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Occupational Licensing and the Wage Structure in Germany

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Abstract: In order to work in licensed occupations, employees need permission from the state. In Germany, it remains unanswered why occupations become licensed and how licensing affects the wage structure. The article describes the institutional embeddedness of licensing in the German labor market. These institutions create barriers to entry and regulate prices of occupational tasks. By accounting for licensing and its accompanying institutions, the article shows licensing to generate a safety net effect rather than mere monopoly rents. As a consequence, wage inequality is reduced. Results from conditional and unconditional quantile regressions based on the BIBB-BAuA Employment Survey 2012 strongly support that view.

Keywords: licensing, economic inequality, labor markets, un/conditional quantile regression

JEL-Codes: D02, J31, J42, J44

For a large number of occupations within the U.S., labor market persons need permission from the state to work within that occupation (Weeden and Grusky 2014; Weeden 2002). Occupational licensing has been criticized repeatedly: Scholars assume that it erects barriers to entry, dampens the competition within these markets artificially, and in its consequence, creates monopoly rents for those inside the market. Apparently, American politics has been particularly susceptible to business interest in the past 30 years (Hacker and Pierson 2010). Political serfdom to the interest of those with high wages and neglect of those with middle and low wages has resulted in growing inequality. Recent scholarship has interpreted licensure of occupations along these lines (e.g. Carpenter et al. 2015; Pagliero 2011, 2010; Kleiner 2010; Weeden and Grusky 2014). While that may be an accurate description of the American case, the question arises of whether it can be transferred to countries with different institutional contexts.

There are relatively few studies of occupational closure and its wage effects in Europe (for a rough description see Koumenta et al. 2014). Bol and Weeden (2014) evaluate the effect of occupational closure on inequality in the United Kingdom and Germany. They note that in Germany, institutions of social closure may protect occupations with wages at the lower end of the wage distribution. However, they do not assess the impact occupational closure has on the total German wage distribution. We provide an answer by making use of unconditional quantile regressions. Our theoretical perspective goes beyond past approaches by accounting for the economic regulation of licensed occupations. In our view, the focus on regulation of market entry alone causes a biased view of its rationale. Accounting for economic regulations such as fee structures, yields a more accurate picture. As a consequence, we conclude that the role of occupational licensing in the German labor market is contrary to what the literature presumes.

First, we hypothesize that the reported wage premium of licensed employees is primarily a safeguard to the *lower* end. Licensed professionals are significantly less likely to have low wages. Typically, their wages are capped additionally at the top through economic regulation of prices. Therefore, we estimate conditional quantile regressions on the basis of the BIBB/BAuA 2012 employment survey. Our aim is to compare the shape of wage distributions between licensed and non-licensed professionals. Further, we analyze whether licensed self-employed are particularly privileged.

Recent scholarship on the effects of occupational licenses on social inequality assumes wage premiums from licensed occupations to increase wage inequality (Bol and Weeden 2014; Weeden and Grusky 2014). We argue instead that the lower safeguard and the upward capping of wages in licensed occupations in combination with the location of their wages within the unconditional wage structure, results in a reduction of wage inequality. We assess whether self-employed persons in licensed occupations differ in this respect. We argue that unconditional quantile regressions are the appropriate measure for an assessment.

We do not aim for an encompassing causal analysis of the effects of occupational licenses. What we aim for is a clarification of the foundations of occupational licensing in Germany. As a consequence, we need to update common assumptions about the kind of advantages arising for licensed professionals. Finally, we analyze the implications of these wage premiums for general wage inequality in Germany.

In section 1, we review the literature on occupational licensing and its meaning for individual wages and general wage inequality. In section 2, we introduce the institutional foundations of occupational licensing in Germany and derive hypotheses concerning the kind of wage premium and its effect on wage inequality (section 3). Presentation of data and methods (section 4) and results follow (section 5). We conclude with a brief discussion of results.

1. Occupational licensing: Review

1.1 Protecting consumers or protecting suppliers?

There is an ongoing discussion of the rationale for occupational licensing (Arias and Scafidi 2009; Kleiner 2006b; Shapiro 1986). The discussants can be grouped into two positions: proponents of the monopoly hypothesis, and proponents of the social welfare hypothesis.

Proponents of the monopoly hypothesis see licenses as the result of strong social closure. Along these lines, licensing an occupation is a success for the respective professional lobby. It increases and protects the market power of all persons active in the respective occupation. In that perspective, the state, as the one who enacts and implements the law, is lobbied into acting against its very own interest. The state should want to prevent the concentration of power in the hands of a few market actors. Whenever occupations have sufficient resources and opportunities, they attempt to influence state actors: “We propose the general hypothesis: every industry or occupation that has enough political power to utilize the state will seek to control entry” (Stigler 1971: 5). This viewpoint is prominently proposed by scholars who subscribe to ideas of liberal markets (Friedmann 1962; Potts 2009). They doubt that legislators intend to protect consumers and see the regulation of occupations as a mere act of unnecessary government intervention (Angirst and Guryan 2008; Arias and Scafidi 2009;

Kleiner and Kudrle 2000). The arbitrariness of licensing is taken as evidence for that view (Carpenter et al. 2015). Certain occupations are regulated in some states but not in others and the burden of regulation also varies. These scholars expect occupational licensing to boost prices for occupational activities without quality improvement at a similar scale. In short, they argue, consumers and tax payers are the financiers of crony state policies. In that view, occupational licensure is a bottom-up process that is initiated by special interest groups. Licensing is the extreme along a continuum with certification, accreditation, and registration as is less severe forms. This process is described for the US in particular (Kleiner and Krueger 2010) but some claim a general pattern that holds for all European countries (Koumenta et al. 2014).

Proponents of the social welfare hypothesis, on the other hand, hold that the political regulation of market access reduces potentially harmful information asymmetries. The example of an acute sick person looking for competent treatment illustrates that argument. How would she know whether a doctor is able to help her? Similarly, a building based on flawed static calculations implies risks and eventual costs for builders, users and neighbors alike. The argument brought forward by the other side thus is, that the state must guarantee the quality of certain goods. Under conditions of free market competition, market actors may threaten social welfare through bad decision making and poor quality of the products they provide. While according to free market logic, inferior competitors should disappear over time, proponents of the protection hypothesis predict markets of this kind to fail where access is unregulated. Market failure is defined as the disproportional payment of costs by one party caused by the information asymmetry with a second one. Such a market failure must be prevented with regulations of occupations like architects and doctors. Put differently, licenses resolve the asymmetry of information, the cost of which would be bared by the consumer. "It is often too costly for the consumers or regulators to observe service quality well enough to condition payments on quality. Licensing has a natural information advantage over quality-contingent policies in that it can be enforced once-and-for-all at the time a professional is trained" (Shapiro 1986: 845). While proponents of the monopoly hypothesis expect a loss of welfare, proponents of the protection hypothesis highlight increases in welfare gained by licensing (von Weizsäcker 1980; Graddy 1991). In this view, licensing is a top-down process, initiated and authored by autonomous states.

Hence, both hypotheses interpret the role of the state differently: From the first perspective, states serve the interest of special interest groups that aim at improving their market power. In the second perspective, states are autonomous actors on their own behalf. They regulate occupations whenever they consider the common good threatened in order to decrease the risk of substandard products for consumers. Few authors have argued for an intermediate perspective. Depending on the kind of occupation Zhou (1993) understands licensure as the outcome of either, special interest groups pressuring the state, or autonomous state action.

