Does occupational deregulation affect in-company vocational training? – Evidence from the 2004 Reform of the German Trade and Crafts Code

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Abstract

The European Commission actively evaluates occupational entry restrictions in all member states. This has attracted a growing interest among scholars of the German crafts sector as it is governed by an idiosyncratic national set of rules. We estimate the effects of the deregulation of the German Trade and Crafts Code in 2004 on the overall vocational training levels in affected crafts trades. We employ Difference-in-Differences regressions as well as Synthetic Control Methods on data for the entire population of the German crafts sector. We show that the overall effect of the reform on vocational training levels was negative, and is largely driven by the additional costs of obtaining a training license in the deregulated sector.

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1. Introduction

The legally defined skilled crafts sector constitutes an integral part of the German economy; it comprises small and medium-sized enterprises from a variety of sectors[1]. According to Müller (2017), 16 % of all companies and 13 % of all regular employees belong to this sector. Its regulatory framework is based on the Trade and Crafts Code (TCC hereafter). Among other things, the TCC determines which trades[2] belong to the skilled crafts sector and what mandatory qualifications are required for being self-employed. In 2004, the TCC was deregulated to some degree. Qualification requirements are no longer a necessary prerequisite for market entry in about half of all crafts trades.

The reduction of entry barriers in regulated professions ranks highly on the current European policy agenda. The European Commission (EC) actively evaluates national regulatory schemes as they may hinder the movement of goods, services, and labor in the common market area (EC 2013). While the EC appears to favor occupational deregulation such as the one that occurred in the German crafts sector in 2004, recent national policy debates in Germany have taken a more critical stance on the reform's success and the new government has included the topic in its coalition agreement of 2018.

Since the 2004 TCC reform was implemented, several scholars have investigated the effects of this occupational deregulation. So far, two main strands have emerged in the literature. The first one is concerned with the impact of the TCC reform on entrepreneurial activity (e.g. Rostam-Afschar, 2014; Koch and Nielen, 2017; Runst et al., forthcoming). The results of these analyses show that, with the year 2004, entry and exit rates increased markedly in deregulated trades. While the increase in self-employment is in line with policy goals specified prior to the TCC reform, there is a vivid debate on whether this boom in business start-ups was beneficial or not.

A second strand of the literature refers to the effects of the TCC reform on income in deregulated trades (e.g. Bol, 2014; Bol and Weeden, 2015; Lergetporer et al., 2016; Damelang et al., 2017; Fredriksen, 2017). This field of research relates to the standard monopoly effects of entry regulations. Overall, the results of these studies are not consistent. Most of them suggest, however, that the income effects of the TCC reforms are negative, but most likely rather small.

In addition, previous research has pointed toward the positive effect of deregulation on the proportion of migrants in the crafts sector (Runst, forthcoming) as well as the development of mechanisms within deregulated markets with which companies can lower search costs (in regard to quality) for potential customers (Fredriksen et al., forthcoming).

Until now, to our knowledge, there is only one paper (Koch and Nielen, 2017) that examines the effects of the 2004 TCC reform on crafts enterprise's engagement in the dual Vocational Education and Training (VET) system. This is rather surprising given the fact that training of skilled workers within the crafts sector, which is relatively higher than in other sectors of the economy, was a major point for discussion in the policy debate prior to the reform (for an overview on the debate, see Müller, 2006). Critics of the TCC reform often claimed that removing occupational licensing requirements will lead to less engagement of crafts companies in the dual VET system and that this would be associated with negative externalities for the German economy as a whole. The initiators of the TCC reform, on the other hand, expected positive effects on the provision of vocational training in the skilled crafts sector (see e.g. Deutscher Bundestag, 2003). The Ordinance on Trainer Aptitude ("Ausbilder-Eignungsverordnung", AEVO)[3] was temporarily suspended in the deregulated crafts trades in 2004 as a part of the TCC reform, temporarily removing the companies' requirement for a training license.

On the basis of their difference-in-differences analysis, Koch and Nielen (2017) argue that the TCC reform virtually had no impact on VET training levels in deregulated crafts trades in the immediate years after 2003.[4] Thus, according to them, neither the view of the critics nor the one of the proponents of the TCC reform has been confirmed (p. 84). Our paper adds to the analysis of Koch and Nielen (2017) in two major ways:

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[1] In the Trade and Crafts Code, more than 100 trades are defined as parts of the skilled crafts sector. For example, main construction trades such as bricklayers or carpenters belong to the crafts as well as finishing trades (e.g. plumbers or joiners), trades for industrial needs (e.g. precision engineers or electrical machine engineers), automobile trades (e.g. automotive mechatronics technicians), foodstuffs trades (e.g. bakers or butchers), health trades (e.g orthotic technicians or hearing aid acousticians) and trades for private needs (e.g. hairdressers or chimney sweeps).

[2] Trades are sub-sectors of the crafts sector. They are legally defined in the TCC and comprise trades as diverse as bakers, butchers, car mechanics or orthopedic technicians. One trade contains one or more occupations. Occupations are not defined on a legal basis. Instead they are defined by the kinds of activities of working individuals. The German Federal Office of Statistics provides a classification code (*Klassifikation der Berufe*, KldB) which is used in all major German data sets. A list of crafts occupations can be found in Runst (forthcoming).

[3] As part of a more general attempt to increase vocational training in Germany, the Ordinance on Trainer Aptitude (AEVO) was suspended between 2003 and 2009 to make it easier for companies to be engaged in the dual VET system. During this time, employers providing in-company vocational training did not have to pass a training aptitude exam (see e.g. Ulmer and Jablonka, 2007).

[4] Koch and Nielen (2017) are using data for the period 1998-2008.

First, we argue that, in case of estimating the reform effects on VET training levels in the skilled crafts sector, the relevant time span for comparing between treatment and control groups is not 2004 to 2008 but the years 2009 and after. Since companies did temporarily not need the training license in order to supervise apprentices (suspension of the AEVO), it is not until 2009 that firms in deregulated trades (B1-trades) bear higher training costs than companies in regulated trades (A-trades). We thoroughly explain the economic rationale underlying this mechanism, that we call the "Kucera-effect"[5], in Section 3.

Second, in addition to the difference-in-differences estimation we also employ the synthetic control method (SCM) in order to examine causal effects of the TCC reform on the provision of in-company vocational training in the skilled crafts sector. Contrary to the difference-in-differences estimator, the synthetic control method allows unobserved effects on the outcome of interest to vary over time (Abadie and Gardeazabal, 2003; Abadie et al. 2010, 2015). SCM does not assume that all treated units and all untreated units evolve in parallel fashion in the pre-treatment period, i.e. an assumption underlying difference-in-differences estimation that is often regarded skeptically.

The rest of the paper is organized as follows: Section 2 gives a brief overview of the 2004 TCC reform. In Section 3, three likely channels are discussed on how the occupational deregulation might have affected VET training levels of the German skilled crafts sector. Sections 4 and 5 presents the data set and outlines our methodological procedure. The empirical analysis is conducted in Section 6. The last section concludes with remarks and implications for policy-makers.

