Germany faced different economic conditions, but fell under the same law that imposes a substantial mandatory standard on entrepreneurs who want to start a legally independent firm in one of the regulated occupations. The empirical results suggest that the entry regulation suppresses long-living entrants, not only entrants in general or transient, short-lived entrants. This effect on the number of long-living entrants is not accompanied by a counteracting effect on the performance of long-living entrants, as measured by firm size several years after entry.

JEL classifications: K20; L25; L26; L50; M13; P52.

Keywords: Firm entry regulation; sustained entry; self-employment; firm size.

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1. Introduction

In recent decades, the regulation of firm entry and entry into self-employment was changed in many countries and industries worldwide. The World Bank's "Doing Business" reports, for example, document 579 regulatory reforms between June 2007 and May 2009 (World Bank, 2008 and 2009). The majority of these reforms were aimed at increasing entry and competition in order to foster technological progress, economic growth, and social welfare. While many empirical studies based on micro data show that reducing entry regulation increases entry, more empirical evidence clarifying the specific mechanisms linking entry regulation to technological progress, growth, and welfare is needed.

In this paper, I take one step in that direction by investigating the impact of firm entry regulation on one specific type of entry. The effects of entry regulation on sustained entry into self-employment are investigated, as well as the effects on the performance of long-living entrants that are able to sustain market activity for several years after entry. The empirical analysis is for Germany in the decade after reunification, a country with a strict regulatory setting and a time period when a natural experiment allows for identifying the effects of interest.

Various forms of geographical entry restrictions are relevant to specific product markets in Germany. According to Djankov et al. (2002), entrepreneurs in Germany have to complete numerous time-consuming and costly administrative procedures.[1] The entry regulation under investigation in this paper follows from the German Trade and Crafts Code (*Gesetz zur Ordnung des Handwerks*).[2] A substantial mandatory standard, the master craftsman certificate (*Meistertitel*), is imposed on entrepreneurs who want to start a legally independent firm in one of the regulated occupations. Similar standards exist in other European countries, for example, in Austria, The Netherlands or Sweden, but the related firm entry regulation in Germany is particularly strict (Monopolkommission, 1998).

To identify the effects of interest, I exploit the situation after German reunification when East and West Germany faced very different economic conditions, but fell under the same law regulating entry in some occupations, but not in others. In the East German transition economy, new entrepreneurial activities were suddenly needed to an unexpectedly high degree. In addition, the East German pool of individuals fulfilling the mandatory entry

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[1] In their study, Djankov et al. (2002) provide data describing the regulation of entry relevant to starting a firm with standard characteristics in 85 countries in 1999. Among the standardized characteristics of the firm are the following ones: operation in the country's largest city, exemption from industry-specific requirements, limited liability company with domestic owners, between 5 and 50 employees, all of whom are nationals, one month after the beginning of market activities.

[2] See section 2.1 for details.

standard for regulated occupations depended on decisions taken under the planned economy system of the German Democratic Republic (GDR). Accordingly, the entry regulation in the German Trade and Crafts Code should exert stronger effects on entry in the East German transition economy than in the more stable West German market economy. Building on this conjecture, I estimate average effects of the West−East shift in the regulatory context by comparing the difference between the average outcomes in regulated occupations and unregulated occupations in East Germany after reunification to the corresponding difference in West Germany.

The subsequent empirical analysis builds on empirical studies that indicate less entry due to firm entry regulation when using a general, broad measure of firm entry, or entry into self-employment, as outcome variable. Bruhn (2008), Kaplan, Piedra and Seira (2009), and Mullainathan and Schnabl (2010), for example, present such evidence based on recent micro data for Mexico and Peru. Prantl and Spitz-Oener (2009) show that the entry regulation in the German Trade and Crafts Code lowers a general measure of entry into self-employment more in regulated occupations in the East German transition context after reunification than in the more stable West German context. Empirical evidence for different sets of countries and different time periods is provided by Ciccone and Papaioannou (2007), Fisman and Sarria-Allende (2004), as well as Klapper, Laeven and Rajan (2006). Their empirical findings are in line with the view that the effects of country-level entry regulation on entry, again broadly defined, are more negative in industries with naturally high entry or high employment growth than in other industries.[3]

With its focus on sustained entry and the performance of long-living entrants, this paper complements the existing literature on the effects of firm entry regulation. To the best of my knowledge, no other paper identifying regulatory effects from within-country variation in micro data has the same focus.[4] More common are studies addressing the effects of entry regulation on aggregate employment creation, or productivity growth, in industries or regions (Bertrand and Kramarz 2002; Chari 2009; Sadun 2008; Viviano 2008). Further related work is on the consequences of product market deregulation, or banking deregulation, for industry

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[3] Djankov (2009) and Schiantarelli (2008) survey further related studies.
[4] Even empirical analyses that have a similar focus and rely entirely on data variation across countries are rare; one exception is Capelleras, Mole, Greene and Storey (2007). To date, several distinctions between different types of entry or entrants have been used in empirical analyses of regulatory effects on entrepreneurship, but no performance-related distinction between sustained and transient entry as considered here. Bruhn (2008), Capelleras et al. (2008) and Kaplan, Piedra and Seira (2009), for example, distinguish between registered and unregistered entrants; Ardagna and Lusardi (2010) compare regulatory effects on entrepreneurs who want to pursue a business opportunity against regulatory effects on those who lack better alternatives.

dynamics (Aghion et al. 2009; Bertrand, Schoar and Thesmar 2007; Cetorelli and Strahan 2006; Kerr and Nanda 2009).

From the methodological point of view, the empirical analysis presented here is most closely related to Prantl and Spitz-Oener (2009), who implement the same empirical approach. Using a natural experiment in entry regulation and allowing for two types of additive unobserved effects, the approach is similar to standard difference-in-difference set-ups that exploit data variation across time and regions or industries following from reforms of entry regulation (Bruhn 2008; Kaplan, Piedra and Seira 2009). Ciccone and Papaioannou (2007), Fisman and Sarria-Allende (2004) or Klapper, Laeven and Rajan (2006), instead, provide empirical estimates identified from data variation across countries and industries along the lines of Rajan and Zingales (1998).

The main results in this paper are twofold. First, the empirical evidence suggests that the entry regulation in the German Trade and Crafts Code reduces sustained entry into self-employment. Due to entry regulation, the probability of being self-employed in 1998/99 with a venture started after reunification and sustained for at least five years is lower in regulated occupations in the East German transition context after reunification than in the more stable West German context. Accordingly, the entry regulation suppresses long-living entrants who should have a higher potential of positively impacting technological progress, economic growth and social welfare than entrants in general or transient, short-lived entrants. Second, this effect on the number of long-living entrants is not accompanied by a counteracting effect on the performance of long-living entrants, as measured by firm size in 1998/99. Altogether, these empirical results provide support for the view that entry regulation may hinder technological progress as well as economic growth, and it may ultimately reduce social welfare.

In the next section, I briefly introduce the firm entry regulation and explain the empirical model for investigating the regulatory effects on sustained entry and entrants' performance. Then, I summarize related micro-data evidence and introduce the research questions addressed here. In Section 4, a brief description of the data and the main variables follows. The empirical results are discussed in Section 5, and Section 6 provides conclusions.

