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Masterful Meisters?
Voluntary Certification and Quality
in the German Crafts Sector

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Zusammenfassung

Informationsprobleme treten in Dienstleistungsmärkten häufiger auf als in Produktmärkten, weil es viele heterogene Firmen und Angebote gibt. Berufslizensierungen wurden in der Vergangenheit oft damit begründet, diese Informationsprobleme aufzulösen und damit für höhere Qualität zu sorgen. Natürlich errichten Berufslizensierungen auch Eintrittsbarrieren in den Markt und reduzieren die Anzahl der Anbieter. Freiwillige Zertifizierungen stehen den verpflichtenden Lizenzen als Alternative gegenüber. In Deutschland wurde die Meisterpflicht bei einer Reihe von Handwerkszweigen im Jahr 2004 abgeschafft und durch ein Zetrifikatesystem ersetzt. In dieser Studie untersuchen wir, ob freiwillige Zertifikate die Suchkosten für Handwerkskunden reduzieren. Als Ergebnis finden wir einen statistisch signifikanten Zusammenhang zwischen der Qualitätsbewertung und dem Besitz eines Meistertitels auf der Online-Plattform MyHammer. Daraus schlussfolgern wir, dass das Meisterzertifikat ein verlässliches Qualitätsmerkmal darstellt.

Abstract

Voluntary certification systems potentially reduce search costs in markets with imperfect information. Service markets with many heterogeneous firms – such as the crafts market – are prone to information imperfections and can therefore potentially benefit from such informational mechanisms. We examine if the Meister qualification in the German crafts sector improves service quality as perceived by consumers. We find a significant and positive relationship between the Meister title and consumer ratings and conclude that the certificate is a credible sign of quality.

JEL Classification: I28, J24, L51

Keywords: Transaction Costs, Search Costs, Voluntary Certification, Service Quality

1. Introduction

In Germany, a reform of the crafts regulation in 2004 – motivated by the aim to increase competition by lowering entry barriers – abolished or lessened the old licensing scheme for a number of crafts trades. In the deregulated trades, the Meister title (an advanced vocational certificate) is now voluntary and no longer a prerequisite to enter the market. Following the reform, popular concerns have been uttered regarding the effectiveness of an optional Meister certificate to safeguard consumer protection in Germany[1] and some German political parties demand the reintroduction of occupational licensing.[2]

Occupational licensing legislation has indeed been justified by claims of minimum quality protection (Kleiner, 2006). Licensing may in fact be beneficial for consumer protection. For instance, when quality information is not readily available to consumers, or if search costs are prohibitively high, as in the case in markets with strong information failures (see e.g. Akerlof, 1970; and Leland, 1975), as when there is extreme uncertainty over product or service quality as a result of many diverse suppliers being present in the market.

While service markets such as the crafts market may be particularly prone to information imperfections and higher search costs, there are a number of potential mechanisms which could lower search costs for customers, such as advertising, labeling, screening, reputation effects and voluntary certification (see e.g. Ippolito and Mathios, 1990; Dranove and Jin, 2010; and Cabral, 2012), with the latter being the focus of this paper.

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[1] Traublinger (2014); "Meisterbrief und Meistervoraussetzung: Basis eines starken, innovativen handwerks", in: Ifo Schnelldienst, 16/2014.

[2] "CDU will Meisterzwang reanimieren" Handelsblatt, 13.11.2016.

We examine whether the optional Meister certificate offers useful information about quality to consumers in German crafts trades, which are no longer subject to a licensing requirement. We estimate the effect of having the Meister certificate on service quality in deregulated crafts trades as perceived by consumers conditional on firm-specific controls. Our finding – consistent across all empirical specifications – is that the Meister certification is perceived as a token of quality. We interpret this as a sign that the voluntary certification scheme in deregulated crafts trades reduces information search costs for consumers.

This study is organized as follows. Part two motivates the study by discussing information availability and search costs in the German crafts market, as well as the role of the Meister certificate in this context. Part three presents the methodology and the data used. Part four lists the results, before part five concludes by discussing the results from a policy perspective.

2. Background

Stiglitz's (2000, p. 1441) essay on the academic contributions of economics of information states that "it is now recognized that information is imperfect, obtaining information can be costly, there are important asymmetries of information, and the extent of information asymmetries is affected by actions of firms and individuals". Our study addresses the cost for consumers related to information procurement, i.e. search costs. The topic is important because economists have shown that market outcomes are sensitive to consumer information acquisition (see e.g. Salop and Stiglitz, 1977, 1982; Varian, 1980 and Wilde, 1980)[3].

The term "search" was first introduced in the economic literature by Stigler, who depicts it as "canvassing various sellers" (Stigler 1961, p. 213). Nelson (1970) defines "search" as all

[3] According to Stiglitz (2000, p. 1455), studies on price dispersion under imperfect information "showed that even […] an epsilon [small] search costs could dramatically change the nature of the market equilibrium".

ways in which consumption options are evaluated. Consumers can search for quality as well as price. This paper focuses on the search for information about quality. Again according to Nelson (1970), information about quality is more costly for consumers to obtain than information about prices.