1.2 Licensing and wage premiums

Empirical contributions on economic consequences of licensing seem to rest on the monopoly hypothesis: Barriers to entry enforced by the state suppress competition and create occupational monopolies. Hence, licensed employees can set higher prices and receive higher

wages compared to employees without license in an otherwise similar part of the labor market. Licensed employees thus earn a monopoly rent, which pushes their wages up. Most scholars claim that net average wage differentials between both types of employees can be seen as evidence for this claim. Next, we review studies of wage effects of licensing for the US, before we consider studies for the rest of the world.

In her study of the US labor market, Weeden (2002) shows licenses to boost wages in addition to other occupational properties by 9%. In her view, licensing is a particularly effective form of social closure with a most severe suppression of potential competition. Morris Kleiner showed licensed employees in the US labor market to have a wage premium of about 10% (Kleiner 2000, 2006a; Kleiner and Krueger 2010). In one study, they find an even higher wage premium of licensing of 18% (Kleiner and Krueger 2013). Also, licensing by larger political jurisdictions (federal or state vs. local) has positive wage effects while entry requirements have no wage effect. According to studies by Kleiner and colleagues, 29% of all wage earners in the US were licensed in 2008. Gittleman, Klee, and Kleiner (2015) qualify Kleiner and Krueger's (2013, 2010) finding of a wage premium based on self-reported licensure in the SIPP. They find a considerably lower wage premium of 6.5% for certificates and licenses. This is also one of the few studies to consider distributional effects. Wages rise in all quartiles thanks to licenses or certifications, but the increase is most pronounced in the bottom quartile.

A number of studies focus on wages in particular occupations. Kleiner and Kudrle (2000) find American dentists to earn more in federal states that require a license than in those that do not. At the same time, the quality of their service does not vary by state. Licensing neither affects the number of reclamations with insurers, nor the number of complaints with dentist chambers. These authors argue that this is what we should find if licensing would improve the quality. Timmons et al. (2014) explore how licensing of non-traditional health practices affects wages of physicians, physio therapists, and chiropractics. Physicians working in states with chiropractic colleges are shown to earn 4-5% less than their colleagues in other states. The authors further assess distributional effects of chiropractics' scope of practice on physician eearnings. A more liberal scope of practice is associated with higher earnings of physicians in the lowest decile and the upper quartile of the wage distribution. Physician wages at the top of the distribution are decreased by granting physio therapists direct access to patients.

According to Pagliero's (2010) estimation, licensing reduces the number of American lawyers by 22%. The wage of lawyers would shrink by 46% if market access was unregulated. In another study, Pagliero (2011) shows starting salaries of US-lawyers to increase, when the difficulty of exams increases. Thus, the regulation of market access for lawyers has a strong influence on their wage. In a similar study of US certified public accountants' (CPA) earnings, Schaefer and Zimmer (2011) find a wage premium in states with stricter experience requirements for entrants. Continuing quality reviews of CPAs do not affect wages.

Kane et al. (2008) evaluate the effect certification has on teacher effectiveness in New York City. According to their study, certification of teachers is a poor predictor of their effectiveness. Performance on the job varies independently from certification. Angrist and

Guryan (2008) come to similar conclusions based on nationally representative data on teachers and schools. Certification of teachers does not improve the quality of personnel but raises their salaries.

Bryson and Kleiner (2010) analyze the situation of licensed occupations in the US and Britain. They find a similar prevalence of licensed occupations in both countries. They estimate the wage premium for licensed occupations to be 13% in Britain and 18% in the US. In 2001, licenses were introduced for employees in the British private security sector. Fernie (2001) finds no evidence of either wage increases or quality improvements after legal change. However, lacking representative quantitative data, he relies on qualitative studies that are mostly providing anecdotal evidence. Also, he admits that the employment of persons with a criminal record was an issue in the past and their number has been reduced through the regulation.

Koumenta et al. (2014) provide an overview of licensing in the EU-27. Between 10-24% of the labor force is affected by occupational regulation. There is broad variation in the activities these countries regulate, with some states regulating more professionals and others regulating more crafts. Generally, occupational regulation is much lower in the EU compared to the US. The authors further provide case studies of eight selected professions in the UK. Positive wage effects are indicated for occupations that require more education and training. Accountants, dentists, pharmacists, and architects enjoy wage premiums of 9-19%, whereas wages of security guards, plumbers, social workers, and teachers remain unaffected. Input performance, measured by skill, is improved for all occupations but social workers and chartered accountants. Remarkably, the skill-boost is strongest for security workers although they have witnessed no wage premium. This finding qualifies Fernie's (2001) critical view of licensing's quality effects in the security sector. Pagliero and Timmons (2013) explore the regulation of lawyers in the EU-27 and identify variation of the institutionalization. Lawyers are licensed in most countries but only certified in a few. The authors argue that certification is superior to licensure because countries that apply it are not flooded with poor lawyers. Also, certification would be conducive towards creating a common market of EU lawyers that allows for competition of non-certified with certified lawyers. In a study comparing Germany and Britain, Bol and Weeden (2015) find licenses' wage premium to be roughly 10% in both countries.

As this short review shows, there is a positive relation between wage levels and licensing of an occupation. However, some qualifications of these results are warranted. First, most studies do not answer why some occupations are licensed while others are not. That holds also for Bol and Weeden's (2014) study for Germany. The monopoly hypothesis is seen as sufficient proof of wage differentials. However, they neglect the economic regulation of occupational licensing that we present in section 2. Second, they do not provide an answer to the question of why states should tolerate the monopolies. If the main consequence of occupational licensing is the protection of occupational monopolies, states might just as well abandon the respective laws. Occupational licensing may result from lobbying and crony policies in some cases, but it remains an open question if that holds as a general rule. As we

will argue, there are various reasons for the wage premium of licensed occupations and its protection that have been neglected by the literature.

1.3 Licensing and wage inequality

Recently, some scholars argued that occupational licensing contributes to an increase of wage inequality. The increased inequality in Western societies "occurred not only because of competition-increasing change at the bottom (e.g. declining union power, globalization) but also because of competition-reducing processes at the top. If we are correct in this diagnosis, the prescription is clear: We can take on poverty and inequality by repairing noncompetitive labor and capital markets and thereby reducing the inequality that such failed markets generate. […] The concept of rent is key to our argument. […] In contemporary labor markets, rent takes on many well-studied forms […] [like] the wage premiums that accrue to licensing and related types of occupational closure" (Weeden and Grusky 2014: 474-475). The authors take it for granted that occupational licensing is to be found disproportionally at the upper end of the wage distribution. Monopoly rents boost high wages and thereby broaden the gap between the top and the middle, contributing to an increase in wage inequality.

The implication is a general welfare loss that goes far beyond biased prices. Potts (2009) mentions five major detriments. Obviously, consumers pay the price for monopoly rents. The products offered by licensed professionals are artificially kept in low supply at the cost of consumers. Second, licensing tends to discriminate against consumers with low incomes who forego the consumption of certain products they would otherwise be able to buy. Third, occupational licensing tends to suppress innovations. That is because rules impair changes to established standards and because the incentive to outperform opponents is eliminated along with competition. Fourth, training of employees by their professional organizations causes further costs that are bared by consumers to the benefit of course providers, usually the bar associations. Fifth, technical innovations allow for stilling needs autonomously that required expert knowledge in the past and are thus licensed. Licensure would illegalize such semi-professional practices and impair both development and use of technical innovations. The bottom line would be that consumers pay for the monopoly rent of licensed professionals and innovations are impaired due to the inflexibility induced by licensure.