2. Empirical Framework and Modeling

2.1 Firm Entry Regulation in the German Trade and Crafts Code

In Germany, the Trade and Crafts Code (*Gesetz zur Ordnung des Handwerks*) imposes a mandatory standard, the master craftsman certificate, on entrants into some, but not all, occupations. Entrepreneurs wanting to start a legally independent firm in one of the regulated occupations need a relevant master craftsman certificate.[5] Regulated occupations are in fields as diverse as metalworking, food, as well as clothing and textiles. In addition, regulated and unregulated occupations can be in similar fields: for example, confectionary, hairdressing or printing and bookbinding are regulated, but ice cream production, beautician services or copy and paper production are not. The master craftsman certificate is an educational degree that an individual can earn after several stages of training, collecting work experience, and taking several examinations. Typically, the individual first completes two or three years of apprenticeship (*Lehre* and *Lehrabschluss*). Then he has to work in the occupation for several years and has to earn the related journeyman degree (*Gesellenzeit* and *-brief*). The journeyman degree certifies a high level of vocational training in all occupation-specific tasks and is the prerequisite for admission to the master examination (*Meisterprüfung*). In the master examination, a region-specific committee examines the master candidate. The committee consists of five members, three of whom hold a master certificate in the candidates' occupation, and many candidates do not pass the exam (Deregulierungskommission 1991). Altogether, earning a master craftsman certificate involves not only direct costs, such as fees for preparation courses, but also a substantial investment of time.

The German Trade and Crafts Code dates back to the end of the 19th century, when parts of the historic guild system became institutionalized as a first backlash to the introduction of the freedom of trade (*Gewerbefreiheit*) in the German Reich. The master craftsman certificate was first imposed on individuals who wanted to train apprentices in a regulated occupation (*Kleiner Befähigungsnachweis*), but in 1935 it gained a substantially different role: all individuals wanting to start a legally independent business in one of the occupations covered by the code needed a master craftsman certificate in a relevant occupation (*Großer Befähigungsnachweis*). Soon after World War II, the West German Trade and Crafts Code confirmed the master craftsman certificate as an entry requirement in the Federal Republic of Germany (FRG) in West Germany and it is still relevant to many occupations today. The planned economy system of the German Democratic Republic (GDR) in East Germany enforced strict entry regulation for all occupations and kept in a rather pro forma manner, an entry regulation that was derived from the German Trade and Crafts Code before World War

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[5] See Prantl and Spitz-Oener (2009) for further details.

II as well as the respective educational degrees. Due to the common historical origins, the set of occupations with Code-based regulation in East Germany was similar to that in West Germany. As the reunification treaty recognized all educational degrees earned in the GDR, East Germans with a GDR master craftsman certificate met the formal requirement relevant for running a business in the respective regulated occupation immediately after reunification. This is important for the subsequent empirical analysis as otherwise entry regulation should exert even larger effects on entry than reported below.

Proponents of the entry regulation in the German Trade and Crafts Code name many benefits; among these are higher average product quality in the regulated markets and surplus vocational training relevant to other sectors of the economy. Opponents, including the German Monopolies Commission and several other German or European Union institutions, stress that individuals with a journeyman degree have a similar occupational qualification to those with a master craftsman certificate and they expect various negative consequences of the entry regulation: higher product prices, lower production quantities, less entry, lower competition, slower job creation and less innovation (Deregulierungskommission 1991; Monopolkommission 1998, 2002).

2.2 Empirical Model

In this paper, the main interest is in average effects of the entry regulation in the German Trade and Crafts Code on entry into self-employment that is sustained for several years and on the performance of long-living entrants.

The most straightforward approach to estimating a regulatory effect on such an outcome variable is to compare the respective average outcomes in regulated and unregulated occupations. The difference between these averages would identify the average effect on the chosen outcome variable if the regulated occupations were randomly selected from the population of occupations. The respective estimation equation looks as follows:

$$Y_{io} = \beta_0 + \beta_1 R_o + X_i'\delta + u_{io} \,. \tag{1}$$

In this equation, the dependent variable is the outcome variable Y, a measure of sustained entry or entrants' performance. Entry regulation is indicated by R. Subscript i indexes individuals, o refers to occupations, and the error term is u. The vector X includes individual characteristics, and the regression coefficients are the parameters β_0, β_1, and δ.

The main problem with this straightforward approach is that systematic, unobserved factors may influence both regulation and an outcome variable of interest − despite the fact that most regulated occupations have been under the German Trade and Crafts Code for many decades

or even centuries. Differences between the average outcomes in regulated and unregulated occupations may provide biased estimates of the regulatory effects on sustained entry and entrants' performance.

To account for such unobserved factors, I exploit a substantial natural experiment in entry regulation accompanying German reunification (see also Prantl and Spitz-Oener 2009). The natural experiment provides data variation across regions and occupations that allows for taking two types of systematic, unobserved effects into account when estimating the regulatory effects of interest: 1) additive unobserved effects on the outcome variable Y that differ across the groups of regulated and unregulated occupations while being constant across regions, and 2) additive unobserved effects on Y that are common to all occupations but differ across regions.[6]

The chosen empirical approach relies on two core characteristics of German reunification. On the one hand, the West German Trade and Crafts Code was extended to East Germany shortly after reunification, in July 1990, and the entry regulation in the Code was kept essentially unmodified.[7] Since then, the same regulatory rules have applied to the same set of occupations in both German regions.

On the other hand, both regions differed fundamentally with respect to the economic context during the 1990s. Most important are the following differences: West German market structures were relatively stable after reunification, and opportunities for firm entry opened up on a regular basis due to random exit of incumbents, incremental technological change or other reasons. Moreover, West Germans who held the educational degrees necessary for firm entry in regulated occupations after reunification had chosen their education freely and had access to information on the relevant entry regulation when taking that decision. East Germany, instead, underwent an unanticipated transition from a planned economy to a market economy. After reunification, new entrepreneurial activities, both firm entry as well as industry restructuring, were suddenly predominant. Most East Germans holding master

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[6] The empirical approach is similar to a standard difference-in-difference approach as I exploit a natural experiment in entry regulation and allow for two types of additive unobserved effects (Angrist and Pischke 2009; Blundell and MaCurdy 1999; Blundell and Costa Dias 2009). The average effect of the regulatory change on treated individuals is identified. This average treatment effect on the treated is equivalent to the average effect on the whole population if individuals' responses to the regulatory change are homogeneous or if individuals with heterogeneous responses are randomly assigned to treatment.

[7] See 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". Note that not only the West German Trade and Crafts Code, but also West German product market regulation more generally, was quickly extended to East Germany after reunification.

craftsman certificates after reunification had earned their degrees under the GDR's planned economy system. At that time, training choices were restricted in various respects and German reunification was unforeseeable, including the entrepreneurial opportunities and the regulation of firm entry after reunification.