There are good reasons to believe that high search costs characterize the German crafts market. Service markets such as crafts markets (e.g. hairdresser and optician services or paint jobs) are prone to imperfect information (see e.g. Leland, 1979). First, crafts services are non-standardized. Quality not only varies among craftsmen but also depends on the specific conditions of the task (e.g. the shape and condition of a roof). In other words, the specific nature of particular tasks makes the search for information about quality costly for consumers. Second, services – as opposed to goods – are purchased before they are provided. This means that consumers cannot observe quality before a purchase, which complicates the search. As it is impossible to assess quality directly, the search process may include indirect sources of information. Examples are other people's evaluations or the checking of educational certificates, such as basic or advanced vocational training degrees. Finally, low frequency purchases, such as house refurbishments, are also associated with higher search costs (see Nelson, 1970).

Information availability and search costs in the German crafts market may have been affected by the deregulation in 2004, which removed the traditional licensing scheme that mandated a Meister degree[4] (an advanced vocational certificate) for market entry in selected crafts trades. In the affected trades, a voluntary certification scheme has taken its place whereby craftsmen

[4] Acquiring the Meister title requires advanced vocational training, which is internationally recognized as tertiary education open only to individuals who have completed apprenticeships or upper secondary vocational schools (see Schneider, 2008, for more information on the German education system).

stand free to acquire a Meister degree or not and consumers choose whether or not to purchase from certified craftsmen.

Studies have documented the increased market entry – predominantly of craftsmen without professional qualification – as a result of the reform (see Rostam-Afschar, 2014; Rostam-Afschar, 2015; Runst et al., 2016; and Koch and Nielen, 2016). Hence, the crafts market is now more competitive and the service providers are more diverse in terms of their formal qualification than before. Theoretically, therefore, the growth in competition may increase consumer surplus by lowering market prices and forcing competitors to strive for higher quality. However, new market entrants and increased supplier diversity may also increase search costs (see Smith et al., 1998). It follows that higher search costs may reduce the positive effects of increased competition.

The effects on consumers of removing occupational licensing appears therefore theoretically undetermined. With regard to the situation in Germany, two points are worth noting. The first point is that "it is unlikely that the number of self-employed will increase in a further de-regulation in occupations where the share of self-employment is already quite high" Rostam-Afschar (2015, p. 21/22). The second point is that various mechanisms that inform consumers may also limit the negative implications of search costs resulting from the de-regulation and market development that has taken place. These include reputations, labeling, minimum quality standards and certification. Our focus is certification and we examine if the 'Meister' certificate can reduce search costs in this market.

Exhaustive economic analysis of the German crafts case has been difficult since there is no avaible data on the quality of the Meister education (see Rostam-Afschar, 2015). This author states that "more evidence on quality and quality uncertainty are needed" (p. 48). Furthermore, it is difficult to rely on evidence from other countries. Empirical studies on

professional voluntary certification schemes are scarce and center on the case of teachers in the US (see Kane et al., 2007; Boyd et al., 2007; and Croniger et al., 2005). Since the effects of certification may be both institution- and market specific, it may not be possible to generalize about them.

There are two channels through which the German Meister certificate – which is easy for consumers to observe – may lower search costs. First of all, higher quality may be a result of higher innate abilities. In this case, the Meister certificate acts as a signal of quality because lower-ability individuals face higher costs in the completion of the qualification and will therefore choose not to pursue this goal (Spence, 1974). According to the signaling hypothesis, the Meister degree does not increase skill, but simply serves as a sorting mechanism. Second, the Meister degree may actually be a productivity enhancing mechanism through which human capital is acquired and individuals become more productive. This is in line with the Becker human capital theory, (see Becker 1964).

In this paper, we estimate the effect of having the Meister certificate on service quality in deregulated crafts trades as perceived by consumers. As stressed in e.g. Caswell and Anders (2009), the effectiveness of certification systems depends on the trust placed in them by consumers. This also depends on existing and significant quality differences between certified and non-certified companies. When this is the case, search costs for consumers are reduced.

3. Data and methods

A general lack of attention in the empirical literature on quality effects of professional qualification has been explained by the difficulty in establishing correct measures (see Kleiner, 2000). We use a novel approach to estimate the effects of having a Meister title on

service quality as perceived by consumers by exploiting data from an online market platform for crafts services (MyHammer).

Crafts companies sign contracts with MyHammer for a given period and a given price, which varies between the different packages that MyHammer offers. The average contract price is 59 Euros (65 Euros when free trials are excluded), which corresponds to 0.12 Euros per day. The crafts companies can then respond to – and compete for – demands for crafts services that consumers place online. Craftsmen may also be contacted directly by consumers who are interested in the company's profile on the platform. After the job has been completed, consumers can leave an online rating about the crafts company that they employed on MyHammer.

On entering the platform, craftsmen provide various types of information about their company and activities. MyHammer has provided us with this data – including all customer ratings – for all contracts signed from May 1, 2013 to October 29, 2015. For information about when the companies first entered the platform, the data goes back to 2009.