2. The TCC reform of 2004

Before 2004, a founder of a crafts company was required to hold a master craftsman certificate (advanced vocational qualification) before he or she was allowed to set up a business. A master craftsperson's examination is taken by skilled workers who have already completed about three years of basic vocational training under the German Dual Training System. With the 2004 TCC reform this key element of German crafts legislation has been amended. Since then, 53 so-called B1-trades have been fully deregulated (TCC §7). They are listed in Annex B1 of the TCC. Examples are Tile, Slab and Mosaic Layers, Interior Decorators, Building Cleaners, Precision Opticians or Flexographers. In these deregulated trades, entrepreneurs are now free from any educational requirements for business approval. For them, obtaining a master craftsman qualification (and any other craftsperson's qualification) constitutes a voluntary decision. The TCC reform came into effect on January 1, 2004.

In case of 41 trades (in the following named "A-trades"), on the other hand, the legislator still demands a master craftsman certificate or, in case of a number of trades, a recognized comparable qualification in order to enter a new company in the official crafts registry (TCC §7). These crafts with compulsory approval are listed in Annex A of the TCC (e.g. Bricklayer and Concretors, Precision Engineers, Plumbers, Bakers or Orthotic Technicians or Hairdressers).[6] Right at the outset of the TCC reform, A-trades made up 69,4 % of all craft companies. The corresponding share of B1-trades amounted to 8,9 % (Müller, 2006, p. 15).[7] In the immediate years after the reform, this share of B1-companies increased sharply due to a boom in business startups (Rostam-Afschar, 2014; Müller, 2014, 2016; Koch and Nielen, 2017; Runst et al., forthcoming).

With regard to the VET performance of the skilled crafts sector, the federal government expected stimulating effects of the 2004 TCC reform (see Deutscher Bundestag, 2003). Concerning the demand-side of the training places market, the deregulation was projected to increase the overall attractiveness of vocational training in the skilled crafts sector by offering craftsmen a range of new business opportunities, even if they choose not to acquire the master craftsmen's certificate.

In view of deregulated B1-trades, the legislator expected that the range of new business opportunities will cause a general increase in the demand for training places among future founders of a crafts company. As another measure to promote this policy goal, the training costs of B1-companies were lowered. This was done by adopting the temporary suspension of the Ordinance on Trainer Aptitude (AEVO, see Footnote 3) in deregulated B1-trades as a part of the 2004 TCC reform. As a result, business owners in the deregulated parts of the skilled crafts sector were permitted to train apprentices without having to pass a qualifying trainer aptitude exam first.

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[5] We name the mechanism after Kucera (1990), who lays out the argument for the first time.

[6] A number of A-trades were partially deregulated such that trained craftsmen were now allowed to start a crafts company if they have worked for more than six years in a managerial position (so-called "Altgesellenregel", see TCC §7b). However, in contrast to fully deregulated B1-trades, the extent of the deregulation in A-trades must be seen as minor (see Runst, forthcoming).

[7] In addition, there are also a number of B2-trades (Annex B2 of the TCC). These so-called 'craft-like trades' have never been subject to any entry-regulations.

3. In-company vocational training in deregulated trades after the TCC reform

In contrast to the intended positive effect of the reform on training levels hoped for by the originators of the legislation, there are three possible negative-impact channels of the 2004 occupational deregulation on the VET performance of the skilled crafts sector. The first one relates to the firm size of companies in deregulated B1-trades ("firm size effect").

Under the conditions of a regulated business environment, entry barriers can more easily be overcome by individuals with a higher level of entrepreneurial ability (Branstetter et al., 2014). In line with this theoretical prediction, Runst et al. (forthcoming) expect an increased number of exits in the case of deregulated B1-trades because the level of entrepreneurial ability should have fallen in these crafts as a result of removing qualification requirements for approval. In fact, this is what the results of their difference-in-differences analysis show: entry and exit probabilities did increase in B1-trades after the TCC reform.

As a result of these dynamics, there was a pronounced change in the firm size structure within deregulated B1-trades. Müller (2012, pp. 303-304) provides some evidence in this regard. Based on the first official census on the German crafts sector since 1995, the author compared the change in firm size structures for A- and B1-trades for the survey years of 1995 and 2008. The results show that the number of B1-companies employing less than 5 employees rose by 124.9 %. During the same time, the number of microenterprises increased in regulated A-trades, too. However, the corresponding percentage increase only amounts to 60.4 %. One explanation for this finding is the fact that many of the B1-companies founded after the 2004 TCC reform are one-person-enterprises. For the year 2010, Müller and Vogt (2014, p. 6) show that one-person-enterprises make up nearly one-third of the businesses founded in regulated A-trades, whereas in case of deregulated B1-trades this share is nearly double that size. We expect that the decrease of firm size in B1-trades lessened the likelihood of B1-companies to offer training places, as microenterprises (including one-person-enterprises) often cannot bear the costs associated with vocational training due to a general lack of in-house capacities.

Apart from this firm size effect, the 2004 TCC reform may also have triggered an "investment effect" in deregulated B1-trades. In particular, the reform has lowered the probability that a training company's Human Capital investment will pay off in the long run. After a B1-company has trained a new worker, this person now stands free to open up his or her own business, potentially generating additional competition for the training company. More importantly, once left, the trained worker is no longer able to generate revenue as a skilled employee of the training company in the long run (Jansen et al., 2015). In a simplified model, the costs of training must be weighed against the short term benefit received from the apprentice's labor during the training period and the present value of the future skilled labor provided by the apprentice times the probability that this person remains in the company. By removing advanced qualification requirements for business founders, the probability of the leave-option, after basic vocational training is completed, increases.

A third impact channel results from an institutional particularity of the German master craftsperson's qualification. As part of their examination, future master craftsmen are obliged to pass a module on teaching and training skills (Part IV of the master craftsperson's examination, TCC § 45 and § 51a). This entitles them to train apprentices at a later stage when they have set up their own business or are employed in a crafts company. Without a master craftsperson's certificate, crafts companies that aim to offer in-house vocational training must prove that their training personnel is qualified in accordance to the Ordinance on Trainer Aptitude (AEVO). The trainer aptitude examination intends to ensure that minimum qualification standards are maintained during in-company vocational training. In case of the German skilled crafts sector, they are an equivalent to Part IV of the master craftsperson's examination (TCC § 22b).

In theory, this institutional feature should lower the costs of vocational training for companies in regulated crafts trades. The underlying effect, discussed by Kucera (1990), can be described as follows: In regulated crafts trades, a master craftsmen's certificate is a necessary prerequisite for market entry. At a later stage, after the company has been founded, a business owner can decide whether to offer in-house vocational training or not. At that point, the time and money spent on acquiring a master craftsman's certificate (including Part IV to validate teaching and training skills) are sunk costs. In deregulated crafts trades, the situation is quite different. Here, a master craftsman's certificate is no longer needed for being self-employed in the first place. As a result, companies in the deregulated trades have to take into account the time and money necessary to pass a trainer aptitude examination if they choose to offer vocational training (see Kucera, 1990).