To illustrate these differences, Tables 1 and 2 provide descriptive statistics calculated from the survey data for the main estimation sample described in greater detail in Section 4. In both German regions, the shares of master craftsmen among employed individuals in occupations with entry regulation are at a similar level: the shares are 12 percent and 13 percent in East and West Germany, respectively (see Table 1). When aggregating all occupations, the respective shares are 7 percent and 6 percent. These results suggest that the master craftsman certificate was assigned to a similar share of the population in the GDR as individuals chose and earned it in West Germany.[8]

Table 2, in contrast, documents substantial differences between potential entrepreneurs in East and West Germany. In regulated occupations, I consider all individuals with the master craftsman certificate of the occupation they are working in as potential entrepreneurs. They fulfill the entry standard that is imposed on those who want to start a legally independent business in the respective occupation.[9] In unregulated occupations, all surveyed individuals are counted instead. All these individuals can, in principle, start a legally independent business, i.e. no entry regulation as in the German Trade and Crafts Code prevents them from doing so. In East Germany, 14 percent of all potential entrepreneurs in unregulated occupations report being self-employed in 1998/99 and having started their venture after reunification. In regulated occupations, the corresponding share is 21 percent, implying a difference of 7 percentage points from the share in unregulated occupations, and a ratio of 1.5. In West Germany, 17 percent of all potential entrepreneurs in regulated occupations are self-employed in 1998/99 with a venture that they started after reunification, and 6 percent in unregulated occupations. All shares for West Germany are lower than the corresponding ones for East Germany − a result that is consistent with the expectation of an exceptionally high level of new entrepreneurial activities in a transition economy. The difference in the propensity to start self-employment after reunification among potential entrepreneurs in regulated and unregulated occupations in West Germany is 11 percentage points. The ratio is 2.8 and, thus, about 90 percent higher than the corresponding ratio of 1.5 in East Germany.

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[8] Note that the survey data at hand covers employed individuals, but no other individuals in the East or West German labor force and population.

[9] Only about 3 percent of all other employed individuals in regulated occupations report self-employment started after reunification in East Germany and in West Germany. This is in line with the imposed entry requirement.

Compared with unregulated occupations, potential entrepreneurs in regulated occupations in West Germany are more likely to be self-employed in 1998/99 with a venture that they started after reunification than in East Germany. This pattern is in line with restricted training choices during GDR times and with the fact that German reunification was unforeseeable before 1989.

Given the discussed differences between East and West Germany, my main conjecture is as follows: entry regulation based on the Trade and Crafts Code is more binding for firm entry in East than in West Germany. Stronger effects on firm entry should arise in the regulatory context of the East German transition economy than in the more stable West German context for the two reasons discussed above: (1) the unexpected economic transition triggers an exceptionally large number of opportunities for entrepreneurial activities, including firm entry, and (2) the pool of people fulfilling the entry requirement in regulated occupations is restricted as it depends on decisions taken under the GDR's planned economy system.

The regulatory effects estimated below are the average effects of the West−East shift in the regulatory context on the probability of sustained entry into self-employment after reunification and on the size of long-living entrants in the regulated occupations. To estimate such an effect, I compare the difference between the average outcomes of interest in regulated and unregulated occupations in East Germany to the corresponding difference in West Germany after reunification. The estimation equation is as follows:

$$Y_{ior} = \beta_0 + \beta_1 R_o + \beta_2 E_r + \beta_3 R_o \bullet E_r + X_i' \delta + u_{ior} \,. \tag{2}$$

In this equation, E indicates East Germany, β_2 is the related regression coefficient, and r indexes regions (East and West Germany). All other variables and parameters are defined as above. The following equation provides a more flexible model specification with occupation fixed effects:

$$Y_{ior} = \beta_0 + \gamma_o + \beta_2 E_r + \beta_3 R_o \bullet E_r + X_i' \delta + u_{ior} \,. \tag{3}$$

The occupation effects, denoted by γ_o, account for unobserved occupation-specific determinants of the outcome variable Y and, thus, for systematic variation in the occupational composition of the group of regulated occupations across regions, or of the group of unregulated occupations. The set of occupation effects represents a flexible replacement of β_1 in Equation 2, the level effect of entry regulation averaging across all the regulated occupations.

The focus in Equations 2 and 3 is on β_3, the coefficient of the interaction between entry regulation R and East Germany E. As derived above, β_3 reflects the average effect of the

West−East shift in the regulatory context in the regulated occupations on the considered outcome variable.

Equations 1 to 3 are estimated using ordinary least squares, even with discrete dependent variables. There are several reasons for doing so (Angrist and Pischke 2009; Wooldridge 2002), but for each considered discrete dependent variable I also compare linear probability estimates against average marginal effects computed from non-linear probit estimates (Ai and Norton 2003; Norton, Wang and Ai 2004). The main findings are robust to the choice of the method.[10] 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). Standard errors allow for correlation between individuals within the same occupation.

3. Existing Evidence and Research Questions

3.1 The Effects on Entry into Self-Employment: Existing Micro-data Evidence

Micro-data evidence on the relation between the entry regulation in the German Trade and Crafts Code and entry into self-employment after German reunification has previously been provided by Prantl and Spitz-Oener (2009). In their study, the effects on a general measure of entry into self-employment are investigated; the measure considers entry decisions taken *any time* during the first decade after reunification.[11]

The basic empirical analysis indicates that entry regulation reduces this general entry measure more in the regulatory context of the East German transition economy than in the context of the more stable West German economy. Implementing the empirical approach as described above (see Section 2.2) gives negative and significant estimates for the coefficient of the interaction between entry regulation and East Germany in equations explaining the probability of being self-employed with a venture that was started at some point during the first decade after reunification. These estimates indicate that the probability is about 5.4 to 5.7 percentage

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[10] The respective estimation results are available upon request, as are all other results discussed in the text but not reported in the tables.

[11] In another part of their study, Prantl and Spitz-Oener (2009) investigate regulatory effects on occupational mobility among workers after reunification: the entry regulation in the German Trade and Crafts Code turns out to reduce occupational mobility more in regulated occupations in East than in West Germany. This result can be explained by entry regulation hampering entry and competition more in regulated occupations in the East than in the West after reunification.

points lower among employed individuals in regulated occupations in East Germany than in West Germany due to entry regulation.[12]

Prantl and Spitz-Oener (2009) then show that their basic finding is closely linked to the entry costs arising due to the mandatory standard for entrants in regulated occupations. The regulatory effects on entry into self-employment are stronger among individuals who should be more restricted in their entrepreneurial choices than others as a result of these entry costs. These are individuals who changed their occupation after their initial training and, thus, had ceteris paribus less time to earn the relevant occupation-specific educational degrees than individuals who stayed in the occupation they were initially trained for. In addition, the basic finding is reported to be robust when exploring the relevance of additional factors that vary across occupations and regions. These are, among others, occupation-specific demand shocks in West Germany after reunification, occupation-specific restructuring requirements in East Germany, occupation- and region-specific levels of incumbent self-employment started before reunification, and skill structures that are heterogeneous across industries and regions.

In sum, the empirical results show that entry regulation reduces a general measure of entry into self-employment after reunification more in the regulatory context of the East German transition economy than in the context of the more stable West German economy.