Similarly, Bol and Weeden's (2015: 1) results about occupational licensing in Germany and the UK have "important implications for understanding between-occupation wage inequality and cross-national differences in aggregate levels of wage inequality". Their assumption is based on the observation that occupational closure is stronger in the UK than in Germany. Further, in Germany the coefficients of occupational closure are significant for high- *and* low-skilled wage earners. They argue that "rents in the United Kingdom exacerbate wage inequality (by driving up top-end wages) more than in Germany, where rent-generating institutions are more likely to also protect low-wage or low-skill workers" (Bol and Weeden 2015: 14). However, they cannot provide a formal test of that assumption and call for research „that focuses on institutionalized rents and their distribution across the occupational structure which may help us understand cross-national differences in aggregate levels of wage inequality" (Bol und Weeden 2014: 1).

To sum up, the literature yields assumptions about the relation between occupational licensing and wage inequality. These assumptions' implications, however, have not been tested statistically. As we argue, there are noteworthy differences in the institutional make-up of German compared to American occupational licensing. Next, we provide an assessment of the German model of occupational licensing and develop hypotheses to test the influence of single occupational groups on the total wage distribution.

2. The Institutional foundations of occupational licensing in Germany

Occupational licensing has been portrayed as a bottom-up process initiated by special interest groups. That view is an inappropriate description of the German case. The regulation of the labor market through licensure is best described as a top-down process. The German Constitution guarantees every citizen to choose the occupation freely (GG, art. 12). Occupational licenses impose strong limitations on this constitutional right. Hence, they are acceptable within the German law system only if they serve a higher interest which outweighs the interest of citizens to choose their occupation freely. Next, we present the foundations of occupational regulation in Germany. We show that the regulation of market access is typically combined with other economic regulations which define a range in which prices for occupational tasks are allowed to vary. They include statutory fees, statutory contracts with insurances, and collective wage agreements with public servants. Only once we include these economic regulations in our analysis of occupational licensing, does the economic situation of licensed occupations in Germany become clear. Licenses must be understood as elements of coherent designs that are authored and implemented top-down with the intent to protect the common good.

2.1 The "Pharmacy-Rule" and the Three-Stage-Theory of the German Constitutional Court

In 1956, a certified pharmacist in Bavaria applied for a license to open a new pharmacy. The state-government denied his application with reference to art. 3, section 1 of the Bavarian Pharmacy Law. This law stated that a new pharmacy cannot be opened where it would compete with other pharmacies. The crowding out of competitors, however, is constitutive of a free market. The Pharmacy Law suspended the market principle in order to protect existing pharmacies from new and potentially better competitors. The government argued that competition between pharmacies might set incentives to sell substandard products. That would threaten the public good of health.

The pharmacist filed a suit against the law in front of the Federal Constitutional Court (FCC) and achieved the annulation of the denial to his application and an amendment of the Bavarian Pharmacy Law. The FCC disagreed with the argument that a new pharmacy would threaten public health. This precedent-setting judgement, known as the '*Apotheker*-Decision', has been the reference point of any formal professional activity and occupational access (Schulte Sodingen 2000). As part of the decision the court presented the so called Three-Stage-Theory (FCC, 6/11 1958). Their jurisdiction determines the conditions that permit the legislator to interfere with occupational freedom.

The *first stage* covers rules of exercising occupational activities. That includes, for example, regulations of nurses' occupational activities. These rules are in line with occupational freedom under the condition that "they serve reasonable purposes of the common good and do not impose excessive or unacceptable burdens on the citizen" (*own translation*). The codes of professional conduct for lawyers, tax consultants, and physicians are complex regulations of exercising professional activities. They are relevant for the analysis of social closure because they restrict the amount of protected activities. The Administrative Court of Minden, for example, decided that plastic surgeons cannot perform the operations of a dentist, even if they are maxillofacial surgeons. A dual certification is required for these persons (decision from 5/14 2007, Az K 3250/06). Hence, the first stage defines the *amount of activities* that are assigned to a profession. The right to exercise them is reserved to members of the profession. They represent no immediate obstacle to market access, since rules of the first stage may relate to single activities and they can define additional barriers *inside* existing closed labor market sectors.[1]

The *second stage* defines subjective entry requirements. That refers to regulations of access to professional activities tied to the person of the applicant. These formal barriers are permitted only "if they are a necessary precondition (under strict observation of proportionality) for the due fulfilment of the profession or for the protection of a fundamental public good (that is superior to the individual freedom)" (*own translation*). The second stage is the foundation of all licensing procedures and is rooted in the protection hypothesis. A common good is threatened if the activities for the provision of the good are substandard or improper. Licensed professions define preconditions for performing the profession for all individuals who want to do so. The first two paragraphs from the "Law on Geriatric Care", for instance, read:

> §1 Persons may hold the professional title of geriatric nurse only once they obtain a legal permission. Persons with a permission according to sentence 1 who completed a voluntary training according to §4, section 7, are entitled to medical practices that have been part of their vocational training.
>
> §2 (1) The permission according to §1 is to be granted, if the applicant
>
> 1. has completed the required training and passed the required exam,
> 2. has forgone any behavior that would question the dependable practice of the occupation,
> 3. has unimpaired sanitary conditions for the exercise of the occupation,
> 4. has the necessary German language skills for the exercise of the occupation.

This law exemplifies the function of occupational licensing. Usually, that kind of law protects the occupational title.[2] The protection facilitates applicant selection by legitimacy. Protection of a title, however, is not equivalent with the protection of a professional activity. The title of

[1] Kleiner and Park (2010) illustrate this phenomenon drawing on varying privileges for dentists and dental hygienists. In some federal states of the US the latter may operate without surveillance by a dentist, leading to an wage premium of 10%. See Döhler (1997) for a comparison of varying rules of exercising professional activities across countries.

[2] Teachers are an exception. It is not the title of teacher that is protected but the official title *Studienrat* or *Oberstudienrat*.

mechatronics engineer, for instance, is protected in Germany, while anyone can do the job of a mechatronics engineer. That is different for geriatric nurses. §1 of the law reserves the exercise of particular professional activities to the bearers of the respective professional title. A geriatric nurse must not exercise health-related activities that are beyond his competencies. Nursing homes have to hire suitable personnel with permission to deliver the respective services.

According to §2, the permission to perform certain activities is conditional upon particular individual characteristics. Typically, applicants have to present evidence of a legally standardized training that is independent of a particular company. The basis of licensed professions is always independent of skill acquired in a company. The idea of standardized trainings is to make licensed wage earners compatible with any company or organization.

However, the sample text from the law also shows that individual qualification is but one aspect of the issuance of a license through the state. Further elements include ethical, health-related, and language-related characteristics. In this way, the process of licensing selects not only by professional expertise. In addition, persons are assessed with regards to their trustworthiness, personality, resilience, and communicative skills.

The *third stage* of the Three-Stage-Theory relates to objective entry requirements. They regulate the amount of permitted professionals or companies. The third stage is "only permissive, where it is imperative for the containment of proven or highly-likely threats to an extraordinarily important public good". Objective entry requirements can ban persons from market access, even if they fulfill all necessary requirements of a professional law.

The monopoly of casinos in Germany is an example for a regulation of the third stage. Also, any quota for professionals is a restriction of the third stage. Quotas for physicians through the German Association of Statutory Health Insurance Physicians (*Kassenärztliche Vereinigung*) are one of few examples (Hoppe 2007).

Our discussion of entry requirements shows the active regulation of the number of wage earners within a closed labor market sector to be almost impossible. There are few exceptions and they are assessed by the FCC. There is no simple way for collective actors to regulate recruiting practices of companies in order to cause shortages of certain professionals. The law imposes strong limitations to such practice when it comes to licensing. If collective actors want to intervene, they have to resort to more subtle methods.