As we are interested in the effects of voluntary certification, we would like to limit our sample to only deregulated trades. [5] The activity classification in the data differs from that in the official crafts legislation. Therefore, we proceed by first removing activities with a very high Meister share from the sample (above 80%). Second, we exclude companies that are not member of a crafts chamber, which is compulsory for crafts companies in Germany. Hence, we exclude from the sample companies that are clearly trades still subject to occupational licensing and companies outside the crafts sector. Furthermore, we remove activity

[5] The final sample include the following activities (w/share of Meister-companies in the considered activity classification): "Windows, doors, frames, shutters (23%)", "tiling (9%)", "painting, varnishing (39%)", "various flooring (8%)" and "interior decoration (12%)".

classifications whose names are almost identical to trades that are still subject to licensing in the official crafts legislation. After this data cleaning, we are left with 5,144 firm observations and an average of 35,196 ratings for four indicators of customer satisfaction. Descriptive statistics of our data are presented in table 1.

According to the German Federal Statistical Office, overall there were 578,013 crafts companies in Germany in 2013, which means that our full sample is a mere 1 percent of the overall population. We have used the official crafts data to assess the representativeness of our sample (see table 2). For most variables, our sample is true for the overall population. Exceptions are the average age of the companies, which is much younger in our sample, and the qualification level, which is much lower in our sample.

3.1 Main variables

Altogether, there are four rating variables in the dataset. These are an overall rating variable and three specific rating variables where the customer judges quality, friendliness and reliability. For the overall rating variable, the customer can give a “negative”, “neutral” or “positive” rating of the service rendered, which we numerate on an ordinal scale from 1 to 3. The more specific ratings are scaled from 1 to 5, with one being the least content and five the most content. Figure 1 shows the distribution of the ratings. Only about one-third of the companies have received a rating and the number of ratings per company varies from 1 to 601, with a mean of 11 ratings (see figure 2).

Given that using online ratings to overcome the problem of measuring quality is an innovative approach, we expect – and therefore pre-empt – certain questions related to the meaningfulness of our dependent variable. Strategic manipulation (discussed in e.g. Dellarocas, 2003) can occur in theory, whereby online reviews are falsified or online

identities are misused. However, since MyHammer only permits consumers who have had interactions with craftsmen on the platform to submit a rating, this problem is substantially reduced.[6] There may also be quality aspects that are unobservable to consumers or only become visible over time. However, our data measures short- and medium-term quality observable to consumers. It is reasonable to expect a strong correlation between observed and unobserved quality, although this correlation cannot be calculated.

The order of ratings may also have an influence on the average quality rating, given that a negative first review may prevent subsequent sales and hence yield a lower average rating than would have been the case with a positive initial rating and subsequent accumulation. This problem is diminished by the fact that high-quality companies have a higher probability of obtaining a positive first review compared with low-quality companies and are, therefore, more likely to keep accumulating ratings. In this way, the influence of one negative review on the average outcome is reduced.

The qualification variable is constructed by MyHammer based on documents provided by the companies (Meister certificate if they have it and/or membership in a local crafts chamber[7]). Altogether, one-quarter of the companies in the sample have the Meister certification.

We use a variety of empirical estimations to explore the data, namely a linear regression model, a random effects ordered logit model, a negative binomial model, a truncated regression model and finally survival analysis.

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6 We conduct robustness checks where we exclude all companies from the sample that have three or less ratings, which does not change the results.

7 Not all companies using MyHammer are crafts companies.

3.2 Initial models

We start our data analysis with a cross-sectional linear regression where the dependent variable is the *average rating* obtained by each firm. The independent variable of interest is the qualification variable (having a Meister title or not). Additionally, we control for the number of employees, the legal status, the year of firm establishment as well as the year of entry onto the online platform, having liability insurance and employing a trainee. We also include regional and sector controls. The sector controls are important since we estimate an average effect over a range of different crafts activities, i.e. heterogeneous markets. For the same reason, we calculate clustered standard errors since our observations are likely to be correlated within certain groups (i.e. type of activity).

We continue the data analysis with a random effects ordered logit model. Here, the data is organized as a panel where the time dimension is the sequence of consumer ratings and the dependent variable is each rating obtained by each firm on either a 1-3 Likert scale (in the case of the overall rating variable) or a 1-5 Likert scale (in the case of the specific rating variables). The independent variable of interest is again the Meister qualification variable and the controls are identical to those in the cross-sectional linear regressions. Again, we calculate cluster-robust standard errors.

The advantage of using a panel specification is that by including each rating, as opposed to calculating an average rating, we remain true to the original format of the dependent variable, as well as having many more observations than in our linear model. Since the activity classification in the dataset is relatively broad (each type of activity contains several distinct crafts trades), the sector controls are unlikely to capture all market-specific effects and therefore unobserved heterogeneity is likely to be present in our model. The random effects ordered logit approach models unobserved heterogeneity as a function of time-invariant

characteristics, including time-averaged regressors, with an additive error term that is assumed to be independent of the model's covariates (see e.g. Muris, 2016).