3.2 The Effects on Sustained Entry and Entrants' Performance: New Questions

The existing evidence on the entry regulation in the German Trade and Crafts Code for the decade after German reunification and the related evidence on various forms of entry regulation in other countries and time periods (see Section 1) indicate that entry regulation reduces entry of firms and entry into self-employment. Such evidence is important, but not sufficient for justifying policy reforms that reduce and simplify firm entry regulation in order to foster technological progress, economic growth and social welfare. Instead, there are many questions regarding the underlying mechanisms that call for further empirical exploration.

Various recent policy-related sources may easily generate the impression that less entry in response to entry regulation unequivocally implies less technological progress, growth and welfare, but economic theory has long since clarified that this is not the case.[13] The theoretical

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[12] The estimates are for a sample of about 27,000 employed individuals where the weighted average probability of being self-employed with a venture started after 1989 is 4.7 percentage points.

[13] Mankiw and Whinston (1986), among others, provide a model of product markets where firms decide freely on entry and must incur entry costs which cannot be recovered upon exiting the market. In this model, equilibrium entry can be excessively high from a welfare perspective (or socially insufficient) instead of socially optimal. See also von Weizsäcker (1980) for an earlier contribution showing that an excessive number of homogeneous firms may produce in the free-entry equilibrium; Belleflamme and Peitz (2010) provide a recent textbook discussion.

literature also suggests that entry regulation limiting entry is more likely to hamper technological progress, growth or welfare if the regulation under investigation inhibits specific types of entrants. These are, for example, entrants that directly increase product variety or charge low prices and successfully attract demand, and entrants or entry threats that are strong enough to trigger advancing reactions in incumbents, including increases in incumbent innovation or productivity (Dixit and Stiglitz 1977; Spence 1976; Foster, Haltiwanger and Syverson 2008, 2009; Aghion et al. 2004, 2009; Weinschenk 2010). This provides the starting point for the subsequent empirical analysis. Specifically, I address the following research questions:

1) Does the entry regulation in the German Trade and Crafts Code reduce the entry of firms that are able to sustain their market activity for several years?

2) Does this entry regulation influence the performance of these long-living entrants, as measured by firm size several years after entry?

Entrants that are long-living in the sense of sustaining market activity during their initial years after market entry constitute a selective sub-sample of all entrants; most importantly, entrants with high growth rates after entry are part of this group. This follows from the large empirical literature on entry and entrants' performance reporting high rates of initial growth for entrants conditional on survival and low survival rates for entrants during their first years after market entry (Audretsch 1995; Caves 1998; Geroski 1995; Sutton 1997). Long-living entrants are more likely than other entrants to be successful in attracting demand and innovating, in creating new jobs, and in exerting competitive pressure, displacing incumbents or fostering innovation and productivity improvements in incumbents.

Entrants that are transient in the sense of exiting the market after only a few periods of economic activity may exit as a consequence of weak entrepreneurial abilities, low product qualities or unfavorable market conditions. They are less likely than other entrants to have proven successful in attracting demand or innovating, in creating new jobs or in exerting competitive pressure. Instead, they are more likely to cause welfare losses that a social planner or regulator may try to reduce. For example, not much can be learned from short-lived entrants' market experimentation in the case of entrants with similar characteristics displacing one another repeatedly and quickly. In addition, factor allocation to an entrant can always damage other market participants substantially, in particular in case of bankruptcy.

Taken together, entrants sustaining market activity during the initial years after market entry should have a higher potential of positively impacting technological progress, economic growth and social welfare than do transient entrants. Accordingly, evidence of reduced sustained entry in response to entry regulation is a stronger indication of potentially negative welfare effects than evidence of reduced entry in general or of reduced transient entry.

Entry regulation may, however, not only influence the probability of sustained entry into self-employment and, thus, the number of long-living entrants, but also their average performance. In that case, the composition of the group of long-living entrants is affected, and this may influence the group's contribution to technological progress, economic growth, and social welfare. To shed light on this matter, I investigate the regulatory effects of the entry regulation in the German Trade and Crafts Code on the employment built up in firms that entered after reunification and sustained their market activity for at least five years.

4. Data

The subsequent empirical analysis is based on data from a large survey that has been carried out repeatedly since the 1970s 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): the "Qualification and Career Survey". Approximately every six to seven years, these institutions collect survey data using representative, unlinked cross-sections of about 30,000 employed individuals.[14] For the purpose of this paper, I use the survey wave launched in 1998/99. It covers employed individuals in East and West Germany, including self-employed entrepreneurs who started self-employment after reunification and did so up to nine years before the survey was taken. Information on the employment in the respective firms at the time of the survey is also available.

In the first part of the empirical analysis, I focus on the impact of entry regulation on sustained entry into self-employment after the fall of the Berlin Wall in November 1989. In order to construct the dependent variable I use data on the current employment status of survey participants at the time of the survey in 1998/99 and, for self-employed individuals, data on the year they started that entrepreneurial activity. The dependent variable indicates

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[14] 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. See Prantl and Spitz-Oener (2009) and references cited therein for further details on the "Qualification and Career Survey".

individuals who were self-employed in 1998/99 with a venture that they started at least five years earlier, but after 1989 (1990 − 1993). In the second part of the empirical analysis, I investigate the impact of entry regulation on firm size using a categorical measure of employment including working entrepreneurs in 1998/99.[15] This variable distinguishes 6 size classes: 1) one employed individual, 2) two employed individuals, 3) three or four employed individuals, 4) five to nine employed individuals, 5) ten to 49 employed individuals, and 6) 50 or more employed individuals. Alternatively, I use an indicator that is coded one for self-employed entrepreneurs who started between 1990 and 1993 with a venture that has at least one additional employed individual apart from themselves in 1998/99, and zero otherwise.

The most important explanatory variables are indicators for entry regulation, East Germany and the interaction of these variables (R, E, and $R \cdot E$). The measure of entry regulation is coded one for occupations with entry regulation, and zero otherwise; it is constructed using survey data on the occupation an individual currently works in and information from the German Trade and Crafts Code as enforced during the 1990s. The indicator for East Germany is one in case of current residence in East Germany, and zero otherwise. To capture influences of individual heterogeneity on the dependent variables, I use demographic and educational variables. Table 3 provides the definitions and some descriptive statistics for all the variables used below.

The main estimation sample is for the first part of the empirical analysis. It includes 15,575 individuals participating in the survey of 1998/99 who are 20 to 59 years old, work between 10 and 75 hours per week, have German citizenship, and report all the information of interest here. Excluded are individuals in the public sector, in non-profit organizations or the mining and quarrying sector, and in all occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB. In accredited occupations, vocational training is based on federal law.[16] These occupations are the population of interest in my study, since the German Trade and Crafts Code regulates firm entry in some of these, but not in others.

In the second part of the empirical analysis, where I focus on explaining firm size, the estimation sample consists of those observations in the main sample that refer to individuals

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[15] Continuous information on firm size is not available in the survey data that I use here.