2.2 Licensed professions and the common good

In order for a profession to be licensed it has to be closely tied to a common good. Therefore, the definition of common goods is a matter of academic and legal debates. The common ground here includes public health, education, public security, and maintenance of the functions of government. Table 1 presents an overview of basic goods and the related professional groups.

[Table 1]

Public health is a major concern of the welfare state. Hence, the majority of health-related professions in Germany are licensed. That includes physicians, pharmacists, podiatrists, non-medical practitioners, nurses, physiotherapists, psychiatrists, psychologists, midwives, and veterinaries. No license is required for those who use the title of "Healer" (*Heiler*) or "Health Advisor" (*Gesundheitsberater*). However, they cannot legally treat their clients even if those were to ask for or benefit from it and even if the therapeutic treatment was free of charge. A self-declared "miracle healer" was sentenced to nine month on probation in 1977 by the German Constitutional Court (decision from 9/13 1977, Az 1 StR 389/77).

The **school system** is under state supervision according to article 7 of the German Constitution. Hence, teachers need a ministerial license in order to practice their profession. The German federal states are autonomous in their educational policies. The regulation of teachers at private schools therefore varies in each of the states. The Federal Constitution rules: "Private schools as replacement for public schools require state permission and are subject to federal state law (*Landesgesetze*). Permission must be granted whenever private schools are not inferior to public schools with respect to their curricula, equipment, and the academic education of their teachers." Thus, the second state exam, which is mandatory for teachers at public schools, is not mandatory for teachers at private schools according to national law. Equivalent qualifications are sufficient. The legal situation is similar for social (education) workers and preschool teachers (*Erzieher*). To sum up, these professions require licensing for employment in public service and they may require it even in the private sector although not necessarily.

The **maintenance of state functions** is imperative for the rule of law. Jurisdiction, administration of justice, tax consultancy, and audit must be independent from state interest and lasting high quality must be assured. The restriction of professional freedom in this area is defended on these grounds.

Public security is another major common good. Since force can be necessary in order to sustain that good and since the state has the monopoly to the use of force, there is a strong case for the regulation of market access in this realm. It is for the interest of public security that the state restricts market access for professions like police, chimney sweeps, pilots, air traffic controllers, pyro technicians, or architects.

2.3 Economic regulation of licensed activities

Licensed professions are always in direct relation to one of the mentioned common goods. The sustainable provision of these goods is not the state's only interest, though. Further objectives include coverage of the whole country and socially acceptable price determination. Provision fails where there are too few physicians to treat the clients or where the number of physicians is sufficient but their service is too costly for the majority of clients. Hence, the state is interested in regulating market access and price determination for goods and services in these labor market sectors.

Usually, fee structures and scales of charges regulate prices for the respective professions. Paragraph 17 of the Federal Solicitor Law, for instance, defines the charges for solicitors. The rationales for fee structures vary. In the case of lawyers, it is the independence of their

jurisdiction that is underlined. That would be impossible under conditions of economic dependence on the principal. Prices for services of architects, construction engineers, chimney sweeps, tax consultants, and most health related professions are regulated for the same reason. Although some health related professions like physiotherapist and nurse are unregulated by fee structures, they are subject to §125 of the Social Law (*Sozialgesetzbuch V*). According to the paragraph, health insurances are bound to enter into nationwide (*flächendeckende*) contracts with providers of these services.

Collective agreements regulate remunerations of employees in the educational system. Usually, only collective actors can engage in wage negotiations. Unions and professional representatives negotiate these wages with the state. Similar arrangements exist for the military, police, and air traffic control.

Licensed professions do not necessarily imply strong regulations of price building and wage systems. Auditors, pyro technicians, and employees in inland navigation do not have schedules of fees and are typically not employed in the public sector. Prices for auditors are restricted to a certain extent, however, by the Civil Code. Other professions are not relevant for our analysis because of their small amount.

The regulation of practices in licensed professions is rather strong. For the most part, free bargaining of prices for these activities is impossible. Practices that do not belong to the state-defined activity of the profession are exempted from the standardization. It is rather common practice among auditors to offer consulting services. Since they do not count as auditing activities, remunerations can be bargained on a free basis here.

3. Hypotheses

Exponents of the monopoly hypothesis expect occupational licensing to sustain higher wages of licensed professionals compared to similarly qualified wage earners. As they argue, licensing reduces competition for existing jobs. Thus, it supports the market power of licensed wage earners and remunerations are higher than they would be under free market competition. This argument relies on two assumptions that are by no means trivial: licensure reduces the supply of labor relative to demand and prices are unregulated by the state. Both assumptions should be treated with caution at least for the German case.

First, licensing of an occupation does not necessarily result in a reduction of labor force supply relative to demand. Collective actors cannot regulate the supply of labor force unless there are objective entry requirements controlled by them. That applies for a minor share of regulated professions. Usually, wage earners compete even in labor market sectors with strong regulation. The example of architects may illustrate this point. Although the market for architects is very small, the supply of architects exceeds demand by far. That holds in spite of strong entry requirements. Licenses are neither necessary nor sufficient for reducing the supply of professionals in a certain field. Still, this assumption underlies the work of many researchers (Weeden 2002, Kleiner and Krueger 2010, Stigler 1971).

Second, the majority of licensed practices are subject to state regulation. It aims to prevent socially intolerable prices for services of licensed professionals. Where free price negotiations

are illegal, supply cuts cannot result in price increases. That is the case for companies in the respective markets in particular.

Employees are subject to that principle as well. Where wages are tied to their share in revenues, their wage for licensed activities is coupled to the standardization of prices. The wage of an employed speech therapist, for instance, can be only a part of his share in the company's revenue. Legal fee structures and lower limits for treatment times exist for most services of speech therapists. They set an upper limit to their wage. The same holds for employees in all labor market segments with fee structures.

These arguments cast doubt on the line of reasoning applied in much of the literature. The monopoly hypothesis is insufficient for understanding the German case. Still, some arguments can be made in favor of the position that licensed wage earners hold a privileged position in the labor market.

First, these professions are particularly able to organize and bargain. They have more functional significance for the state since they provide common goods that the state wants to guarantee. Their bargaining power potentially results in more favorable collective agreements and fee structures. Since they are mandatory for licensed wage earners their wages can be expected to build on them.

Second, the provision of public goods entails a public interest in avoiding corruption. Perceived underpayment is a major reason for corruption. Hence, safeguards against substandard wages represent major instruments of corruption avoidance.

Third, these professions are usually less affected by decreasing demand for their services. Demand is assured by the character of the basic good they provide, a lack of which would impair state functions. Since they hold the monopoly on the provision, efforts of canalizing demand towards them is unnecessary. Additionally, the state has an interest in assuring a minimal supply of licensed professionals. Sometimes the anticipation of poor wages may result in decreasing interest in a particular profession. In the German debate, that is currently discussed for professions in the health sector (nurses, geriatric nurses) and in the educational system (teachers, preschool teachers). In these cases, actual supply cuts are not necessary to increase bargaining power. The anticipation of supply shortage alone can be enough for attaining economic privileges. The example of judges and public prosecutors illustrate the mechanism. On 5 May 2015, the FCC agreed with their claim that wages were insufficient to attract qualified personnel. Generally, the aim of such claims is to guarantee respective professions' appeal by insuring them against substandard wages.