If voluntary certification actually increases quality as perceived by consumers, high-quality Meister companies (especially market incumbents) may not have such a strong need to build a high quality reputation via online ratings. This might explain why Meister companies are under-represented on MyHammer in the first place. We estimate a negative binomial model where the dependent variable is the total number of consumer ratings received by each firm to ascertain whether there is a difference in rating accumulation among Meister and non-Meister companies.

An important limit to these initial models stems from the skewness of the rating variables. Few poor ratings[8] in the data mean little variation in our sample. It is also likely to mean that our sample is not fully representative of the quality of German crafts services. There are strong reasons to suspect that poor performers are under-represented. Resnick et al. (2006) study reputation effects on eBay and note that consumers only tend to rate when they are satisfied as sellers' ratings are positive 99% of the time. Furthermore, quality-related selection mechanisms may be at work. Company owners who consider their own quality to be low may not enter the MyHammer platform in the first place because low ratings will lead to fewer contracts (self-selection). Poor-quality companies that choose to enter the platform are likely to realize the sanctioning effect of customer ratings relatively quickly and leave after a short time (market selection), whereas companies providing higher quality services are likely to stay longer on the platform.

[8] For instance, the mean scores for the three specific rating variables were 4.7, 4.6 and 4.6, respectively.

Since issues related to selection effects are likely to appear in our sample, we proceed by estimating a truncated regression model, which is appropriate in cases where observations above or below a given threshold are systematically excluded from the sample. We also supplement with a survival model that – instead of looking at ratings – identifies the factors that influence the total time spent on the platform by each company.

3.3 Extensions

In the presence of self-selection, low-quality companies are likely never to enter the MyHammer platform. A common method in the literature addressing sample selection bias is the Heckman selection model (see Heckman, 1976). However, in our case the Heckman two-step estimator is not feasible since we have no information about the truncated observations. Instead, we estimate a simple truncated model, which is appropriate when sample data is only obtained for a subset (in our case, higher quality companies) of the true population (in our case, both high- and low-quality companies) (see e.g. Greene, 2008). We use the same setup for our truncated model as for the linear regression model, meaning that the dependent variable is the *average consumer rating* obtained by each firm.

In our case, truncation due to any self-selection happens from below since the probability of being on MyHammer should decrease with the prospect of accumulating bad ratings. However, there is no predetermined quality level at which the truncation begins. Therefore, we estimate multiple truncated regression models where the truncation begins at different values. The ratings on MyHammer are scaled from 1-3 (overall rating) or 1-5 (quality rating). Altogether, 92% of consumers have given the top overall rating (3) and 94% of consumers have given the two best quality ratings (4 and 5). Therefore, we use both 1 and 2 as the lower bound for the overall rating variable and 1, 2 and 3 as the lower bound for the quality rating variable.

In the presence of market selection, high-quality crafts companies are more likely to continue using the MyHammer platform. By changing our dependent variable from customer ratings to the number of days spent on the MyHammer platform, we can use survival analysis to estimate the effects of the covariates from the previous specifications, particularly the qualification variable. We are able to improve our observation number by including companies that have never been rated in the sample.

The focus of survival analysis is time-to-event (in our case, the number of days between the date when crafts companies enter the MyHammer platform and the date when they leave). We calculate the Kaplan-Meier survival function, defined as $S(t) = 1 - F(t) = P(T \geq t)$, which is the probability of surviving past time *t* (see e.g. Wooldridge, 2001). In order to estimate the effect of the Meister title, we calculate common parametric survival models (i.e. Exponential, Weibull and Gompertz regression coefficients. We control for company size, legal status, the year of firm establishment as well as having liability insurance and employing a trainee. Again, we also include regional and sector controls.

Censoring – defined in Cleves et. al (2010, p. 29) as "when the failure event occurs and the subject is not under observation" – is a challenge in survival analysis. Right-censoring happens when subjects do not experience the event (here leaving the MyHammer platform) within the duration of our study (see Cleves et. al, 2010). This is a common case and does not pose a problem for the validity of results as long as the censoring is independent of the probability of the event (see Prinja et al., 2010). We consider that the assumption of independent right-censoring holds in our case. Left-censoring happens when the event occurs prior to the subject entering the study (see Cleves et al., 2010). In our case, this is not a problem since the observation period for each company begins at the date when it enters the MyHammer platform.

As before, we fear unobserved heterogeneity in our data. It has been shown that the influence of the observed covariate is underestimated when the presence of omitted covariates is ignored (see e.g. Chamberlain, 1985). As suggested by Jenkins (2008), we therefore run a frailty-model assuming both a Gamma and an inverse Gaussian distribution – as is commonly used for continuous time models. However, since the relevant likelihood ratio test does not reject the null hypothesis that the frailty component equals zero, we also present estimates using the non-frailty model.

4. Results

4.1 Meisterful Meisters

Basic descriptive statistics of our dataset suggest a positive association between our qualification variable and our rating variables. Among the companies that have an overall rating above the mean (2.7), 20 percent have the Meister certification. In comparison, the share of certified companies among those that have very low ratings (below 1.5) is 0.2 percent. All of our empirical models confirm this intuition.