[16] The vocational training in accredited occupations is carried out under the dual system of apprenticeship and, thus, consists of both on-the-job training in companies and training in schools. See Harhoff and Kane (1997) and references cited therein for more details. The empirical results reported in Section 4 are robust if re-estimated on a sample with all occupations, including those that are not accredited by the Federal Ministry of Education and Research and the BIBB.

who indicate being self-employed in 1998/99, having started that activity at least five years earlier, but after 1989, and owning a firm with fewer than 50 employed individuals.[17]

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[17] Due to the latter restriction, I exclude two observations with missing firm size and seven observations with a firm size of more than 50 employed individuals. The regulatory effect estimates reported in Section 5 are, however, not sensitive to this restriction.

5. Empirical Results

In this section, I first discuss the impact of the entry regulation in the German Trade and Crafts Code on the probability of sustained entry into self-employment after reunification and then the effect on the performance of the long-living entrants.

About 38 percent of all self-employed individuals who started a venture after reunification (in the years 1990 to 1993) and who were surveyed in 1998/99 have then been active with their venture for at least five years. Table 4 shows estimates of linear probability models that explain the probability of this type of sustained entry into self-employment for employed individuals.[18]

Column 1 provides the estimate of Equation 1 with the entry regulation indicator R as the main explanatory variable for the sub-sample of 3,183 employed individuals residing in East Germany. The other explanatory variables are a constant and measures of individual characteristics (age, gender, education). Column 2 provides the corresponding estimate for the sub-sample of 12,392 employed individuals residing in West Germany. In both these regressions, I find negative coefficients of the entry regulation indicator R. The one for East Germany (column 1) is statistically significant at the five-percent level, in contrast to the one for West Germany (column 2). As discussed in Section 2.2, these results may indicate effects of the entry regulation, but they may also reflect systematic, unobserved effects on the probability of being self-employed with a long-lasting venture started after reunification.

The refined model specification in Equation 2 allows for estimating the average effects of the West−East shift in the regulatory context after reunification while controlling for the following types of additive unobserved effects: those that differ systematically across the groups of regulated and unregulated occupations but are constant across regions, and those that are common to all occupations but differ systematically across regions. Equation 2 includes the East Germany indicator E and the interaction term between entry regulation and East Germany, besides the entry regulation indicator R and all other explanatory variables of Equation 1.

The relevant sample for estimating Equation 2 covers all 15,575 employed individuals in East and West Germany and the estimates are shown in column 3 of Table 4. The estimated coefficient of the level term for entry regulation is negative and insignificant, but the coefficient of the interaction term between East Germany and entry regulation is negative and

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[18] Similar estimation results are found for the four model specifications of Table 4 if all self-employed individuals that did not start their venture in the years 1990 to 1993 (and where the dependent variable is coded zero) are excluded from the estimation sample.

significant. The latter result suggests that entry regulation lowers the probability of self-employment in long-lasting ventures started after reunification by 5.4 percentage points more in regulated occupations in the East than in the West. The coefficient of the level term for East Germany is positive and significant, which is well in line with economic transition triggering unusually high entry and industry restructuring.

As shown in column 4, estimating a flexible model specification with occupation fixed effects (Equation 3) confirms the negative coefficient of the interaction between East Germany and entry regulation. Accordingly, the main finding holds up if unobserved occupation-specific heterogeneity and, thus, systematic variation in the occupational composition of the groups of regulated and unregulated occupations across regions are allowed for.[19]

All model specifications in Table 4 include further explanatory variables, measuring demographic and educational characteristics, to capture the effects of individual heterogeneity on sustained entry into self-employment. Men are more likely than women to be self-employed in 1998/99 with a long-lasting venture started after reunification. For age, the estimated effects are positive along the whole sample distribution and increasing until an age of 32 to 38 years in the regressions in columns 2 to 4; in the regression in column 1, the maximum is attained at 49 years. The estimated effects for the included education indicators are weak.[20] Migrants with German citizenship who live in East or West Germany, but grew up in a foreign country or the part of Germany they do not live in at the time of the survey, are less likely to be self-employed with a long-lasting venture started after reunification than non-migrants.[21]

Altogether, the pattern of empirical findings in Table 4 indicates that entry regulation decreases the probability of sustained entry into self-employment in regulated occupations more during economic transition than in a more stable market environment. This suggests that

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[19] For comparison, I re-estimate Equation 3 with all exogenous variables as in column 4 of Table 4, but a dependent variable as in Prantl and Spitz-Oener (2009). This dependent variable indicates self-employed individuals with a venture started *any time* after reunification (in the years 1990 to 1999). The estimation results suggest that entry regulation reduces the probability of these self-employment activities by 7.3 percentage points more in regulated occupations in the East than in the West. In line with expectations, this effect on a general entry measure is higher than the sustained entry effect of 5.4 in column 4 of Table 4 (by about 1.9 percentage points).

[20] In some model specifications, highly educated individuals residing in West Germany and holding a degree from a university or a technical college have a higher probability of being self-employed in 1998/99 with a long-lasting venture started after reunification than individuals with medium education (reference group). Medium education indicates a vocational training degree from the dual system of apprenticeship or a vocational school. I find significant coefficient estimates neither for highly educated individuals who reside in East Germany nor for individuals with low education, i.e., those holding neither a vocational training degree nor a higher educational degree.

[21] In contrast, the regression mentioned in footnote 19 shows that migrants do not differ significantly from non-migrants in an empirical model explaining a general measure of entry. In addition, note that the regulatory effect estimates in Table 4 remain robust if all 1,263 migrants are excluded from the estimation samples.

transient, short-lived entrants are not the only driving force behind regulatory effects on general measures of entry into self-employment, as, for example, discussed in Footnote 19 and in Prantl and Spitz-Oener (2009). The entry regulation in the German Trade and Crafts Code does not only suppress transient, short-lived entrants that may well cause welfare losses, but also long-living entrants that should have a higher potential of positively impacting technological progress, economic growth, and social welfare.

Having shown that the entry regulation in the German Trade and Crafts Code reduces the probability of sustained entry into self-employment after reunification, I now turn to the effect on entrants' performance. This is important, as the sustained entry effect lowering the number of long-living entrants is not necessarily the only regulatory effect influencing how the group of long-living entrants contributes to technological progress, economic growth, and social welfare. The effect on the individual performance of the group members can also be relevant. Specifically, I investigate the effect on the long-term average employment built up and reported in the survey of 1998/99 by self-employed individuals who started their ventures after reunification and sustained market activity for at least five years. The respective dependent variable is a categorical measure of firm size that distinguishes six employment classes (see Section 4).

Column 1 of Table 5 displays the estimates of Equation 1 for the sub-sample of 166 self-employed individuals with long-lasting ventures started after reunification in East Germany. Column 2 provides the corresponding estimates for the West German sub-sample of 241 observations. I find positive coefficients for the indicator of entry regulation R in these regressions. The one for East Germany (column 1) is insignificant; the one for West Germany is significant at the five-percent level (column 2). The results for Equation 2 in column 3 indicate a positive and significant coefficient of the level term for entry regulation and a negative, insignificant coefficient of the interaction term between entry regulation and East Germany. Accordingly, there is no empirical support for differential effects of the entry regulation in the German Trade and Crafts Code on the long-term average employment in long-living entrants started after reunification in regulated occupations in East and West Germany.[22]

The main finding of an insignificant coefficient for the interaction term between East Germany and entry regulation is robust to the following changes of the model specification.