Fourth, licensed professionals are highly sought in closed labor market segments. Licensed employees can cause vacancies that can be filled only by them. Hence, the costs of fluctuation in markets with licensed professions are asymmetric in favor of the employees. A major benefit of licensing from the perspective of the individual is companies' lack of alternatives in case of labor shortage. Companies can draw on lateral entrants only under special arrangements that are extremely difficult to establish. The opportunity to switch between employers rather easily is an insurance against poor wages, since meager offers can be rejected without risk.

Finally, licensed professionals can realize high wages in markets that are unregulated, where they are in a good position thanks to their license. That is an argument for the privileged position of licensed self-employed. Licensed lawyers, for instance, are well qualified for the elaboration and assessment of contracts. However, these services are unregulated by the state as long as they are not part of lawsuits. When law firms offer them in combination, they may become more attractive. The bundling of regulated and unregulated services can be found in the health sector, too. The research institute of a German health insurer (AOK) estimates that one in four patients receives an offer for private health services from their doctor (Zok 2010). These services (e.g. acupuncture and homeopathic treatment) are unregulated by public insurances. Hence, the price negotiation is free. To mention another example, chimney sweeps are often energy consultants. The better licensed wage earners are positioned on free markets through their licensed profession, the higher the wages they can realize. An accountant will improve his wage by providing consultant services as opposed to concentrating on his main profession. This kind of service bundling should be expected from self-dependent wage earners and freelancers in particular. High wages can be expected for this group because there is no upper limit to additional unregulated services. However, they represent a small fraction of all licensed professionals.

Hypothesis one follows from these arguments.

H1: Occupational licensing in Germany reduces the likelihood of low wages but does not increase the likelihood of high wages.

There is one caveat to this hypothesis. It follows from our brief discussion and from the fifth argument in particular: The likelihood of high wages increases for self-dependent licensed workers. Some of them benefit from quotas. The certification of doctor's offices by the Association of Statutory Health Insurance Physicians is a case in point.

If we accept the first hypothesis, a second one follows, concerning the effect of occupational licensing on wage inequality. If occupational licensing reduces the likelihood of low wages in the first place and increases high wages to a lesser degree, wage inequality is reduced. In Germany, licensed workers are more prevalent in the middle of the wage distribution whereas Weeden and Grusky (2014) assume their concentration at the top of the distribution in the US. Hence, national differences in licensing institutions lead to different effects on wage inequality. The regulation of fees and prices in licensed professions has to be accounted for.

H2: Occupational licensing reduces wage inequality in Germany.

This effect would be neutralized by wage premiums of licensed self-dependent workers, where top earners benefit as much as workers at the bottom of the wage distribution. However, we argue that the increased wage through licensing in the top groups does not level the overall minimizing effect occupational licensing has on wage inequality.

4. Data and methods

4.1 Data description and variables

We test our hypotheses relying on the BIBB/BAuA Labor Force Survey 2012 (Hall et al. 2014), a representative survey of 20,036 persons above the age of 15 and with a minimum of 10 hours weekly working time. It yields detailed information on working conditions and worker qualifications. The scope of information provided and the number of cases at the level of occupations allow for stringent testing of our hypotheses.

We test our hypotheses on two populations. First, all employees in the German labor market and, second, all wage earners in 2012. Hence, self-dependent workers and freelancers are included in the second sample. We excluded household members and persons who failed to indicate their professional activities.

Our central dependent variable is logarithmic hourly wage (gross). We use imputed wage values as provided by BIBB. Week hours are as reported in the questionnaires but we reduced extreme values to 70 hours per week. Additional top- or bottom-coding does not alter interpretations.

The licensure variable is coded as 1 for each profession with state regulation effective in 2012. Coding is based on the 'three-digits' of the job classification from 2010.

The *gender composition* of an occupation is introduced as a control. An occupation is defined as dominated by men or women when 70% or more are of each gender respectively. There is evidence for wage-reducing effects of female domination (Busch 2013). Since many jobs in the educational and the health care system are licensed, and since these professions typically have high concentrations of women, wage premiums could be neutralized by this 'gender effect'.

4.2 Methods

Two methods are required to test our hypotheses. The first hypothesis concerns the relation of the wage distributions of licensed and unlicensed wage earners. The second hypothesis concerns the relation of the wage distribution of licensed workers to the total distribution. Since we want to analyze group-specific distributional differences, quantile regressions (Koenker and Bassett 1978) are an appropriate method for the first case. In the second case, we are interested in the effect of one group on the total distribution, which is modelled with unconditional quantile regressions (Firpo et al. 2009). We provide intuitive introductions to both procedures. Technical details and differences between both procedures can be found elsewhere (Borah and Basu 2014, Haupt and Nollmann 2014).

The distribution of interest is split into shares of equal size for both regressions. In the case of 1000 shares, each share counts as a quantile.[3] Each share has an upper boundary that lies on a value from the respective distribution. This value is called quantile value. Hence, the value of the 10^{th} quantile separates the lower 10 per cent of observations from the upper 90 per cent.

4.2.1 The analysis of differences in wage distributions with conditional quantile regressions

[3] In the literature, differentiation of per centiles and quantiles is common. Per centiles have a range of 1 to 100, whereas quantiles have a range of 0 to 1. For reasons of readability we neglect this differentiation throughout.

Conditional quantile regressions estimate differences between group quantile-values. The licensing dummy for the 20^{th} quantile in a conditional quantile regression refers to the difference between two values: The one that separates the lower 20 per cent of all licensed, and the one that separates the lower 20 per cent of all non-licensed workers. A higher value for licensed implies a higher wage threshold for the lower 20 per cent of licensed workers. Licensed workers with low wages relative to their group would be in a better economic position compared to non-licensed with low wages. Hence, conditional quantile regressions allow for understanding in which parts of the wage distribution licensed workers are privileged compared to non-licensed ones.

Figure 1 illustrates the variety of outcomes showing three hypothetical examples. The left hand panel shows quantile value differences by different quantiles. Each line is for a series of coefficients based on conditional quantile regressions for group-specific quantiles. The right hand panel displays the distributions that result from differences in quantile-values, comparing them to a reference group. The figure illustrates which group-specific distributional differences correspond to what kind of specific quantile value difference.

[Figure 1]

Case (a) relates to a mere level shift of a group compared to the reference group. All observations are shifted upwards by a fix amount from the range. The shape of the distribution remains unchanged. In case (b) quantile values at the bottom are roughly the same as in the reference group. Increasing quantile value differences result from a strongly stilted distribution compared to the reference group. In case (c) the largest premium is enjoyed by those in the middle, while top and bottom quantile value differences are negative or null. The corresponding distribution is compressed and shifted right relative to the reference group.

If all workers benefit equally from their licensure, our finding should be similar to (a). If only a specific group with top wages benefits, we should find a spread as in (b). And if licensure was a safeguard for those with low wages but no proportional advantage for those with top wages, we should find (c).

4.2.2 The analysis of effects on a total distribution with unconditional quantile regressions

Conditional quantile regressions serve for the comparison of two points on the distribution of two groups. However, no reliable inference can be drawn concerning the relation of the analyzed group to the overall distribution. That kind of relationship can only be analyzed with unconditional quantile regressions. These regressions estimate the effect of subgroups on the position of quantiles of the overall distribution. If occupational licensing were to increase top wages thereby increasing wage inequality, we should be able to identify an increased *distance* of top segments to the middle by the shape and location of the wage distribution of licensed workers.

Figure 2 provides a graphic illustration of that idea. A coefficient of 0.5 in an unconditional quantile regression can be read as an increase of the analyzed quantile value by 0.5 for each unit of the predictor. An elevation of quantile values below the median by 0.5 pushes the

share of the distribution that is comprised in the quantile towards the middle. The same coefficient above the median magnifies the distance to the middle, or, increases inequality.

