

# **How Does Government Regulate Occupations in the UK and US? Issues and Policy Implications**

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## *Introduction*

One would be hard-pressed to think of a major labor market institution that is growing faster than occupational regulation in both the US and UK. Yet there has been little coverage of the policy issue in either the academic or public policy publications (Stephenson and Wendt, 2009). The regulation of occupations by government has a long and varied history in the US and the UK. In the US systematic licensing of occupations began at the state level in the late 19<sup>th</sup> Century with the regulation of traditionally licensed occupations such as doctors and lawyers (Council of State Governments, 1952). In the UK there has been a long tradition of guilds and charters given by the Queen or by Parliament. More recently occupational regulation has grown in both the US and the UK and so has the economic influence of this institution.

Occupational regulation refers to the process where entry into an occupation requires the permission of the government or a relevant professional body (Kleiner 2000). Economists have long recognized the potential economic effects of occupational regulation. Adam Smith for instance comments In the Wealth of Nations he comments on the ability of the crafts to lengthen apprenticeship programs and limit the number of apprentices per master, thus ensuring higher earnings for people in those professions (Smith, 1937). Explicit in his argument is the idea that such institutions were not necessarily associated with increases in the quality of the output, rather they served as a restrictive mechanism. Similarly in the US Nobel Laureate Milton Friedman stated that “there has been retrogression, an increasing tendency for particular occupations to be restricted to individuals licensed to practice them by the state” (Friedman, 1962).

One of the major reasons occupational regulation has grown is because it serves the interests of those in the occupation as well as government. Members of an occupation benefit if they can increase the perceived or the real quality and thus the demand for their services, while restricting supply simultaneously. Government officials benefit from the electoral and monetary support of the regulated as well as the support of the general public, whose members think that regulation results in quality improvement, especially when it comes to reducing substandard services or protecting the public health and safety.

## *Occupational Regulation in the US*

In the US more than two thirds of occupational regulation takes place at the state level. In general, state regulation of occupations takes three forms. The least restrictive is registration, in which individuals file their names, addresses, and qualifications with a government agency before practicing the occupation. The registration process may include posting a bond or filing a fee. In contrast, certification permits any person to perform the relevant tasks, but the government or (more often) another nonprofit agency administers an examination and certifies those who have passed the level of skill and knowledge for certification. For example, travel agents and car mechanics are generally certified but not licensed. The toughest form of regulation is licensure; this form of regulation is often referred to as the right to practice. Under licensure laws, working in an occupation for compensation without first meeting state standards is illegal.

For the members of the occupation, obtaining licensing is generally the objective, because it imposes state sanctions on new entrants from within a state or for those moving in from another jurisdiction. For the administrators of the professional association, the resulting increase in responsibility and revenue from dues and continuing education usually results in an increase in pay. Moreover, most licensing provisions require continuing education classes for fees, which raise the revenue of the occupation association. Revenue of the occupation association increase in responsibility and revenue from dues and continuing education usually results in an increase in pay for leaders of the occupational association.

For the occupational association, obtaining licensing legislation requires raising funds from members to lobby the state legislature, particularly the chairs of appropriate committees. In addition, the occupation association often solicits volunteers from its membership to work on legislative campaigns. With both financial contributions and volunteers, the occupational association has a significant ability to influence legislation, especially when opposition to regulatory legislation is absent, diffuse or minimal.

## *Occupational Regulation in the UK*

The UK model of occupational regulation bears many similarities with those found in other Commonwealth countries such as Australia and Canada but has some marked differences with the US model. It involves a variety of diverse institutional structures including general and industry-specific law as well as practices based on custom. As a result, it can vary along the following key dimensions. First, it can be statutory, meaning that the requirement for a license is set down in statute, or it can be voluntary. In the former case, it largely follows the Victorian model in that professions are granted such status with an Act of Parliament so regulation is at the national level. Second, it can vary depending on the range of products or services that are licensed. As such, an individual with a specific job title can provide all products and services covered by that occupation (known as protection of title), or a specific job title enables the individual to undertake certain activities or provide only specific services (known as protection of function). This latter form of regulation does not restrict individuals from entering the profession, but it places restrictions on the activities they are allowed to perform as part of the profession. For example, one can practice as an electrician and can carry out electrical installations but a certified electrician has to inspect these installations and certify their safety. Third, it can vary depending on whether the license is issued by an occupational body, a government organization, or whether the license is issued on a local basis usually by a local authority. Regulatory bodies in the UK are independent of any branch of government but they work closely with government departments when reviewing occupational regulation issues. The majority of occupations in the UK are licensed nationally with the exception of taxi drivers who are issued a license at a local authority level. Requirements for obtaining a license or becoming registered with a professional body can include passing an industry specific exam, the demonstration of work practices and passing a medical or criminal record check. Finally, a license in the UK can either be for life or might have to be renewed periodically to demonstrate continued fitness to practice (Frontier Economics 2003).