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[22] The coefficient estimate for the level term of East Germany varies across model specifications. It is close to zero and insignificant in column 3, positive and insignificant in column 4, and significantly positive in column 5.

First, the coefficient estimate is also insignificant if one uses a flexible model specification with occupation fixed effects as in Equation 3 (column 4). Second, the result is also confirmed when using a discrete dependent size indicator (coded one for self-employed entrepreneurs who employ at least one more individual apart from themselves, and zero otherwise) instead of the categorical variable of firm size (column 5).

As the chosen measure of entrants' performance may depend on individual heterogeneity, all model specifications in Table 5 also include measures of demographic and educational characteristics. The coefficient estimates for males are positive, but mostly insignificant. For age, I find a concave relationship with firm size; the coefficient estimates for the age terms are jointly significant in columns 1 to 4, at least at the 10-percent level. Education indicators are always insignificant. Migrants employ fewer workers in 1998/99 than non-migrants; the negative coefficient estimates in columns 3 and 4 are significant at the 10-percent level.

In summary, I find no differential effect of the entry regulation in the German Trade and Crafts Code on the long-term average employment of long-living entrants in regulated occupations in East and West Germany. Accordingly, the estimation results in Table 5 provide no indication of an effect on entrants' performance that would counteract the negative effect on the probability of sustained entry into self-employment after reunification and, thus, the number of long-living entrants.

6. Conclusions

In this paper, I provide empirical evidence on the consequences of entry regulation on sustained entry into self-employment, as opposed to entry in general. In addition, I study the effects on the performance of long-living entrants that are able to sustain market activity for several years after entry. The entry regulation under scrutiny here is a substantial restriction to entry following from the German Trade and Crafts Code. The law imposes a mandatory standard, the master craftsman certificate, on entrepreneurs who want to start a legally independent firm in one of the regulated occupations. In order to identify the effects of interest, I exploit the situation after German reunification when East and West Germany faced different economic conditions, but fell under the same law regulating entry in some occupations, though not in others. In the East German transition economy, entry regulation should exert stronger effects on entry than in the more stable West German market economy. Building on this conjecture, I estimate average effects of the West−East shift in the regulatory context by comparing the difference between the average outcomes in regulated occupations

and unregulated occupations in East Germany after reunification to the corresponding difference in West Germany.

The main empirical findings reported in this paper are as follows. First, the entry regulation in the German Trade and Crafts Code reduces sustained entry into self-employment more in regulated occupations in the East German transition context after reunification than in the more stable West German context. Accordingly, the entry regulation suppresses long-living entrants who should have a higher potential of positively impacting technological progress, economic growth, and social welfare than entrants in general, or transient, short-lived entrants. Second, this effect on the number of long-living entrants is not accompanied by a counteracting effect on the performance of long-living entrants, as measured by firm size several years after entry. Altogether, these empirical results support the claim that entry regulation may hinder technological progress as well as economic growth, and it may ultimately reduce social welfare.

7. References

Aghion, P., Blundell, R., Griffith, R., Howitt, P. and Prantl, S. (2004). Entry and Productivity Growth: Evidence from Micro-Level Panel Data. *Journal of the European Economic Association*, 2(2-3), 265-276.

Aghion, P., Blundell, R., Griffith, R., Howitt, P. and Prantl, S. (2009). The Effects of Entry on Incumbent Innovation and Productivity. *Review of Economics and Statistics*, 91(1), 20-32.

Ai, C. and Norton, E. C. (2003). Interaction Terms in Logit and Probit Models. *Economics Letters*, 80(1), 123-129.

Angrist, J. D. and Pischke, J.-St. (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton, NJ: Princeton University Press.

Ardagna, S. and Lusardi, A. (2010). Explaining International Differences in Entrepreneurship: The Role of Individual Characteristics and Regulatory Constraints. In J. Lerner and A. Schoar (Eds.), *International Differences in Entrepreneurship*. Chicago, IL: University of Chicago Press.

Audretsch, D. B. (1995). *Innovation and Industry Evolution*. Cambridge, MA: MIT Press.

Belleflamme, P. and Peitz, M. (2010). *Industrial Organization: Markets and Strategies*. Cambridge, UK: Cambridge University Press.

Bertrand, M. and Kramarz, F. (2002). Does Entry Regulation Hinder Job Creation? Evidence from the French Retail Industry. *Quarterly Journal of Economics*, 117(4), 1369-1413.

Bertrand, M., Schoar, A. and Thesmar, D. (2007). Banking Deregulation and Industry Structure: Evidence from the French Banking Reforms of 1985. *Journal of Finance*, 62(2), 597-628.

Blundell, R. and Costa Dias, M. (2009). Alternative Approaches to Evaluation in Empirical Microeconomics. *Journal of Human Resources*, 44(3), 565-640.

Blundell, R. and MaCurdy, T. (1999). Labour Supply: A Review of Alternative Approaches. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, 3 (pp. 1559-1695). Amsterdam, The Netherlands: Elsevier.

Bruhn, M. (2008). License to Sell: The Effect of Business Registration Reform on Entrepreneurial Activity in Mexico. Forthcoming in *Review of Economics and Statistics*.

Capelleras, J.-L., Mole, K. F., Greene, F. J. and Storey, D. J. (2008). Do More Heavily Regulated Economies have Poorer Performing New Ventures? Evidence from Britain and Spain. *Journal of International Business Studies*, 39(4), 688-704.

Caves, R. E. (1998). Industrial Organization and New Findings on the Turnover and Mobility of Firms. *Journal of Economic Literature*, 36(4), 1947-1982.

Cetorelli, N. and Strahan, P. E. (2006). Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local US Markets. *Journal of Finance*, 61(1), 437-461.

Chari, A. V. (2009). Identifying the Aggregate Productivity Effects of Entry and Size Restrictions: An Empirical Analysis of License Reform in India. Mimeo, Ithaca, NY: Cornell University.

Ciccone, A. and Papaioannou, E. (2007). Red Tape and Delayed Entry. *Journal of the European Economic Association*, 5(2-3), 444-458.

Deregulierungskommission (1991). *Marktöffnung und Wettbewerb*. Gutachten der Unabhängigen Expertenkommission zum Abbau marktwidriger Regulierungen. Stuttgart, Germany.

Dixit, A. K. and Stiglitz, J. E. (1977). Monopolistic Competition and Optimum Product Diversity. *American Economic Review*, 67(3), 297-308.

Djankov, S. (2009). The Regulation of Entry: A Survey. *World Bank Research Observer*, 24(2), 183-203.

Djankov, S., La Porta, R., Lopez-De-Silanes, F. and Shleifer, A. (2002). The Regulation of Entry. *Quarterly Journal of Economics*, 117(1), 1-37.

Fisman R. and Sarria-Allende, V. (2004). Regulation of Entry and the Distortion of Industrial Organization. NBER Working Paper No. 10929. Cambridge, MA: National Bureau of Economic Research.

Foster, L., Haltiwanger, J. and Syverson, C. (2008). Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability? *American Economic Review*, 98(1), 394-425.