[Figure 2]

The estimation of the effect on an unconditional quantile value is based on the idea that a distribution is a sum of relative frequencies of the analyzed variable. Relative frequencies at any point of the distribution are additive compositions of relative frequencies of sub-groups. The composition of sub-group specific relative frequencies can be analyzed for any part of the distribution. The effect of a single group on a point of the overall distribution depends on the distribution of relative frequencies of a group around this point. If 90 per cent of a group are below and ten per cent of it are above the 90th quantile, it leaves the position of the 90th quantile unaffected. This claim can be illustrated by help of a thought experiment: If wage distributions of employees with temporary contract, indefinite contract, and civil servant status (*Beamte*) were identical, ten per cent of them would be above and 90 per cent below the 90th quantile. If all temporary workers were removed from the sample, the degree of inequality would remain unaffected, since the *shape* of the new distribution remained the same. If only one per cent of all temporary workers are above the 90th quantile, their influence on the 90th quantile is negative. By virtue of their higher likelihood to be below the 90th quantile, they drag the quantile value downwards. The 90th quantile is the dividing line separating the lower 90 per cent from the upper ten per cent. If a group contributes more observation below the 90th quantile compared to other groups, the quantile value needs downward adjustment in order to ensure the 90/10 ratio. If 20 per cent of all civil servants are above the 90 per cent quantile, the value is affected positively, because more observations at the upper margin shift the boundary upwards.

5. Results

5.1 Descriptive statistics

About fifteen per cent of all workers in the sample need a license for their profession. Health professions and teachers make for 50 per cent of all licensed employees. Licensed workers are slightly more frequent among freelancers and self-employed (17%). Physicians, jurists, and therapists dominate within that group. Roughly eight per cent of workers are self-employed in both groups and freelancers are more rare in both groups. However, the likelihood of being freelancer is about twice as high among licensed workers (3.9%) compared to non-licensed.

[Figure 3]

Figure 4 shows relative frequencies of licensed workers for different quantiles of the wage distribution for persons with different labor statuses. The higher the wage, the higher is the share of licensed workers. It rises from five per cent at the bottom to 16.5 per cent in the top quantiles. Among freelancers and self-employed the share steadily rises from five to 30 per cent starting at the 40th quantile. Only in the top quantiles can we notice the effect of the higher share of licensed workers among self-employed for all workers.

[Figure 4]

Overall, these results illustrate the economic premium of licensed workers. It is significantly lower, however, for employees. While the lower two thirds of the distribution are shifted to the right, top wages hardly differ from non-licensed employees. Wage premiums are most remarkable for licensed self-employed, their share among self-employed and freelancers being disproportionately high.

5.2 Differences in wage distributions

Next, we discuss results of multivariate conditional quantile regressions. In order to compare wage distributions, we estimate 47 models starting from the 5^{th} quantile to the 97^{th} quantile in steps of two. After the estimation coefficients of occupational licensing are plotted along percentiles of the log. gross hourly wage distribution. We use a graphical way to present the data. A presentation in table format is not feasible owed to the high number of models.[4] Models are estimated for the whole sample and for employees alone.

Figure 5 shows estimated quantile value differences of licensed workers relative to non-licensed ones. They are positive throughout and statistically significant at least at the 5% level. Licensed wage earners are economically better off throughout the wage distribution. This relative advance loses strength over the wage distribution and follows a linear pattern as it was expected for a wage compression effect (see figure 1). For each quantile the coefficient drops by 0.0003 logpoints (95% CI: -0.00035; -0.00026; R^2 = 79.9%).

The addition of freelancers and self-employed increases quantile value differences only in the lower half of the distribution. The tendency for a reduction of the economic premium is more pronounced. For each quantile the coefficient drops by 0.0005 logpoints (95% CI: -0.00054; -0.00046, R^2 = 93.3%).

Overall, our results support the hypothesis that occupational licensing is a safety net towards the bottom (H1). There is no evidence of a level shift. In that case all coefficients would have to be on one level (cf. Figure 1 case (a)). Also, licensed workers at the top of the wage distribution do not realize a significant wage premium. If that was the case, quantile value differences would increase and not shrink in the upper segments. However, the greater advantages are in the lower third of the distributions in both samples. If self-employed and freelancers are included, the shift of the lower third of the wage distribution of licensed workers becomes more apparent. As a bottom line, this supports the claim that the wage premium of licensed workers is more of a safety net than a monopoly rent boosting wages at the top.

[Figure 5]

5.3 The effect on wage inequality

In this section we analyze whether licensed occupations increase or reduce wage inequality, or whether the effect is neutral. As in the previous section we estimate unconditional

[4] Stata do-files for replications are available upon request. Online-Appendix A3 contains figures of all coefficients for both samples.

multivariate quantile regressions between the 5th and the 97th quantile in steps of two, tracing the coefficients for occupational licensing.

The results for occupational licensing and wage distribution can be seen in figure 6. The black line shows quantile value differences for wage earners alone. The grey line shows those of wage earners together with freelancers and self-employed. The effect of licensure on unconditional quantile values of wage earners is positive up to the 80th quantile. After that, no effect can be observed. The effect on lower quantile values and for the lower third in particular is more pronounced. Occupational licensing elevates employees from the low-wage sector, thinning the lower parts of the wage distribution. If it was not for licensing, more workers would receive low wages. That would increase wage inequality. Starting from the median, quantile values are pushed upwards. If that was the only effect, the assumption of an inequality increasing effect of licensure would be supported. However, the slight spread above the median comes with a strong compression below the median. Hence, occupational licensing reduces the distance of lower parts to the middle significantly, whereas distance of the upper segments is increased only marginally or not at all.

[Figure 6]

Counterfactual quantile value relations illustrate this case mathematically. The value of the 50th quantile is 1.3 times as big as the value of the 10th quantile (2.67/2.06≈1.3). Occupational licensing has a strong positive impact on lower quantile values. The value of the 10th quantile is elevated by 0.141 points and the value of the 50th quantile is elevated by 0.059 points. If we account for these effects in our calculation, the resulting relation is 1.24 ((2.67 + 0.059)/(2.06 + 0.133) ≈ 1.24), a reduction of the distance by 4.83 per cent. In this way we can calculate the impact on other distances. The distance of high wages (90th quantile) to middle wages (50th quantile) is reduced through licensure by 2.18 per cent and the distance between high and low wages (10th quantile) is reduced by 6 per cent.

The only systematic effect of the addition of self-employed and freelancers to our sample concerns high quantile values. There is a positive and increasing effect starting from the 85th quantile. Self-employed licensed workers are disproportionally represented in the top wage segments. Although their wage premium is not excessive (see figure 5), their disproportionate representation in the upper segments (see figure 4) results in a strong influence on those segments of the distribution. That broadens the gap between top and middle wages. Overall, the retrenching effect of occupational licensing on wage inequality persists and is only slightly weakened by spreading at the top. The 90th/10th quantile ratio is now reduced by 4.82 per cent, the 90th/50th ratio by 0.58 per cent, and the 50th/10th ratio by 4.26 per cent.

In spite of the wage premium of licensed professionals, especially of self-employed, that premium results in a net reduction of wage inequality. The reason is that the premium is not concentrated at the top but in the middle of the wage distribution. The likelihood of high wages for licensed vs. non-licensed workers is similar among employees. Hence, licensure leaves high quantile values unaffected. The likelihood to receive top wages is significantly higher for licensed self-employed and freelancers (see figure 4). However, due to the small

size of that group, overall wage inequality remains unaffected. These findings clearly support H2.