Due to this "Kucera-effect", the VET training levels of deregulated B1-trades should have been lowered as a result of the 2004 TCC reform. However, it is crucial to note, that the Kucera-effect cannot fully exert its influence until the year 2009 – which might explain why Koch and Nielen (2017) did not find any causal effects on vocational training in B1-companies in the immediate years after the reform up to 2008. In contrast, the firm-size effect and the investment effects should have operated starting in 2004.

From 2003 to 2009, the requirement for a training license was suspended in order to stimulate in-company vocational training.[8] The AEVO suspension was adopted for deregulated B1-trades with the 2004 TCC reform to help achieving the policy goals of the deregulation in terms of higher in-company vocational training. In case of still regulated A-trades, passing Part IV of a master craftsperson's certificate or an equivalent trainer aptitude examination was still a compulsory prerequisite for offering vocational training. Thus, companies in deregulated B1-trades did not incur higher training costs vis-à-vis companies in A-trades for the years 2004 to 2008. Starting in 2009, however, when the AEVO suspension expired, companies within the B1-trades would have to incur the costs of the special exam if they chose to train apprentices.

It should be mentioned that the Kucera-effect on the VET-training level of the B1-trades may, to some degree, have appeared already right at the beginning of the post-reform period in 2004. Research on the AEVO suspension implies that a noticeable share or companies was not informed about the regulatory arrangement (Ulmer and Jablonka, 2007) and consequently did not know that they were eligible to train apprentices.

4. Data

As Koch and Nielen (2017), we base our empirical analysis on administrative data provided by the German Confederation of Skilled Crafts ("Zentralverband des Deutschen Handwerks", ZDH). Precisely, ZDH-data on the number of apprentices undertaking vocational training in a crafts trade and ZDH-data on the number of new training contracts signed in a year in the skilled crafts sector is used by us as outcome variables to compare treatment and controls groups. Two additional outcome variables are created to take into account the absolute amount of training activity in a given trade by normalizing it with the corresponding number of all employees in a given trade.

From a research point of view, the ZDH-data has the advantage of including all existing crafts companies in the German economy. It thus covers the entire population of the skilled crafts sector.[9] Another advantage is its accuracy in terms of crafts trade's identification: Since membership to crafts trades in Germany is regulated by legal registration, empirical surveys often suffer from the fact that they do not include a clear-cut crafts indicator (Haverkamp, forthcoming). This can be problematic when a precise distinction is needed between regulated and deregulated crafts trades, as in the present case (on this issue, see Runst et al., forthcoming). On the basis of the ZDH-data, still regulated A-trades can clearly be distinguished from companies in B1-trades where no master craftsmen qualification was required for market entry, starting in the year 2004. A third advantage is the long time span for which data is available. Our analysis covers the years 1997 to 2016, allowing us to completely examine the pre- and post-reform-periods.

A disadvantage of the ZDH-data is that it is only available in an aggregated format for data protection purposes. Hence, it does not contain any firm- or individual-level information. To mitigate this drawback, we matched our data set with trade-level information available in the database "Berufe im Spiegel der Statistik" for the years 1999 to 2011, which is provided by the Institute for Employment Research (IAB) in Nuremberg. This allows us to create a set of control variables on the aggregate level of crafts trades. However, it has to be noted that data on control variables is not available for all crafts trades and that it only covers the bulk of the pre- and post-reform periods under investigation (i.e. 1999 to 2011). Hence, in models with controls, the sample size will be reduced accordingly.

5. Method

In the first part of the empirical analysis, we employ log-linear Difference-in-Differences (DiD) regressions to examine the causal effects of the 2004 TCC reform on the VET performance of the skilled crafts sector. Deregulated B1-trades represent the treatment group. The control group consists of A-trades that remained regulated in the post-reform period.

$$\text{Log(Apprentices)}_i = \alpha + \beta B1_i + \gamma \text{PostYear}_i + \sigma B1_i \text{PostYear}_i + \pi X_i + \varepsilon_i$$
$$\text{Log(New training contracts)}_i = \alpha + \beta B1_i + \gamma \text{PostYear}_i + \sigma B1_i \text{PostYear}_i + \pi X_i + \varepsilon_i$$
$$\text{Log(Apprentices per person)}_i = \alpha + \beta B1_i + \gamma \text{PostYear}_i + \sigma B1_i \text{PostYear}_i + \pi X_i + \varepsilon_i$$
$$\text{Log(New training contracts per person)}_i = \alpha + \beta B1_i + \gamma \text{PostYear}_i + \sigma B1_i \text{PostYear}_i + \pi X_i + \varepsilon_i$$

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[8] See Section 1. The suspension of the AEVO ended in 2009 because it emerged that the stimulating effects on the provision of in-company vocational training were smaller than expected. At the same time, the suspension seemed to have negatively influenced the quality of vocational training being offered by companies (see Ulmer and Jablonka, 2007).

[9] Theoretically, this fact removes the requirement for statistical significance levels since we are no longer required to make an inference based on a sample. Strictly speaking, coefficients can be interpreted without examining levels of statistical significance as we have data on the entire population.

As mentioned above, the dependent variables to measure the VET-training level of crafts trades are (1) the absolute amount of apprentices enrolled in a crafts trade per year, (2) the absolute amount of new training contracts signed in a year, (3) the number of apprentices per person for a given trade (4), and the number of new training contracts per person. These four outcome variables of interest are recorded in a logarithmic scale to measure the treatment effect of the 2004 TCC reform in %. The treatment effect represents the interaction of the post-2003/post-2008 dummy (*PostYear*) with the treatment group dummy that indicates a formerly regulated and then deregulated B1-trade (*B1*).

The control variables contained in the vector *X* are (1) the share of women in a given trade, (2) the share of foreigners in a given trade, (3) the share of employees with higher secondary education entrance qualification ("Abitur") in a given trade, (4) the share of unemployed persons in a given trade and (5) the average income in a given trade. Trade fixed effects and time fixed effects are captured by a set of dummy variables. Errors ε are robust and clustered by trade.

As will be discussed in more detail below, we also add additional variables in order to control for potential biases introduced by the economic crises in 2009. As the crafts for industrial needs were the only sub-group of the skilled crafts sector that was affected by the strong recession in the year of 2009, we include a corresponding interaction term in our empirical model.