We discuss the linear model and the random effect ordered logit model together as they yield similar results. To facilitate the reading of the result tables, we only show the results for the overall rating variable as well as the quality rating variable as dependent variables, although the results for the other specific rating variables are consistent with the results presented.[9]

Qualification consistently has a significant impact on ratings. The linear estimate of our Meister variable OLS varies from 0.04 to 0.08, meaning that having a Meister in the company

[9] Furthermore, estimations conducted using the full sample of all companies on MyHammer regardless of sector (also not presented) tell a similar story, albeit with slightly higher and more significant effect sizes.

adds 0.04 to 0.08 to the average consumer rating obtained (see table 3). While this may seem like a small effect size, one must keep in mind that most ratings made are between 2 to 3 (overall rating) and 4 to 5 (quality rating). The logit estimates for the qualification variable are also significant (see table 4). According to the average marginal effect calculations, Meister companies have a 2% higher probability of achieving the best overall rating and a 3% higher probability of achieving the best quality rating (see table 5). It is interesting to note that Meister companies have a lower probability of achieving the second-best quality rating, meaning that they appear to deliver the very best in terms of quality. In terms of the predicted probabilities of achieving a given rating (displayed in table 6), a first observation is that independent of qualification companies have a very high probability of achieving the best rating, which is a result of the skewness of the rating variable. However, there is a difference[10] in the predicted probabilities according to qualification. Meister companies have a 93% chance of achieving the best overall rating as opposed to 91 % for non-Meister companies, while they have 83% chance of achieving the best rating as opposed to 80 % for non-Meister companies.

Turning to the control variables, employing one or more additional workers affects customer satisfaction negatively. An explanation resembling a principal-agent problem could be put forward for this result. That is that smaller companies are more transparent and each person feels more responsible for the company and therefore has higher incentives to be concerned with quality service provision.

Furthermore, the companies' legal form appears to matter for customer ratings (at least in the logit model). Being an *UG* (stock corporation) has a mostly significant and negative effect on

[10] Equal to the estimate of the qualification variable in table 5.

ratings relative to the comparison group, which is *Einzelunternehmen* (sole trader or sole proprietorship). The effect of being a *GmbH* (private limited company) seems to proceed in the same direction. We find that this result is reasonable given that sole traders or proprietors are held 100 percent personally liable for the financial situation of the company. As such, they will have an additional incentive to be concerned with service quality. The effect of being a *GbR* (a company constituted under civil law) is mostly insignificant, corroborating our explanation as the owners of such companies also stand personally financially liable.

The variables for the geographical location of the company, the year when it was founded, whether it employs trainees, whether it has liability insurance as well as the number of ratings it has received on MyHammer are not significant. The fact that the foundation year proved insignificant should reduce concerns related to sampling as the main difference between MyHammer companies and the rest of German crafts companies is the companies' age.

Furthermore, having a Meister has a significant and negative effect on rating accumulation (see table 7), although the size of the estimate is very small, with Meister companies accumulating on average half a rating less. This is consistent with the finding that certification affects quality as perceived by consumers. In this case, certified companies are less dependent on reputation mechanisms to fill their order books. The advantage that online platforms offer such companies is primarily to obtain first contact with consumers. The experience of the MyHammer management is that, in a number of cases, the interaction between craftsmen and consumers quickly goes offline. This explains the low consumer propensity to ultimately rate companies online.

Our suspicion of selection effects seems to be corroborated by the data. Estimates for the "entry-year" variable show that in comparison to companies that entered in 2009, those that entered in the latest years (2014 and 2015) appear to achieve higher customer satisfaction.

This is in accordance with the theory that with more experience using the platform, crafts companies will only choose to enter if they deem their services on par with customer expectations, as the self-selection hypothesis predicts. Furthermore, in line with the market selection hypothesis, companies with no ratings spend the lowest average time on MyHammer, followed by those with very low ratings (overall rating below 1.5). By contrast, companies with an above-average overall customer rating (>2.8) stay on MyHammer for an above-average length of time.

Therefore, we complement our findings with results from a truncated regression model (which addresses the problem of self-selection) and a survival model (which addresses the problem of market selection).

4.2 Allowing for selection

The results from the truncated regression model shown in table 8 are overall consistent with the findings in the previous models. With a lowest truncation limit of 1, the number of truncated observations is 24 for the regression with the overall rating as the dependent variable. It is 29 for the regression with the quality rating as the dependent variable. With 2 as the lower bound, 98 and 43 observations are truncated, whereas 83 quality ratings are truncated when 3 is our lower bound. In all cases, both the sign and the size of the estimates are similar to the linear cross-section estimates. Most importantly, qualification still has a positive and significant impact on ratings, with an effect size ranging from a 0.02 to 0.07 higher average consumer rating.

Turning to the survival analysis, there are visible threshold effects in the survival function with steep declines in survival rates after 90 and 455 days (see figure 3), meaning that many companies stay for this duration on the platform. This finding is explained by the type of

contracts that MyHammer offers. The MyHammer starter packet – which lasts for three months – is meant as a test before a greater commitment to a longer duration contract. Thereafter, MyHammer offers one-year contracts. After one year and three months, the survival function takes a smoother shape.