6. Discussion

In this article we analyze the position of licensed workers in the German labor market. The legal foundation of occupational licensing in Germany is complex. Hence, a transfer of observations and theoretical assumptions that have been made for the US labor market may lead to flawed results in other settings. Accounting for the legal situation and the connection between licensed professions and common good provision is essential. We claim that the wage premium of licensed employees is best understood as a safety net. Results of conditional quantile regressions support that claim. Licensed self-employed and freelancers have strong wage premiums compared to unlicensed self-employed. Still, they do not change the overall picture. We show licensed occupations to reduce wage inequality by help of unconditional quantile regressions. Licensed workers are unlikely to realize low wages and they do not receive disproportionately high wages. As before, licensed self-employed and freelancers have a special role. Their high probability to receive top wages results in a spread at the top of the wage distribution. Due to the small size of that group, however, the effect on the total distribution is marginal.

The FCC's interpretation of the Basic Law restricts licensure to professions that are neatly tied to common good provision. About thirteen per cent of German employees need a license. Prices for professional activities that provide or produce these activities are highly regulated and standardized. Even if the literature's interpretation of occupational licensing as the result of successful lobbying is accurate, this reading has to be qualified for the German case. Accounting for the relation to common good provision gives a more comprehensive picture of occupational licensing.

Overall, results support claims to the necessity of a more differentiated analysis of licensure in the German labor market. Monopolies and economic rents from occupational licensing are only part of the picture. More research is needed to assess the combined effects of licensure and economic regulation in other countries.

The results are highly relevant for labor market research. They demonstrate the institutional embeddedness of labor market relations that escape market logic. Many models in labor market research neglect the role of the state as an autonomous actor with specific interest. Instead, state service to particular interest groups is often presupposed. Our analyses show how state interest in the maintenance of public goods legitimizes barriers to market entry and economic regulation of prices. Both forms of regulation are consequential for the German labor market. Inclusion of these state regulations in our labor market models promises more accurate results.

The results presented in this paper are also relevant for a better understanding of social inequality. First, they show that the wage premium of one group in the labor market can reduce total inequality. The wage premium of licensed workers is a case in point. The methodological approach presented here, allows for a qualification of socio-structural analysis. Former findings on inequality between groups can be used to analyze the effect of

inter-group-inequality on total inequality. Second, results show that the normative evaluation of the relation between market entry barriers and social inequality has to be qualified, at least in the case of Germany. A small group of licensed workers, licensed self-employed, realize high wages, causing stronger wage inequality in the top segment. The discussion of the impact of occupational licensing has concentrated on this small group. However, self-employed solicitors, physicians, and lawyers comprise a rather small fraction of all licensed workers. Once we broaden the perspective and include all licensed professions, we find a compressing effect on the wage distribution. That makes the analysis of occupational licensing an example for the study of the relation between labor market institutions and social inequality in a more nuanced way. The normative conclusions will be rather different.

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Tables and Figures

Health	Academic health professions Health care professions Assistant health professions Food chemists	**State function**	Judicial officers Tax consultants + Tax personnel (*Fachangestellte*) Accountants
Education	Teachers at schools Driving teachers Preschool teachers	**Public Safety**	Military, police Aviation and shipping Chimney sweepers/ Furnace builders Architects, construction engineers, consulting engineers Pyro technicians, blasters

Table 1: Licensed occupations and their related public goods

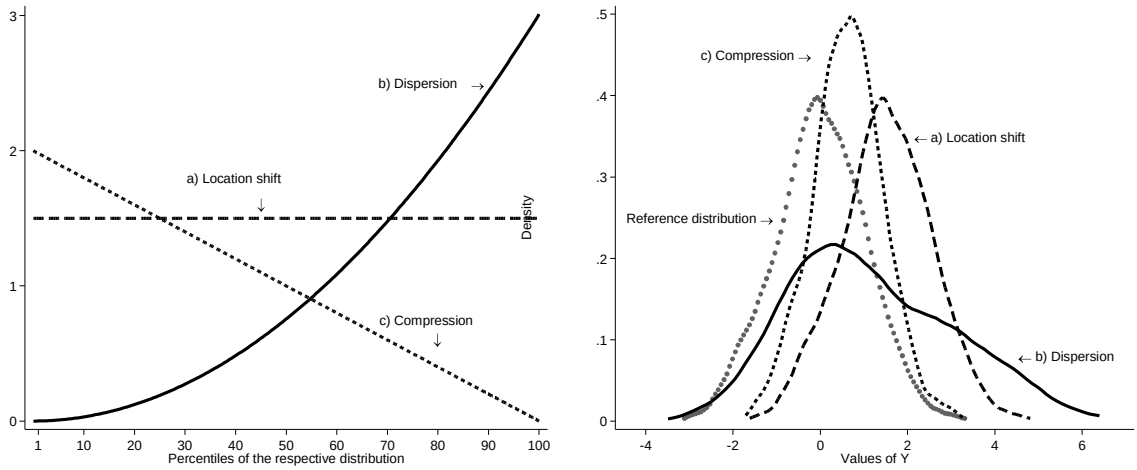

Figure 1: Quantile value differences of simulated distribution in relation to a reference distribution (left) and their corresponding subgroup specific distributions

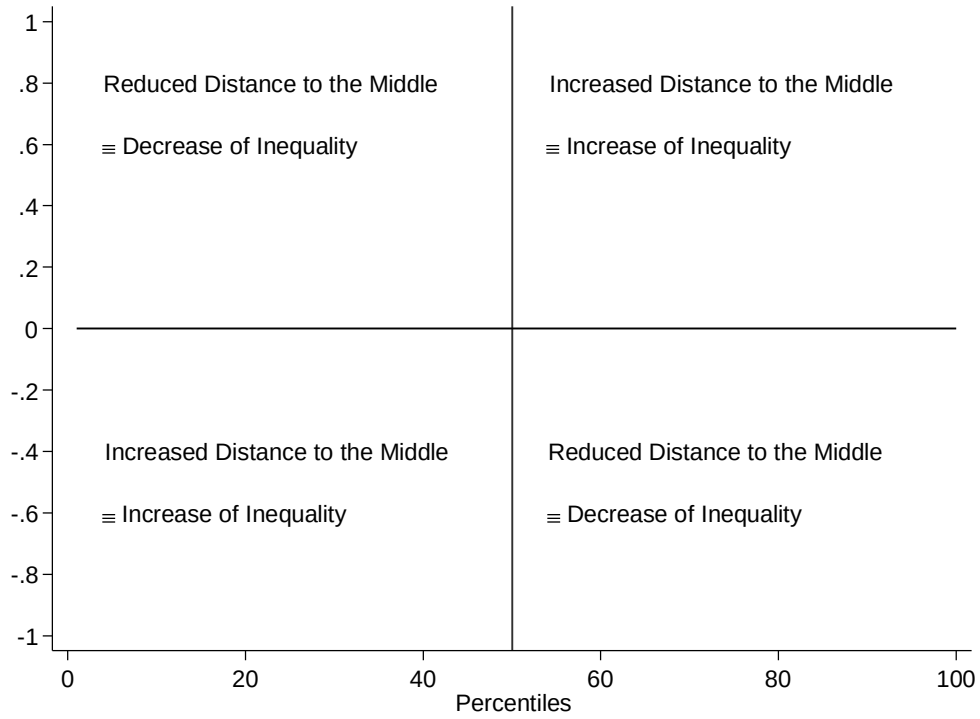

Figure 2: Heuristic for the interpretation of unconditional quantile regression results

Figure 3: Empirical distributions of the log. gross hourly wages for licensed and not licensed occupations.