In the second part of the empirical analysis the Synthetic Control Method (SCM) is used as an alternative to estimate the treatment effect (on SCM estimation see Abadie and Gardeazabal, 2003; Abadie et al., 2010, 2015). Employing the SCM is appropriate because we have only one treated unit (B1-trades). SCM evaluates the impact of the 2004 TCC reform by comparing outcome values of the treated unit with the counterfactual case that no deregulation has occurred. The latter is built by using pre-treatment values from non-deregulated crafts trades to create a weighted average that best reproduces the pre-treatment values of the treated unit. This weighted average constitutes a synthetic control trade. On this basis, the treatment effect of the 2004 TCC reform can be measured by the difference in post-treatment values between B1-trades and the synthetic control trade. One advantage of SCM is that it does not assume a parallel trend in the outcome variable for all observations in all treatment and control groups in the pre-treatment period, instead selectively generates a synthetic control group such that this assumption will be fulfilled.
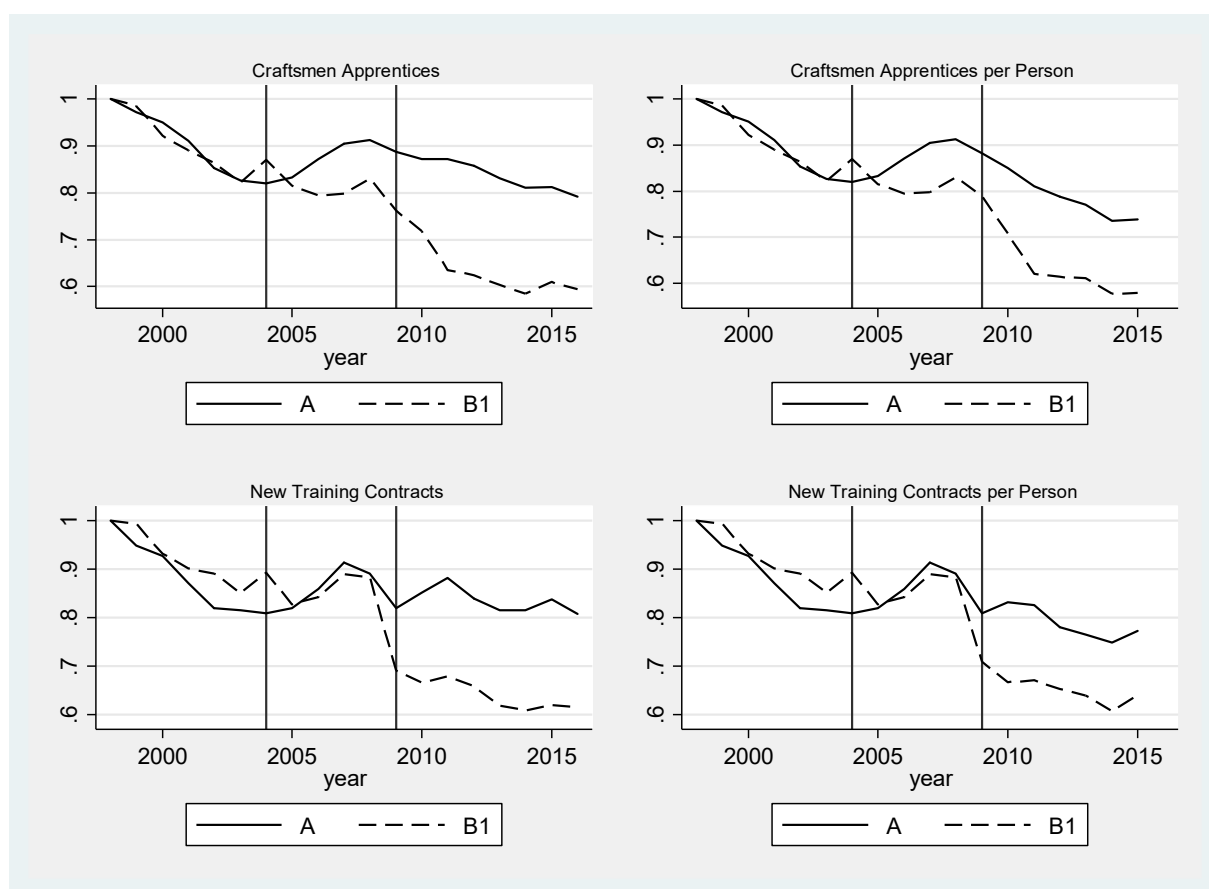
6. Empirical analysis

6.1 Descriptive statistics

Group means of the outcome and control variables are provided in Table 1. As expected, the VET-training level is higher in regulated A-trades compared to deregulated B1-trades. This is not surprising given that, prior to the reform, the absolute amount of in-company vocational training provided by a single trade was a key criterion applied by the legislator to decide on which crafts trades will be deregulated and which will be not (Müller, 2006).

The group means of the control variables show that there are structural differences between the A- and B1-trades under investigation.[10] The shares of women and foreigners are higher in B1-trade occupations. This may relate to higher difficulties faced by B1-companies to find apprentices, since the likelihood of women and foreigners to participate in the dual VET system is below-average (BIBB, 2010). Next, according to our sample, the share of employees with higher education entrance qualification ("Abitur") is higher in B1-trade occupations, too. This may imply that B1-companies often have not built up a tradition of providing in-house vocational training and therefore are less interested in getting engaged in the dual VET system. Other features of B1-trade occupations are higher unemployment rates and lower income levels. Both should negatively affect the employer attractiveness of B1-companies, which in turn increases the difficulties of B1-companies to find apprentices.

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[10] Please note that data on the control variables is not available for all A- and B1-trades (on this issue, see Section 4).

Graph 1. Development of outcomes of A- and B1-trades in the pre-and post-reform periods (1998=1)

Graph 1 displays the development of the four outcome variables for A- and B1-trades prior and after the 2004 TCC reform. The graphical inspection suggests that there might have been a slightly negative impact on VET training levels in deregulated crafts trades in the immediate years after 2003. However, beginning with the year 2009, deregulated B1-trades display a marked decrease in VET-training levels vis-à-vis still regulated A-trades. This can be observed for all four dependent variables (see Graph 1). Hence, the Kucera-effect of the TCC reform may in fact have started to negatively affect vocational training in the deregulated crafts trades on a larger scale commencing with the year 2009.

6.2 Difference-in-differences estimation

Tables 2 and 3 show the DiD-regression results for the two different points in time at which our treatment begins (2004 and 2009). In the case of the 2004-treatment (Table 2), only observations up to 2008 are included in the corresponding DiD-models, while the evaluation of the 2009-treatment (Table 3) includes all years in the post-reform period under investigation. In doing so, the Kucera-effect of the TCC reform can be more clearly separated from the other two impact channels discussed in Section 3.

The graphical inspection in Section 6.1 is validated by the DiD regressions. The interaction between the post-2003 dummy and the B1-trade dummy is not significant in any of the 2004-treatment models; including those with further control variables (see Table 2). Hence, it seems that, in fact, the 2004 TCC reform virtually had no impact on the VET training levels of deregulated B1-trades in the immediate years after 2003. This coincides with the results of Koch and Nielen (2017).