The Kaplan-Meier function by group shows that qualification clearly matters for survival. As can be seen in figure 4, the survival estimate for companies with a Meister employed is noticeably above that of non-Meister companies and the statistical significance of this difference is confirmed through a Chi^2-test for the equality of survival functions between two groups. It appears that the advantage of having a Meister holds in particular for durations above approximately 90 days. We interpret this as further evidence in favor of the presence of a selection mechanism, since positive ratings for high quality take some time to accumulate and have an effect on the company's wish to stay on the platform.

The higher survival chance for Meister companies is corroborated by our parametric estimations shown in table 8. The margins estimates shown is the difference in median survival time with respect to the comparison group. We see that the median survival time for Meister companies is higher than that of non-Meister companies or – put differently – having a Meister significantly increases the chances of staying on the platform. The statistical significance of the results are similar across all models, both with and without frailty, although there is some variation in effect sizes. The estimated coefficients mainly range between 200 and 300 days.[11] This means that being a Meister company on average across the models increases the median survival time on the platform by 256 days.

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[11] The companies in the sample stay between 88 and 2801 days on the platform.

As for the estimates of the control variables, they are mostly consistent with the results from the previous models. Employing more than ten employees decreases survival and companies with limited liability have lower survival spans than fully-liable companies. Finally, there is a significant positive effect of insurance on survival.

5. Conclusion and policy implications

Certifying professionals is an alternative to erecting market entry barriers in markets where information is incomplete. Empirical studies of professional voluntary certification schemes are scarce, although they are in theory an attractive means of reducing consumer search costs.

In the German crafts sector, voluntary certification and occupational licensing have co-existed since 2004. Using data from an online platform for crafts services on which craftsmen and customers interact, we have found that in trades that are subject to a voluntary scheme, the presence of a person with a Meister certificate – i.e. a person with an advanced training degree – improves service quality as perceived by the consumer. This result is confirmed in a variety of empirical specifications.

We argue that our findings show that the Meister certificate is a credible sign of quality for consumers which contributes to reducing search costs in the deregulated market segment. To this, it should be added that the Meister certificate is administered by the German Chamber of Crafts and Trades. This should also positively influence credibility as previous studies have shown that the source of information matters for the cost of acquiring it and that information provided by third parties (rather than directly by the producer) is generally more credible (see e.g. Ippolito and Mathios, 1990).

The topic of search costs in the German crafts sector is by no means exhausted yet. Due to the nature of our data, we are unable to analyze whether the Meister certificate influences

consumer behavior. Therefore, this important question is left to future research. Furthermore, quality most likely varies within the group of Meister companies as well as within the group of non-Meister companies. This, we do not address. Its impact on consumer search costs could only be relieved through other mechanisms than the Meister certificate, such as reputation effects and online consumer rating portals.

Nonetheless, our analysis marks an important starting point in terms of understanding search costs in the German crafts market and the insights gained are relevant for the policy discussions surrounding the common European market. National entry regulations such as occupational licensing stand in the way of labor mobility and market competition. Our findings should ease popular concerns about eroding consumer protection under voluntary certification and weaken the position of those who prefer and even lobby for more activist government approaches.

6. Literature

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7. Tables and figures

Table 1: Descriptive Statistics

	Mean	St.d.
Meister	0.41	0.49
Employees 0	0.39	0.46
Employees 1-3	0.39	0.49
Employees 4-9	0.18	0.34
Employees 10-20	0.04	0.15
Employees 21+	0.01	0.09
Einzelunternehmen (fully liable)	0.84	0.37
GmbH (limited liability)	0.08	0.26
UG (limited liability)	0.02	0.15
GbR (full liability)	0.04	0.19
Other	0.02	0.14
Foundation year	2006	12.68
Employing a trainee	0.04	0.19
Liability insurance	0.09	0.28
Entry in 2009	0.03	0.16
Entry in 2010	0.11	0.32
Entry in 2011	0.08	0.27
Entry in 2012	0.08	0.27
Entry in 2013	0.20	0.40
Entry in 2014	0.30	0.45
Entry in 2015	0.21	0.41
Overall Rating	2.61	0.35
Quality Rating	4.64	0.39
N	*5,144**	

*N=3,483 for the variable 'foundation year', N=2,614 for the overall rating variable and N=2,552 for the quality rating variable.

Table 2: Sample representativeness

Share of	**MyHammer**	**Overall population**
Meister	41%	75%
Employees 0	39%	28%
Employees 1-3	39%	33%
Employees 4-9	18%	20%
Employees 10-20	4%	11%
Employees 21+	1%	7%
Einzelunternehmen (fully liable)	84%	67%
GmbH (limited liability)	8%	23%
UG (limited liability)	2%	1%
GbR (full liability)	4%	8%
Other	2%	1%
Foundation after 2004	72%	28%
Employing a trainee	4%	14%
N	*5,144**	*583,668*

* N=3,483 for the variable ‘foundation year’