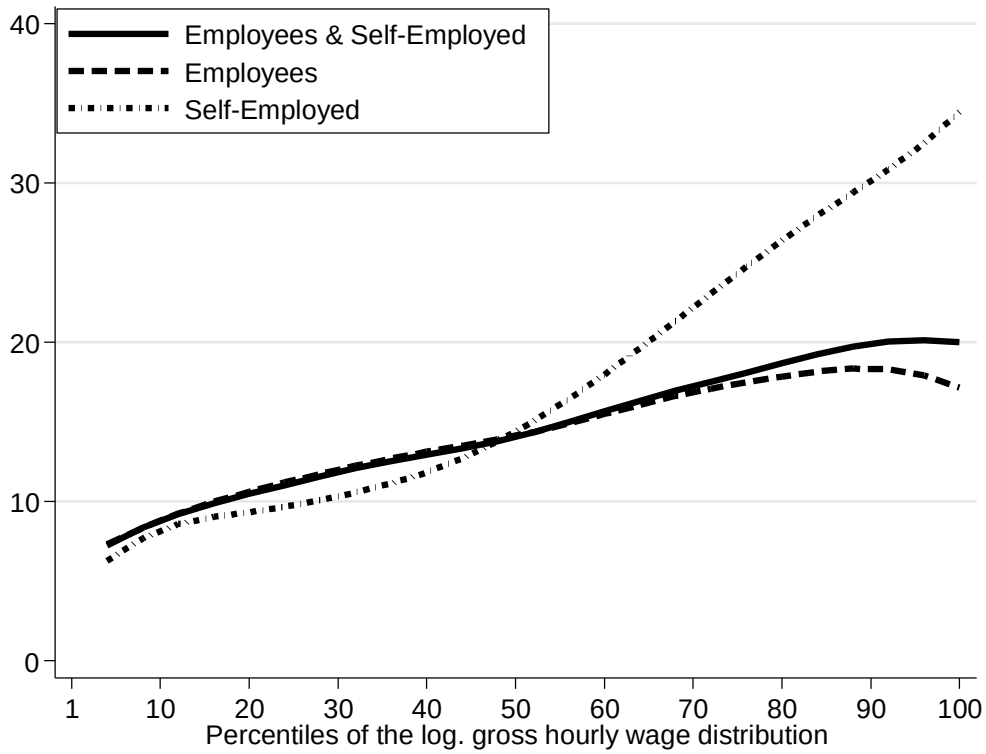

Figure 4: Share of licensed employees / self-employed over the unconditional distribution of log. hourly wages. The lines are based on a LOWES-Smoothing.

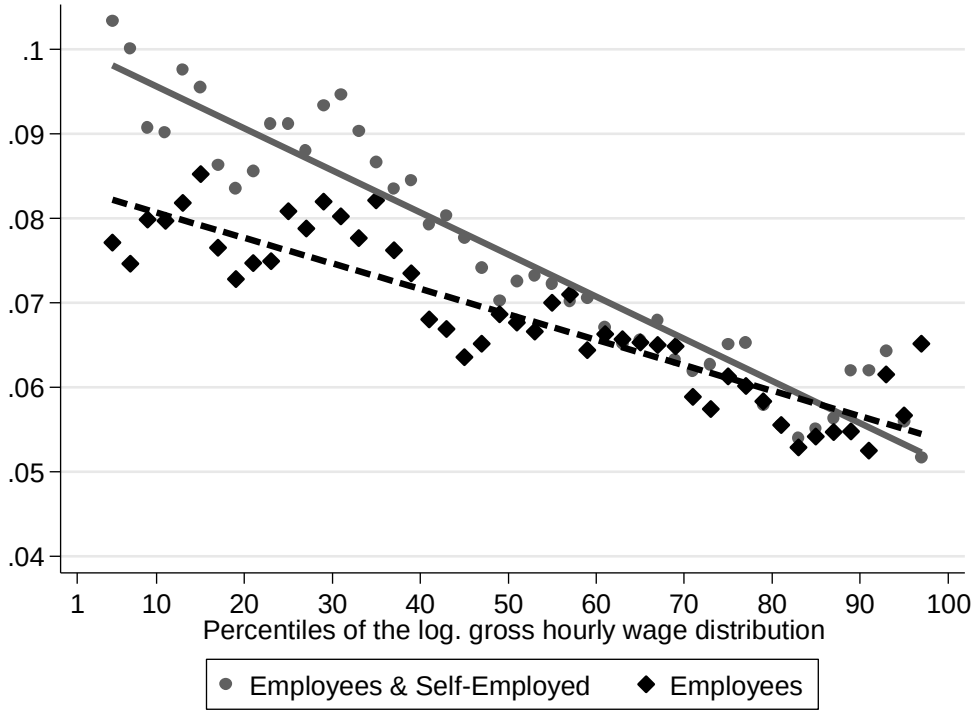

Figure 5: Results of multivariate conditional quantile regressions for licensed occuptions separated by employment status. Filled symbols indicate significance at the 5% level in two sided tests. The lines refer to OLS estimates with the estimated quantile value differences as dependend and the percentile as independed variable.

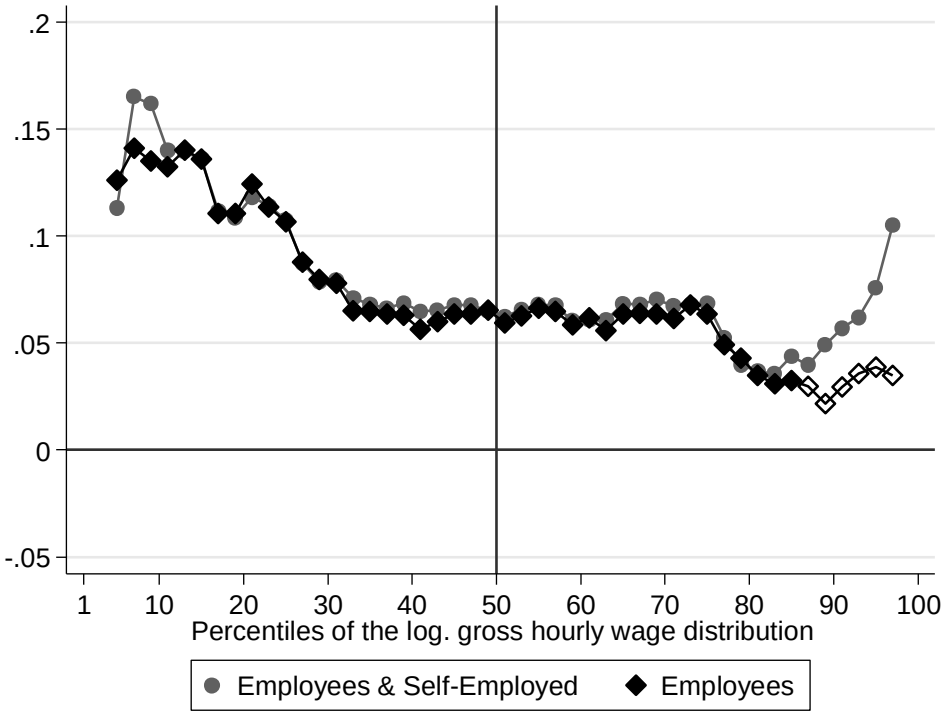

Figure 6: Results of multivariate unconditional quantile regressions for licensed occuptions separated by employment status. Filled symbols indicate significance at the 5% level in two sided tests.