The picture looks different in case of the 2009-treatment models (see Table 3). Now, the interaction term is negative and statistical significant for all dependent variables. Thus, the absolute amount of apprentices as well as the number of new training contracts did decrease in deregulated B1-trades after 2008. The size of this treatment effect varies depending on the outcome variable and the use of further control variables. The number of apprentices seems to be slightly more affected by the TCC reform than the number of new training contracts. Moreover, in each case, the size of the treatment effect is reduced when further controls are added to the model. However, regardless of which dependent and control variables are used, the 2004 TCC reform appears to have caused a strong decrease of VET-training levels in B1-trades which occurred with a delay of several years after

occupational deregulation (the impact of the treatment effect ranges from 13.4 to 30.4 percentage points, depending on the model, see Table 3).

6.3 Robustness checks

To assess the causal robustness of our DiD-findings, we tested the common trends assumption underlying this estimation method. The validity of DiD-estimation is sometimes questioned because of doubts that the pre-treatment trends of the treatment and control groups can really be assumed to be parallel. To examine whether this assumption has been met in the present case, DiD-estimation is repeated by replacing the post-2008 dummy with a set of time dummies covering each year of the pre- and post-reform periods. For each year, the interaction between the treatment group B1 and the corresponding time dummy is calculated (see Table 4). As can be observed, the interactions of the B1-dummies and the year dummies are starting to become negative and statistical significant only after the year 2008. In every year of the pre-reform period, no coefficient appears to be significant. This speaks in favor of the common trends assumption. Hence, the results of this robustness check support the DiD-findings presented in Table 3.

Another robustness concern may be raised by the temporal overlap to the economic crisis of 2008/09. In the year 2009, the German economy experienced a sharp recession. The main driver behind this was a collapsing demand for German exports because of the global recession. The German skilled crafts sector responded asymmetrically to this shock. While the large majority of crafts trades were more or less unaffected by the crisis due to their focus on domestic markets, some crafts trades with strong relationships to export-intensive manufacturing industries faced a sharp economic downturn (Thomä, 2010, 2011). To check for this effect, we re-run the 2008-treatment DiD-regressions by including an interaction term of a dummy for these trades for industrial needs (e.g. metal workers, precision engineers or electrical machine engineers) and the 2009-year dummy. The results show that our DiD-findings remain stable after this robustness check (see Table 5).

6.4 Synthetic control estimation

Graph 2 displays the results of the SCM. The pool of SCM donors is composed of all non-treated crafts trades. The year at which treatment presumably begins is set at 2004, thus allowing for possible effects of the firm-size and investment channel before the year 2009. We include all lags of the outcome variable in the estimation and no control variables. The results are not much different when fewer lags are used, however, the all-lags-model displays the lowest root mean squared prediction error (RMSPE), which is why we use it as our main specification. The synthetically generated control group is composed of a small number of donor observations and the pre-treatment deviation between treatment and synthetic control group is small in all cases.

Graph 2. Results of synthetic control estimation

Graph 2a. Number of apprentices

Graph 2b. New training contracts

Graph 2c. Number of apprentices per person

Graph 2d. New training contracts per person

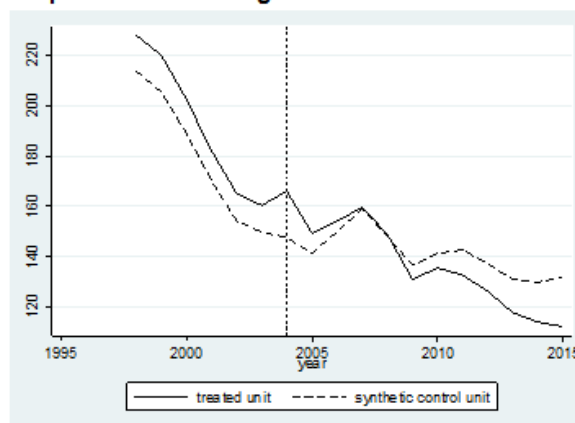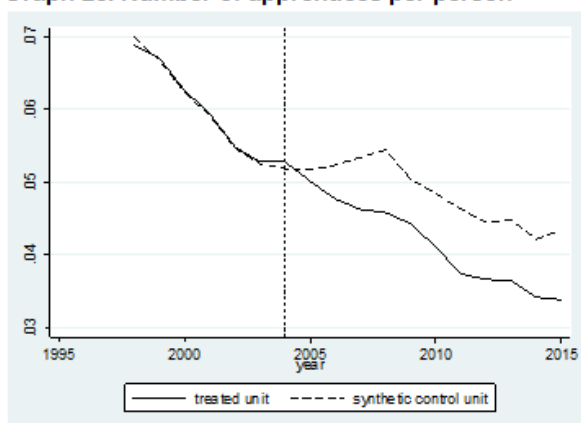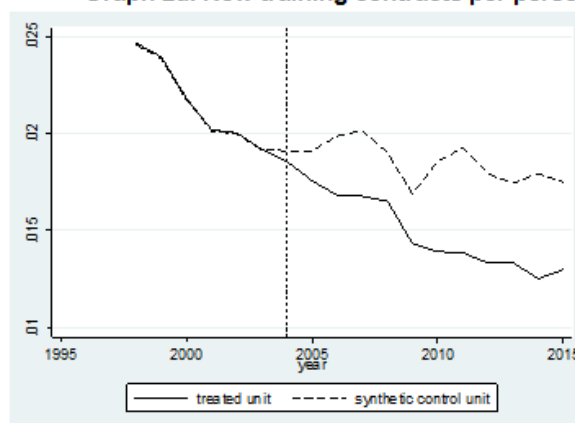For both upper panels in Graph 2 (2a and 2b), which display the number of apprentices as well as the number of new training contracts, we can see that a small gap between control and treatment groups appears before the year 2009 after which it increases sharply, indicating that both the firm-size channel and the investment channel are relatively less important, while the Kucera-effect is quantitatively meaningful. We can also see a slight increase in training in deregulated B1-trades in the year 2004, suggesting that the policy intention of boosting training was successful in that particular year. However, the positive effect only appears in the year 2004. In the overall treatment period training clearly fell in deregulated trades. The two lower panels (2c and 2d),which display the number of apprentices per person as well as the number of new training contracts per person, the situation is similar. Here we do find a very small gap between groups that is already apparent for the years 2004 to 2008. However, the gap significantly widens after 2009, which leads us to similar conclusions about the relative importance of the Kucera-effect.

Finally, it can be stated none of the panels give any reason to suspect a significant influence of the recession year of 2009 as there are no troughs visible. Instead, the gap widens in that year and remains largely constant (or is even slightly increasing) thereafter.

7. Conclusion

The 2004 deregulation of the German Trade and Crafts Code (TCC) abolished the advanced educational requirements for starting a business in a selected number of crafts trades. Before the year 2004, a master craftsperson's examination was a prerequisite for self-employment in all crafts trades. Many individuals, with or without basic crafts training, have seized this opportunity and the number of businesses (as well as exit rates) has increased strongly in the deregulated crafts trades after the 2004 TCC reform (Runst et al., forthcoming). In the present paper, and in contrast to Koch and Nielen (2017), we show that the occupational deregulation has also lowered the level of basic vocational training provided by companies in the affected trades. Difference-in-differences regressions as well as the Synthetic Control Method show a strong decline in vocational training levels by more than 13 but possibly as high as 30 percentage points.