Foster, L., Haltiwanger, J. and Syverson, C. (2009). The Slow Growth of New Plants: Learning about Demand? Mimeo, Chicago, IL: University of Chicago Booth.

Geroski, P. A. (1995). What Do We Know About Entry? *International Journal of Industrial Organization*, 13(4), 421-440.

Gesetz über die Inkraftsetzung des Gesetzes zur Ordnung des Handwerks der Bundesrepublik Deutschland in der Deutschen Demokratischen Republik vom 10. Juli 1990. http://www.drkoerner.net/DDwz/ighwo90.htm. Accessed 19 May 2010.

Gesetz zu dem Vertrag vom 31.08.1990 zwischen der Bundesrepublik Deutschland und der Deutschen Demokratischen Republik über die Herstellung der Einheit Deutschlands – Einigungsvertragsgesetz – und der Vereinbarung vom 18.09.1990, *Bundesgesetzblatt*, II-1990, 885.

Gesetz zur Ordnung des Handwerks (Handswerksordnung) in der Fassung vom 28.12.1965, *Bundesgesetzblatt*, I-1966, 1.

Harhoff, D. and Kane, T. J. (1997). Is the German Apprenticeship System a Panacea for the U.S. Labor Market? *Journal of Population Economics*, 10(2), 171-196.

Kaplan, D. S., Piedra, E. and Seira, E. (2009). Entry Regulation and Business Start-ups: Evidence from Mexico. Mimeo, Washington, DC: The World Bank.

Kerr, W. R. and Nanda, R. (2009). Democratizing Entry: Banking Deregulations, Financing Constraints, and Entrepreneurship. *Journal of Financial Economics*, 94(1), 124-149.

Klapper, L., Laeven, L. and Rajan, R. (2006). Entry Regulation as a Barrier to Entrepreneurship. *Journal of Financial Economics*, 82(3), 591-629.

Mankiw, N. G. and Whinston, M. D. (1986). Free Entry and Social Inefficiency. *RAND Journal of Economics*, 17(1), 48-58.

Monopolkommission (1998). *Marktöffnung umfassend verwirklichen*. Hauptgutachten der Monopolkommission 1996/97. Baden-Baden, Germany.

Monopolkommission (2002), *Reform der Handwerksordnung*. 31. Sondergutachten der Monopolkommission. Baden-Baden, Germany: Nomos-Verlag.

Mullainathan, S. and Schnabl, P. (2010). Does Less Market Entry Regulation Generate More Entrepreneurs? Evidence from a Regulatory Reform in Peru. In: J. Lerner and A. Schoar (Eds.), *International Differences in Entrepreneurship*. Chicago, IL: University of Chicago Press.

Norton, E. C., Wang, H. and Ai, C. (2004). Computing Interaction Effects and Standard Errors in Logit and Probit Models. *Stata Journal*, 4(2), 154-167.

Prantl, S. and Spitz-Oener, A. (2009). How Does Entry Regulation Influence Entry into Self-employment and Occupational Mobility? *Economics of Transition*, 17(4), 769-802.

Rajan, R. G. and Zingales, L. (1998). Financial Dependence and Growth. *American Economic Review*, 88(3), 559-586.

Sadun, R. (2008). Does Planning Regulation Protect Independent Retailers? CEP Discussion Paper No. 888. London, UK: Centre for Economic Performance.

Schiantarelli, F. (2008). Product Market Regulation and Macroeconomic Performance: A Review of Cross-Country Evidence. Boston College Working Papers in Economics 623, first version 2005. Boston, MA: Boston College.

Spence, M. (1976). Product Selection, Fixed Costs, and Monopolistic Competition. *Review of Economic Studies*, 43(2), 217-235.

Sutton, J. (1997). Gibrat's Legacy. *Journal of Economic Literature*, 35(1), 40-59.

Viviano, E. (2008). Entry Regulations and Labour Market Outcomes: Evidence from the Italian Retail Trade Sector. *Labour Economics*, 15(6), 1200-1222.

von Weizsäcker, C. C. (1980). A Welfare Analysis of Barriers to Entry. *The Bell Journal of Economics*, 11(2), 399-420.

Weinschenk, P. (2010). Entry and Incumbent Innovation. Preprint 2010/17. Bonn, Germany: Max Planck Institute for Research on Collective Goods.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

World Bank (2008). *Doing Business 2009*. Washington, DC: The World Bank.

World Bank (2009). *Doing Business 2010*. Washington, DC: The World Bank.

8. Tables

Table 1:
Master Craftsman Certificates in Occupation Groups and Regions

In this table, the shares of employed individuals with and without master craftsman certificates are shown by occupation groups and regions. The weighted descriptive statistics are for the main estimation sample of 15,575 employed individuals in the Qualification and Career Survey of 1998/99. Individuals are 20 to 59 years old, work 10 to 75 hours per week, have German citizenship, and report all relevant information. Excluded are individuals in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited the Federal Ministry of Education and Research and the BIBB.

Occupation group	Master craftsman certificate	East Germany	West Germany
		Percentage	
Occupations with entry regulation	Yes	12.39	13.10
	No	87.61	86.90
Occupations without entry regulation	Yes	4.30	2.11
	No	95.70	97.89
All occupations	Yes	7.48	5.77
	No	92.52	94.23

Table 2:
Entry into Self-employment after Reunification in Regions and Groups of Individuals

This table provides the shares of employed individuals who report being self-employed in 1998/99 with a venture that they started after reunification for unregulated occupations, for employed individuals with a relevant master craftsman certificate in regulated occupations and for other employed individuals in regulated occupations by region. The corresponding shares of those who did not choose this type of self-employment are also reported. The weighted descriptive statistics are for the main estimation sample of 15,575 employed individuals in the Qualification and Career Survey of 1998/99. Individuals are 20 to 59 years old, work 10 to 75 hours per week, have German citizenship, and report all relevant information. Excluded are individuals in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.

Region	Entry into self-employment after reunification	Unregulated occupations	Regulated occupations	
			Individuals with relevant master craftsman certificate	Other individuals
		Percentage		
East Germany	Yes	14.44	21.32	3.30
	No	85.56	78.68	96.70
West Germany	Yes	6.30	17.38	2.74
	No	93.70	82.62	97.26

Table 3:
Definitions of Variables and Descriptive Statistics

In this table, non-weighted descriptive statistics are shown for the main estimation sample of 15,575 employed individuals in the Qualification and Career Survey of 1998/99. Individuals are 20 to 59 years old, work 10 to 75 hours per week, have German citizenship, and report all relevant information. Excluded are individuals in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.