Table 3: Linear regression model

	Overall rating	Quality rating
Meister	0.04**	0.08*
Employees 1-3	-0.03*	-0.04
Employees 4-9	-0.19***	-0.16***
Employees 10-20	-0.10	-0.30*
Employees 21+	-0.15	-0.74*
GmbH (limited liability)	-0.05	-0.08
UG (limited liability)	-0.12*	-0.13
GbR (full liability)	-0.02	0.01
Other	-0.06	-0.15
Sector controls	Yes	Yes
Geographical controls	Yes	Yes
Foundation year	-0.00	-0.00
Liability insurance	0.03	0.03
Employing a trainee	0.00	-0.07
Entry in 2010	-0.01	-0.05
Entry in 2011	0.04	-0.04
Entry in 2012	0.05	0.02
Entry in 2013	0.04	0.01
Entry in 2014	0.08	0.09
Entry in 2015	0.07**	0.10
Number of reviews	0.00	0.00
R-square adjusted	*0.02*	*0.02*
N	*1,928*	1,883

*,**,*** correspond to 10, 5, and 1 percent levels of statistical significance.

Table 4: Random effects ordered logit model

	Overall rating	**Quality rating**
Meister	0.32**	0.21**
Employees 1-3	-0.45**	-0.15*
Employees 4-9	-0.88***	-0.49***
Employees 10-20	-1.40***	-0.78***
Employees 21+	-0.51**	-1.24*
GmbH (limited liability)	-0.27	-0.29
UG (limited liability)	-0.86**	-0.42*
GbR (full liability)	-0.27	-0.01
Other	-0.88**	-0.41*
Sector controls	Yes	Yes
Geographical controls	Yes	Yes
Foundation year	-0.01	0.00
Liability insurance	0.24	0.09
Employing a trainee	-0.18	0.10
Entry in 2010	-0.07	0.04
Entry in 2011	0.14	-0.24
Entry in 2012	-0.01	-0.11
Entry in 2013	0.10	-0.01
Entry in 2014	0.59**	0.21
Entry in 2015	0.66**	0.28*
Number of reviews	0.00	-0.00
Prob >chi2	*0.00*	*0.00*
Cut1	*-23.79*	*0.78*
Cut2	*-23.18*	*1.00*
Cut3		*1.28*
Cut4		*2.69*
N	*29,863*	*27,619*

*,**,*** correspond to 10, 5, and 1 percent levels of statistical significance.

Table 5: Random effects ordered logit model: Average marginal effects

	Overall rating			Quality rating				
	Rating=1	**Rating=2**	**Rating=3**	**Rating=1**	**Rating=2**	**Rating=3**	**Rating=4**	**Rating=5**
Meister	-0.01**	-0.01**	0.02**	-0.01**	-0.00**	-0.00**	-0.02**	0.03**
Employees 1-3	0.02**	0.01**	-0.03**	0.01*	0.00*	0.00*	0.01*	-0.02*
Employees 4-9	0.04***	0.01***	-0.05***	0.02***	0.00***	0.00***	0.04***	-0.07***
Employees 10-20	0.06***	0.02***	-0.08***	0.03***	0.01***	0.01***	0.06***	-0.11***
Employees 21+	0.06**	0.02**	-0.08**	0.05***	0.01***	0.01***	0.10***	-0.17**
GmbH (limited liability)	0.01	0.00	-0.02	0.01	0.00	0.00	0.02	-0.04
UG (limited liability)	0.01	0.00	-0.02	-0.02*	0.00	0.01*	0.03*	-0.06*
GbR (full liability)	0.04**	0.01**	-0.05**	0.00	0.00	0.00	0.00	-0.00
Other	0.04**	0.01**	-0.05**	0.02	0.00	0.00*	0.03*	-0.06*
Sector controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Foundation year	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00
Liability insurance	-0.01	-0.00	0.01	-0.00	-0.00	-0.00	-0.01	0.01
Employing a trainee	0.01	0.00	-0.01	-0.00	-0.00	-0.00	-0.01	0.01
Entry in 2010	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.01
Entry in 2011	-0.01	-0.00	0.01	0.01	0.00	0.00	0.02	-0.03
Entry in 2012	0.00	0.00	-0.00	0.00	0.00	0.00	0.01	-0.02
Entry in 2013	-0.00	-0.00	0.01	0.00	0.00	0.00	0.00	-0.00
Entry in 2014	-0.02	-0.01	0.03	-0.01	-0.00	-0.00	-0.02	0.03
Entry in 2015	-0.03**	-0.01**	0.04**	-0.01*	-0.00	-0.00*	-0.02*	0.04*
Number of reviews	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-0.06*

*,**,*** correspond to 10, 5, and 1 percent levels of statistical significance.

Table 6: Random effects ordered logit model: Predicted outcomes

	Overall rating			Quality rating				
	Probability Rating=1	**Probabilty Rating=2**	**Probability Pating=3**	**Probability Rating=1**	**Probability Rating=2**	**Probability Rating=3**	**Probability Rating=4**	**Probability Rating=5**
Meister companies	0.046***	0.025***	0.928***	0.036***	0.008***	0.013***	0.220***	0.825***
Non-meister companies	0.059***	0.030***	0.911***	0.043***	0.009***	0.015***	0.135***	0.798***
N	*29,863*	*29,863*	*29,863*	*27,619*	*27,619*	*27,619*	*27,619*	*27,619*

*,**,*** correspond to 10, 5, and 1 percent levels of statistical significance.