With respect to the policy implications, our results imply that the entry requirement of a master craftsman certificate has a positive impact on Vocational Education and Training (VET) levels in the skilled crafts sector. Theoretically this impact is mediated through three channels. First, the firm size composition is skewed toward fewer and larger crafts businesses by the existence of an entry-restriction. As larger and older businesses are more likely to offer in-house vocational training, the 2004 TCC reform has caused the average firm size to fall in the deregulated trades, which in turn, lowered their vocational training levels.

A second impact channel that might have lowered the VET-training levels in deregulated trades results from lower incentives among business owners to invest in vocational training because they do not want to breed new competitors. Before 2004, training companies could assume that it will either take some time before their trainees are in a position to hold a master craftsman certificate in order to start their own company or they may never acquire the advanced degree at all. With the 2004 TCC reform, this situation has changed. Business founders in deregulated crafts trades can enter the market without any qualification requirements. Hence, for example, craftsperson can set up their own business right after they have finished their basic vocational training. Thus, the likelihood of reviving a positive return on the investment in an apprentice has fallen after the deregulation.

Our empirical results indicate that the firm size and the investment effects are relatively less important, however, because vocational training levels did not fall significantly between 2004 and 2008, in which these two mechanisms could have exerted their influence as many small and new companies have entered the market in deregulated trades. In contrast, we find that the so-called "Kucera-effect" (Kucera, 1990) is relatively more important in explaining the negative impact of the 2004 TCC reform on vocational training levels. Theoretically, firm owners in regulated crafts trades must treat the cost of passing a trainer aptitude examination as sunk because it was already obtained as part of their mandatory master craftsman certificate (Part IV of the master craftsperson's examination, TCC § 45 and § 51a). On the other hand, companies in the deregulated trades do not automatically possess a training license and must, therefore, factor in the time and money it takes to obtain it. Because of this difference in company training costs, we expect vocational training levels to fall in the deregulated crafts trades. However, this mechanism could not operate between the years 2004 and 2008 when the necessity to pass a trainer aptitude examination was temporarily suspended in the deregulated parts of the skilled crafts sector. Starting in 2009 however, we observe an economically and statistically significant fall in vocational training levels due to the "Kucera-effect".

Our results are of particular interest given that the European Commission actively evaluates the economic justification and legality of restricted access to professions in all member states in order to facilitate Common Market area exchanges and labor migration (see e.g. EC 2013). The evidence provided in the present paper may provide one argument in favor of occupational licensing regulation in the German skilled crafts sector. In addition, our results are specifically important for policy-makers in Germany. In the German election 2017, a debate about further deregulation on the one hand, and a possible re-regulation of certain occupations was recently taken up by most political parties. The new coalition agreement 'Confidence in the Future' asserts the necessity of upholding domestic qualification standards as entry-requirement in the skilled crafts sector.

The welfare consequences of the reform depend on a number of auxiliary factors, of course. For example, a sizable proportion of crafts apprentices are employed in other sectors of the economy such as the manufacturing industry (Haverkamp and Gelzer, 2016). Thus, it could be claimed that companies from non-crafts parts of the German economy benefit from the spillover effects of crafts vocational training. In this view, the 2004 TCC reform may have reduced this positive externality.

On the other hand, current (lower) VET training levels in companies in the deregulated crafts trades reveal their preference for less in-house vocational training. Thus, the fixed costs of a mandatory trainer aptitude exam, which many crafts companies without a master craftsman certificate currently do not want to bear, would have to be weighed against any benefits from a positive externality. In addition, while the entry-restriction imposed by a mandatory master craftsperson's examination may raise overall VET training levels in the skilled crafts sector, it itself represents a cost imposed on society by reducing competition in the crafts market. Examining these potential welfare consequences of the 2004 TCC reform warrants further empirical study.

References

Abadie A, Gardeazabal J., 2003. The Economic Costs of Conflict: A Case Study of the Basque Country. The American Economic Review, Vol. 93, No. 1. (Mar., 2003), pp. 113-132.

Abadie, A., Diamond, A., Hainmueller, J., 2010. Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program. Journal of the American Statistical Association, 105:490, pp. 493-505.

Abadie, A., Diamond, A., Hainmueller, J., 2015. Comparative Politics and the Synthetic Control Method. American Journal of Political Science, 2015, 59 (2), pp. 495-510.

BIBB, 2010. Datenreport zum Berufsbildungsbericht 2010. Informationen und Analysen zur Entwicklung der beruflichen Bildung, Bonn.

Bol, T., 2014. Economic returns to occupational closure in the German skilled trades. Social Science Research 46(2014), pp. 9-22.

Bol, T., Weeden, Kim A., 2015. Occupational Closure and Wage Inequality in Germany and the United Kingdom. European Sociological Review, Vol. 31(3), pp. 354-369.

Branstetter, L., Lima, F., Taylor, L.J., Venancio, A., 2014. Do Entry Regulations Deter Entrepreneurship and Job Creation? Evidence from Recent Reforms in Portugal. The Economic Journal 124(577), pp. 805-832.

Damelang, A., Haupt, A., Abraham, M., 2017. Economic consequences of occupational deregulation: Natural experiment in the German crafts. Acta Sociologica, pp. 1-16.

Deutscher Bundestag, 2003. Gesetzentwurf der Fraktionen SPD und BÜNDNIS 90/DIE GRÜNE- Entwurf eines Dritten Gesetzes zur Änderung der Handwerksordnung und anderer handwerksrechtlicher Vorschriften, 15. Wahlperiode, Drucksache 15/1206, Berlin.

EC, 2013. Evaluating national regulations on access to professions. European Commission (EC), COM(2013) 676 final, Brussels.

Fredriksen, K., 2017. Do legal restrictions to accessing professions impact imcomes?- The German crafts case. ifh Working Papers, No. 11, ifh Göttingen.

Fredriksen, K., Runst, P., Bizer, K., forthcoming. Masterful Meisters? Voluntary Certification and Quality in the German Crafts Sector. German Economic Review.

Haverkamp, K., forthcoming. Das Handwerk – Zur definitorischen und statistischen Abgrenzung eines Querschnittsbereichs. Zeitschrift für KMU und Entrepreneurship (accepted for publication).

Haverkamp, K., Gelzer, A., 2016. Verbleib und Abwanderung aus dem Handwerk: Die Arbeitsmarktmobilität von handwerklichen Nachwuchskräften. Göttinger Beiträge zur Handwerksforschung, Heft 10, Göttingen.

Jansen, A., Pfeifer, H., Schönfeld, G., Wenzelmann, F., 2015. Ausbildung in Deutschland weiterhin investitionsorientiert, Ergebnisse der BIBB-Kosten-Nutzen-Erhebung 2012/13. BIBB REPORT 1/2015.

Koch, A., Nielen, S., 2017. Ökonomische Wirkungen der Handwerksnovelle 2004: Ergebnisse einer Kontrollgruppenanalyse. Perspektiven der Wirtschaftspolitik18(1), pp. 72-85.