Variable	Definition	Mean/share (Std. dev.)
Self-employment started between 1990 and 1993	1: individuals who report being self-employed in 1998/99 with a venture started in 1990 to 1993; 0: otherwise	0.0267
Self-employment started between 1990 and 1999	1: individuals who report being self-employed in 1998/99 with a venture started in 1990 to 1999; 0: otherwise	0.0740
Employment in firms of self-employed entrepreneurs who entered in 1990 to 1993	Employment in 1998/99 in six size classes (1, 2, 3-4, 5-9, 10-49 and 50 or more employees) as reported by self-employed individuals who entered the market in 1990 to 1993	2.2100
Self-employed entrepreneurs who entered in 1990 to 1993 and employ at least one more individual in 1998/99	1: self-employed individuals who entered the market in 1990 to 1993 and employ at least one additional individual apart from themselves in 1998/99; 0: otherwise	0.5765
Entry regulation	1: occupations with the entry regulation of the German Trade and Crafts Code; 0: otherwise	0.3215
East Germany	1: individuals residing in East Germany; 0: otherwise	0.2044
Gender	1: males, 0: females	0.5728
Age	Age of the individual in years in 1998/99	38.78 (10.00)
Low education	1: individuals with no vocational training degree; 0: otherwise	0.1067
Medium education	1: individuals with a vocational training degree (dual system of apprenticeship, vocational school); 0: otherwise.	0.8288
High education	1: individuals with a degree from a university or a technical college; 0: otherwise	0.0645
Migrant	1: individuals who are living in East or West Germany and have German citizenship but grew up either in a foreign country or the other part of Germany than they currently live in; 0: otherwise	0.0811

Table 4:
Sustained Entry after Reunification

This table provides ordinary least square estimates of a linear probability model explaining the probability of long-lasting self-employment started after reunification. The dependent variable is coded one for individuals who are self-employed in 1998/99 and started their venture in 1990 to 1993. Estimates in columns 3 and 4 are for the sample of 15,575 employed individuals in the Qualification and Career Survey of 1998/99. In column 1, the estimates are based on the sub-sample of 3,183 individuals who report current residence in East Germany. In column 2, the corresponding sub-sample of 12,392 individuals in West Germany is used. All individuals are 20 to 59 years old, work 10 to 75 hours per week, have German citizenship, and report all relevant information. Excluded are individuals in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.

	1	2	3	4
	Sample coverage:			
	East Germany	West Germany	East and West Germany	East and West Germany
	Dependent Variable: Self-employment in 1998/99 with a venture started between 1990 and 1993			
Explanatory variables:				
	Coefficient (Standard Error)[a]			
East Germany			0.0573***	0.0598***
			(0.0207)	(0.0221)
Entry regulation	-0.0839**	-0.0072	-0.0113	
	(0.0344)	(0.0084)	(0.0094)	
Entry regulation•East Germany			-0.0543**	-0.0540**
			(0.0224)	(0.0234)
Gender (male=1)	0.0639***	0.0129**	0.0233***	0.0277***
	(0.0237)	(0.0065)	(0.0089)	(0.0084)
Age	0.0097***	0.0064***	0.0069***	0.0076***
	(0.0033)	(0.0016)	(0.0016)	(0.0021)
Age squared	-0.0001**	-0.0001***	-0.0001***	-0.0001***
	(0.00004)	(0.00002)	(0.00002)	(0.00003)
High education•West Germany		0.0276*	0.0249*	0.0102
		(0.0148)	(0.0148)	(0.0094)
High education•East Germany	-0.0207		-0.0079	-0.0188
	(0.0165)		(0.0161)	(0.0136)
Low education	-0.0185	-0.0041	-0.0055	0.0028
	(0.0195)	(0.0043)	(0.0054)	(0.0040)
Migrant	-0.0352*	-0.0094**	-0.0114***	-0.0063**
	(0.0190)	(0.0036)	(0.0035)	(0.0028)
Constant	-0.1648***	-0.1113***	-0.1306***	-0.1528***
	(0.0556)	(0.0259)	(0.0284)	(0.0474)
Occupation effects	No	No	No	Yes
Number of observations	3,183	12,392	15,575	15,575

[a] Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** (**, *) indicates significance at the 1% (5%, 10%) significance level.

Table 5
Size of Long-living Entrants started after Reunification

Columns 1 to 4 of this table provide ordinary least square estimates of linear models explaining the employment in long-living entrants. The dependent variable indicates the number of all employees (incl. working entrepreneurs) in 1998/99 in ventures started in 1990 to 1993. The variable is categorical with six size classes: 1) 1 employed individual, 2) 2 employed individuals, 3) 3-4 employed individuals, 4) 5-9 employed individuals, 5) 10-49 employed individuals, and 6) 50 or more employed individuals. In column 5, the table provides ordinary least square estimates of a linear probability model where the dependent variable is equal to one for self-employed entrepreneurs who started between 1990 and 1993 and employ at least one additional individual apart from themselves in 1998/99, and else zero. Estimates in columns 3 to 5 are for the sample of 407 self-employed individuals in the Qualification and Career Survey of 1998/99 who started their venture in 1990 to 1993. In column 1, the estimates are based on the sub-sample of 166 self-employed individuals who report current residence in East Germany. In column 2, the corresponding sub-sample of 241 individuals in West Germany is used. All individuals are 20 to 59 years old, work 10 to 75 hours per week, have German citizenship, and report all relevant information. Excluded are individuals in the public sector, in non-profit organizations or the mining and quarrying sector, and in occupations that are not accredited by the Federal Ministry of Education and Research and the BIBB.

Explanatory Variables:	1	2	3	4	5
	Sample Coverage:				
	East Germany	West Germany	East and West Germany	East and West Germany	East and West Germany
	Dependent Variable: Employment in 1998/99 in ventures started between 1990 and 1993				
	Coefficient (Standard Error) [a]				
East Germany			-0.0197	0.2078	0.1623**
			(0.2271)	(0.2175)	(0.0756)
Entry regulation	0.2370	0.6414**	0.6372**		
	(0.3126)	(0.2763)	(0.2648)		
Entry regulation•East Germany			-0.3707	-0.1666	-0.0822
			(0.3799)	(0.5005)	(0.1679)
Gender (male=1)	0.4197	0.2391	0.3192*	0.1827	0.0549
	(0.2882)	(0.2022)	(0.1803)	(0.1705)	(0.0577)
Age	0.2127*	0.2679**	0.2382***	0.1397	0.0456
	(0.1178)	(0.1172)	(0.0773)	(0.0882)	(0.0279)
Age squared	-0.0026*	-0.0033**	0.0029***	-0.0018*	-0.0006*
	(0.0013)	(0.0014)	(0.0009)	(0.0010)	(0.0003)
High education	-0.2243	-0.1479	-0.1841	-0.0898	-0.0316
	(0.2740)	(0.3393)	(0.2207)	(0.2145)	(0.1042)
Low education	0.2142	-0.3240	-0.2719	0.2190	0.0605
	(0.4969)	(0.3821)	(0.3067)	(0.3796)	(0.1741)
Migrant	-0.6106	-0.5617	-0.5804*	-0.7531*	-0.2016
	(0.5838)	(0.4044)	(0.3104)	(0.4064)	(0.1766)
Constant	-2.0677	-3.0980	-2.5238	-0.3106	-0.2511
	(2.4333)	(2.4251)	(1.6545)	(1.9822)	(0.5936)
Occupation effects	No	No	No	Yes	Yes
Number of observations	166	241	407	407	407

[a] Robust standard errors allowing for correlation between individuals within the same occupation are reported in parentheses. *** (**, *) indicates significance at the 1% (5%, 10%) significance level.