Table 7: Negative binomial model, number of ratings as dependent variable

Meister	-0.43***
Employees 1-3	0.03
Employees 4-9	0.04
Employees 10-20	-0.79***
Employees 21+	0.83
GmbH (limited liability)	0.06
UG (limited liability)	0.02
GbR (full liability)	-0.48***
Other	-0.21
Sector controls	Yes
Geographical controls	Yes
Foundation year	0.01**
Liability insurance	-0.16
Employing a trainee	0.13
Entry in 2010	0.30
Entry in 2011	-0.12
Entry in 2012	0.29
Entry in 2013	-0.07
Entry in 2014	-0.35
Entry in 2015	-0.89
Prob >chi2	*0.00*
N	*1,928*

*,**,*** correspond to 10, 5, and 1 percent levels of statistical significance.

Table 8: Truncated regression model

	Lower limit=1		Lower limit=2		Lower limit=3
	Overall rating	**Quality rating**	**Overall rating**	**Quality rating**	**Quality rating**
Meister	0.03*	0.07**	0.02***	0.07***	0.05***
Employees 1-3	-0.02	-0.04	-0.02***	-0.03	-0.03*
Employees 4-9	-0.05**	-0.11**	-0.04***	-0.07*	-0.08***
Employees 10-20	-0.10	-0.18	-0.02	-0.13	-0.15**
Employees 21+	-0.16	-0.42	0.01	-0.05	-0.11
GmbH (limited liability)	-0.02	-0.10	-0.00	-0.06	-0.02
UG (limited liability)	-0.15**	-0.18	-0.15**	-0.02	-0.06
GbR (full liability)	0.02	-0.00	-0.04	-0.07	-0.00
Other	-0.09	-0.11	-0.07	-0.13	-0.12
Sector controls	Yes	Yes	Yes	Yes	Yes
Geographical controls	Yes	Yes	Yes	Yes	Yes
Foundation year	-0.00	-0.00**	-0.00***	-0.00**	-0.00**
Liability insurance	-0.03*	0.02	0.02*	0.02	0.05**
Employing a trainee	0.00	-0.04	-0.02	-0.09	-0.06
Entry in 2010	0.01	-0.00	0.00	-0.05	-0.01
Entry in 2011	0.03	-0.06	-0.01	-0.08	-0.06
Entry in 2012	0.04	-0.05	-0.02	-0.09	-0.06
Entry in 2013	0.03	-0.01	-0.00	-0.04	0.01
Entry in 2014	0.06	0.06	0.02	0.01	0.04
Entry in 2015	0.07	0.06	0.02	0.03	0.05
Number of reviews	-0.00	-0.00	0.00***	-0.00**	-0.00***
Prob >chi2	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
N	*1,904*	*1,852*	*1,830*	*1,902*	*1,800*

*,**,*** correspond to 10, 5, and 1 percent levels of statistical significance.

Table 9: Parametric estimation results

	Gamma distribution			Inverted Gaussian distribution			No frailty		
	Exponential	**Weibull**	**Gompertz**	**Exponential**	**Weibull**	**Gompertz**	**Exponential**	**Weibull**	**Gompertz**
Meister	273.66**	270.10*	105.05	279.25**	244.55*	171.55*	247.50**	272.04**	292.02**
Employees 1-3	91.41	94.90	53.86	92.87	80.30	55.87	61.24	73.33	78.90
Employees 4-9	75.89	76.65	68.03	79.78	83.95	59.04	48.44	61.22	65.27
Employees 10-20	-1006.15***	-1000.10***	-481.70**	-1016.30***	-956.30***	-700.63***	-914.01***	-978.63***	-1048.30***
Employees 21+	-851.53	-839.50	-334.12	-852.19	-788.40	-574.88	-811.91*	-849.77	-913.05
GmbH (limited liability)	-86.67	-94.90	-98.86	-85.96	-80.30	-66.53	-54.50	-59.07	-65.10
UG (limited liability)	-917.78**	-876.00**	-266.02	-940.84**	-952.65***	-634.90**	-956.34***	-1013.03***	-1089.08***
GbR (full liability)	-455.87	-463.55*	-274.81	-462.27*	-427.05*	-324.53*	-370.13*	-408.67*	-436.16
Other	-290.32	-270.10	-89.83	-315.48	-335.80	-229.11	-301.21	-336.54	-356.04
Liability insurance	1022.94***	1058.50***	931.38	1017.08***	890.60***	786.07***	864.03***	891.39***	954.71***
Employing a trainee	1524.89***	1540.30***	1032.95***	1557.60	1529.35***	1151.41***	1302.79***	1416.28***	1518.50***
Foundation year	5.05	7.30	5.92	4.97	3,65	3.23	1.52	2.27	2.46
Geographical controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prob>chi^2	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
N	3,483	3,483	3,483	3,483	3,483	3,483	3,483	3,483	3,483