Kucera, G., 1990. Die Regulierung des Handwerks aus volkswirtschaftlicher Sicht. In: Kucera, G. and Stratenwerth, W. (Hrsg.), Deregulierung des Handwerks – Gesamtwirtschaftliche Risiken und Gefahren, Göttingen, pp. 23-148.

Lergetporer, P., Ruhose, J., Simon, L., 2016. Labor Market Effects of Entry Barriers to Self-Employment: Evidence from Deregulating the German Crafts Sector. Ifo Center for the Economics of Education, Ifo Institute.

Müller, K., 2006. Erste Auswirkungen der Novellierung der Handwerksordnung von 2004. Göttinger Handwerkswirtschaftliche Studien, Band 74, Duderstadt.

Müller, K., 2012. Analyse der Handwerkszählung 2008. Göttinger Handwerkswirtschaftliche Studien, Band 85, Duderstadt.

Müller, K., 2016. Handwerksrechtsnovelle von 2003. Was waren die Ergebnisse?. Gewerbearchiv, 62. Jg., Heft 2, Alfeld, pp. 54-59.

Müller, K., 2017. Die Stellung des Handwerks innerhalb der Gesamtwirtschaft. Göttinger Handwerkswirtschaftliche Studien, Band 99, Duderstadt.

Müller, K., Vogt, N., 2014. Soloselbstständigkeit im Handwerk - Anzahl, Bedeutung und Merkmale der Ein-Personen-Unternehmen. Göttinger Handwerkswirtschaftliche Studien, Band 95, Duderstadt.

Rostam-Afschar, D., 2014. Entry regulation and entrepreneurship: a natural experiment in German craftsmanship. Empirical Economics 47, pp. 1067-1101.

Runst, P., forthcoming. The Effect of Occupational Licensing Deregulation on Migrants in the German Skilled Crafts Sector. European Journal of Law and Economics.

Runst, P., Thomä, J., Haverkamp, K., Müller, K., forthcoming. A replication of 'Entry regulation and entrepreneurship: a natural experiment in German crafts-manship'. Empirical Economics.

Thomä, J., 2010. Das Handwerk - ein Konjunkturstabilisator?, in: Küpper, Hans-Ulrich (Hrsg.), Lehren aus der Krise. Auswirkungen und Konsequenzen aus der Finanz- und Wirtschaftskrise 2008/2009 für den Handwerksbereich. München, pp. 19-75.

Thomä, J., 2011. Das Handwerk als Stabilisator der konjunkturellen Entwicklung?. In: Wirtschaftsdienst - Zeitschrift für Wirtschaftspolitik, 91 (2), pp. 127-132.

Ulmer, P., Jablonka, P., 2007. Mehr Ausbildungsbetriebe – mehr Ausbildungsplätze – weniger Qualität? Die Aussetzung der Ausbilder-Eignungsverordnung (AEVO) und ihre Folgen. BIBB REPORT 3/2007, Bonn.

Tables

Table 1. Descriptive Statistics (means by group)

Dependent variables	1998-2003		2004-2008		2009-2016	
	A	**B1**	**A**	**B1**	**A**	**B1**
Total number of apprentices	11,655.3	533.2	9,491.8	415.9	7,967.5	322.2
New training contracts	3,911.2	193.0	3,284.2	155.6	2,849.5	122.9
Number of apprentices per person	0.096	0.061	0.083	0.049	0.074	0.038
New training contracts per person	0.033	0.022	0.029	0.017	0.026	0.013
Control variables	**1999-2003**		**2004-2008**		**2009-2011**	
Share of women	12.2	34.1	12.4	34.2	12.6	34.4
Share of foreigners	7.3	8.2	6.5	8.0	6.4	8.1
Share Abitur	1.1	2.5	1.2	2.9	1.4	3.4
Share unemployed	16.0	17.8	14.9	16.6	9.0	11.1
Monthly income in €	2,229.8	1,984.4	2,339.2	2,054.4	2,414.1	2,099.3

Notes: ‚Abitur' is an upper secondary schooling degree that serves as prerequsite for taking up studies at a university. Foreigners are defined as working individuals without German citizenship.

Table 2. DiD-estimations results, Part I (year at which treatment begins: 2004)

	Log apprentices		Log new training contracts		Log apprentices/ persons		Log new training contracts/ persons	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B1	-2.711***	-2.684***	-2.672***	-2.829***	0.791***	0.755**	0.821***	0.609*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.036)	(0.000)	(0.076)
Post 2003	-0.246***	-0.440***	-0.281***	-0.517***	-0.263***	-0.440***	-0.270***	-0.517***
	(0.001)	(0.003)	(0.000)	(0.001)	(0.000)	(0.003)	(0.000)	(0.001)
B1 x post 2003	-0.0647	-0.0549	-0.105	-0.0685	-0.0643	-0.0549	-0.101	-0.0685
	(0.362)	(0.502)	(0.181)	(0.509)	(0.343)	(0.502)	(0.186)	(0.509)
Controls on year and trade	yes	yes	yes	yes	yes	yes	yes	yes
Further controls								
Share Women		0.0248		0.0422		0.0248		0.0422
		(0.255)		(0.126)		(0.255)		(0.126)
Share Foreigners		-0.0377		-0.0344		-0.0377		-0.0344
		(0.396)		(0.403)		(0.396)		(0.403)
Share Abitur		-0.0185		-0.0392		-0.0185		-0.0392
		(0.846)		(0.618)		(0.846)		(0.618)
Share Unemployed		-0.0110		-0.00968		-0.0110		-0.00968
		(0.228)		(0.242)		(0.228)		(0.242)
Income in €		0.000273		0.000615		0.000273		0.000615
		(0.542)		(0.177)		(0.542)		(0.177)
Constant	9.920***	9.773***	8.950***	7.931***	-2.837***	-2.944**	-3.823***	-4.786***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.018)	(0.000)	(0.000)
Observations	1112	626	1102	620	1019	626	1010	620
r2	0.991	0.993	0.985	0.988	0.921	0.925	0.869	0.884

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robust standard errors, clustered by occupation, have been used. Occupation and time fixed effects are employed.

Note: Sample sizes are reduced in models with controls due to the fact that data on the control variables is not available for each crafts trade and each year of the pre- and post-reform periods (see Section 4).

Table 3. DiD-estimations results, Part II (year at which treatment begins: 2009)

	Log apprentices		Log new training contracts		Log apprentices / persons		Log new training contracts/ persons	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B1	-2.442***	-2.811***	-2.477***	-2.938***	0.995***	0.713**	0.944***	0.612**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.034)	(0.000)	(0.041)
Post 2008	-0.461***	-0.564***	-0.444***	-0.527***	-0.537***	-0.520***	-0.489***	-0.496***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.002)	(0.000)	(0.002)
B1 x post 2008	-0.304***	-0.204*	-0.284***	-0.165**	-0.201***	-0.197*	-0.162**	-0.134*
	(0.001)	(0.050)	(0.001)	(0.042)	(0.007)	(0.065)	(0.019)	(0.092)
Controls on year and trade	yes	yes	yes	yes	yes	yes	yes	yes
Further controls								
Share Women		0.0463*		0.0322		0.0479*		0.0325
		(0.092)		(0.217)		(0.098)		(0.233)
Share Foreigners		-0.0238		-0.00871		-0.0339		-0.0198
		(0.628)		(0.830)		(0.476)		(0.612)
Share Abitur		-0.0300		-0.0547		-0.0334		-0.0608
		(0.691)		(0.395)		(0.658)		(0.348)
Share Unemployed		-0.00603		-0.0116		-0.00588		-0.0107
		(0.592)		(0.192)		(0.610)		(0.232)
Income in €		0.000523		0.000477		0.000388		0.000320
		(0.278)		(0.295)		(0.421)		(0.485)
Constant	9.776***	8.928***	8.857***	8.089***	-2.941***	-3.410**	-3.871***	-4.198***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.001)
Observations	1847	750	1819	740	1555	702	1529	692
r2	0.986	0.990	0.982	0.987	0.893	0.903	0.861	0.881

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Robust standard errors, clustered by occupation, have been used. Occupation and time fixed effects are employed.
Note: Sample sizes are reduced in models with controls due to the fact that data on the control variables is not available for each crafts trade and each year of the pre- and post-reform periods (see Section 4).

Table 4. Testing of the Common Trends Assumption

	(1) Log apprentices	(2) Log apprentices /person	(3) Log new training contracts	(4) Log new training contracts /person
B1 x 1999	0.00900	0.00900	-0.0156	-0.0156
	(0.687)	(0.687)	(0.815)	(0.815)
B1 x 2000	-0.0471	-0.0471	-0.0404	-0.0394
	(0.291)	(0.291)	(0.513)	(0.523)
B1 x 2001	-0.0144	-0.0215	-0.0165	-0.0165
	(0.782)	(0.681)	(0.818)	(0.818)
B1 x 2002	-0.0249	-0.0249	0.0132	0.0211
	(0.714)	(0.714)	(0.877)	(0.805)
B1 x 2003	-0.0308	-0.0308	-0.0665	-0.0609
	(0.651)	(0.651)	(0.489)	(0.528)
B1 x 2004	0.0283	0.0283	-0.00915	-0.00915
	(0.699)	(0.700)	(0.914)	(0.914)
B1 x 2005	-0.0391	-0.0391	-0.0669	-0.0613
	(0.636)	(0.637)	(0.533)	(0.569)
B1 x 2006	-0.106	-0.114	-0.154	-0.154
	(0.290)	(0.261)	(0.217)	(0.217)
B1 x 2007	-0.138	-0.145	-0.184	-0.184
	(0.197)	(0.177)	(0.112)	(0.112)
B1 x 2008	-0.152	-0.159	-0.197	-0.197
	(0.197)	(0.178)	(0.146)	(0.147)
B1 x 2009	-0.241*	-0.200	-0.241**	-0.191
	(0.056)	(0.109)	(0.046)	(0.103)
B1 x 2010	-0.305**	-0.256*	-0.305**	-0.252**
	(0.028)	(0.056)	(0.015)	(0.035)
B1 x 2011	-0.374***	-0.301***	-0.346***	-0.268**
	(0.003)	(0.009)	(0.008)	(0.025)
B1 x 2012	-0.362***	-0.277**	-0.327***	-0.234**
	(0.004)	(0.017)	(0.009)	(0.040)
B1 x 2013	-0.353***	-0.258**	-0.372**	-0.277**
	(0.007)	(0.030)	(0.010)	(0.038)
B1 x 2014	-0.379***	-0.290**	-0.379***	-0.283**
	(0.008)	(0.024)	(0.008)	(0.029)
B1 x 2015	-0.389**	-0.303**	-0.392***	-0.296**
	(0.011)	(0.024)	(0.010)	(0.038)
B1 x 2016	-0.385**	0	-0.402***	0
	(0.011)	(.)	(0.007)	(.)
B1	-2.345***	1.052***	-2.370***	1.021***
	(0.000)	(0.000)	(0.000)	(0.000)
Controls on year and trade	yes	yes	yes	yes
Constant	9.726***	-2.981***	8.777***	-3.931***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1754	1663	1727	1637
r2	0.987	0.897	0.983	0.866

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Robust standard errors, clustered by occupation, have been used. Occupation and time fixed effects are employed.

Table 5. DiD-regressions with controlling for the recession 2009

	Log apprentices		Log new training contracts		Log apprentices / persons		Log new training contracts/ persons	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B1	-5.640***	-7.867***	-5.691***	-7.015***	0.843***	-1.327	0.801***	-0.478
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.356)	(0.000)	(0.722)
Post 2008	-0.460***	-0.563***	-0.444***	-0.526***	-0.501***	-0.558***	-0.437***	-0.521***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
B1 x post 2008	-0.305***	-0.212**	-0.284***	-0.167**	-0.221***	-0.177*	-0.192***	-0.133*
	(0.001)	(0.030)	(0.001)	(0.036)	(0.002)	(0.059)	(0.005)	(0.071)
Trades for industrial needs	3.193***	5.035***	3.214***	4.069***	0.154***	1.994	0.155***	1.030
	(0.000)	(0.002)	(0.000)	(0.004)	(0.000)	(0.201)	(0.000)	(0.445)
Trades for industrial needs x 2009	0.105	0.167	-0.00354	0.0561	0.104	0.170	-0.00736	0.0591
	(0.313)	(0.243)	(0.959)	(0.623)	(0.337)	(0.234)	(0.914)	(0.577)
Controls for years and trades	yes	yes	yes	yes	yes	yes	yes	yes
Further Controls								
Share Women		0.0463*		0.0320		0.0441		0.0298
		(0.092)		(0.219)		(0.103)		(0.242)
Share Foreigners		-0.0228		-0.00826		-0.0294		-0.0148
		(0.639)		(0.839)		(0.535)		(0.707)
Share Abitur		-0.0219		-0.0519		-0.0272		-0.0560
		(0.774)		(0.426)		(0.721)		(0.392)
Share Unemployed		-0.00622		-0.0117		-0.00667		-0.0122
		(0.581)		(0.188)		(0.554)		(0.168)
Income in €		0.000509		0.000472		0.000457		0.000420
		(0.287)		(0.301)		(0.335)		(0.353)
Constant	9.777***	8.959***	8.857***	8.101***	-2.952***	-3.576**	-3.895***	-4.433***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.010)	(0.000)	(0.001)
Observations	1847	750	1819	740	1663	750	1637	740
r2	0.986	0.990	0.982	0.988	0.896	0.904	0.864	0.881

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Robust standard errors, clustered by occupation, have been used. Occupation and time fixed effects are employed.
Note: Sample sizes are reduced in models with controls due to the fact that data on the control variables is not available for each crafts trade and each year of the pre- and post-reform periods (see Section 4).