Based on these dimensions, occupational regulation in the UK can take the following forms. *Certification or accreditation* is the process in which a relevant authority assesses whether practitioners meet at minimum a set of predetermined

criteria that demonstrate competence and knowledge in a specific area. A private non-profit industry body is usually responsible for overseeing the process and granting the certificate. Certification is not mandatory; therefore a non-certified practitioner also may provide similar services. However, given that certification indicates the achievement of a certain level of skill, some consumers might be prepared to pay a premium for using a certified practitioner as opposed to a non-certified one.

Registration on the other hand may be voluntary or mandatory (law requires practitioners to be registered e.g. doctors) and it involves practitioners meeting certain standards before they can enter the register of qualified practitioners in the field. Requirements for registration may include the attainment of certain educational qualifications and passing exams. Registration with the relevant body may involve a statutory protection of a title, in that only those who are members of such a body may call themselves by that title (known as protection of title). For example, it is not a requirement to hold a license to describe oneself or to practice as a surveyor, but to use the title 'Chartered Surveyor' one must be a member of the Royal Institute of Chartered Surveyors. Using a protected title without being registered with the relevant regulatory body is an offence that carries a financial penalty.

Licensing is similar to registration in that the license to practice depends on the candidate complying with set requirements, most commonly the attainment of certain qualifications and proof of competence through tests. However, it refers to the mandatory requirement to hold a legal permit to practice the range of activities that can be performed by a practitioner (e.g. gas installation). Comparing licensing with registration in the UK context, registration tends to be tied to the protection of a title, whereas licensing refers to the absolute prohibition of the practice of a profession without holding the relevant license. The use of the term licensing is limited in the UK, because there are far fewer controlled acts and occupations compared to the US. However, there is evidence that it is becoming more widespread. In November 2009, for example, the medical profession became the first for which both registration and the requirement to hold a license is mandatory by UK law, covering some 240,000 professionals. Under the new regulations, anyone practicing any form of medicine such as writing prescriptions and signing death certificates will have to hold a license.

## *Who is licensed?*

From a political economy perspective occupational licensing has been a successful labor market institution and has grown as unionization has declined in the US (Kleiner and Krueger, 2009). Figure 1 shows trends in the growth of occupational licensing and unionization from 1980 to 2008.<sup>1</sup> Licensing data for the earlier periods shown in the graph are available only at the state/occupational level; the data gathered through the Gallup and Westat surveys for 2006 and 2008 are denoted with a dashed line in the figure (Kleiner and Krueger 2009 and 2010). Despite possible problems in both data series, occupational licensing clearly is rising and unionization is declining. By 2008, approximately 29 percent of workers polled in the Westat survey said they were required to have a government-issued license to do their job, compared with about 12.4 percent who said they were union members in the Current Population Survey (CPS) for the same year and less than 10 per cent are covered by the minimum wage. Despite these differences in coverage of the workforce, unionization and the minimum wage have received considerable attention by scholars and policy makers, occupational licensing remains one of the most under-researched labor market institutions.

Aggregate data on occupational regulation in the UK is not available. To overcome this obstacle, we compiled a break down of qualifications and statutory licensing or registration requirements for exercising each one of the occupational groups outlined in the Standard Occupational Classification (SOC 2000). This exercise enabled us to decide whether the occupation was licensed or regulated and subsequently to obtain an estimate of the proportion of workers in licensed jobs. Only those occupations which by law required practitioners to have obtained a specific qualification or to be registered with a professional body were included. Occupations for which registration

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<sup>1</sup> The method used to calculate the percentage licensed prior to 2006 first involved gathering the listing of licensed occupations in each state by Labor Market Information units under a grant from the U.S. Department of Labor (see America's Career InfoNet, [http://www.acinet.org/acinet/licensedoccupations/lois\\_occ.aspx?stfips=27&by=occ&keyword=&searchType=&](http://www.acinet.org/acinet/licensedoccupations/lois_occ.aspx?stfips=27&by=occ&keyword=&searchType=&)). This was matched with occupations in the 2000 Census. If no match was obtained, the occupation was dropped. From the Census the number working in the licensed occupation in each state was estimated and used to calculate a weighted average of the percentage of the workforce in the US that works in a licensed occupation. For 2008 we deleted individuals who were certified from our tally of licensed individuals who were either licensed or certified in the survey conducted by Westat.

is voluntary were dropped from the sample. Similarly, occupations for which a license is legally required to carry out specific activities (protection of function) were also excluded from our sample. This is because there is no way of discriminating between those practitioners that hold a license and those that do not. However, we recognize that this has resulted in underestimating the proportion of the workforce that is subject to licensing regulations and accept it as a limitation of our study. With these caveats in mind, we estimate that out of the 353 occupational groups included within SOC2000, 12 per cent could exclusively be performed by someone who is registered or holds a license.

Using historical data from the Labour Force Survey we were able to show the growth in occupational licensing from 1997-2008 and compare it to aggregate levels of unionization. As it can be seen from Figure 1, the proportion of the workforce that is registered or licensed has consistently been rising while levels of unionization have been declining. By 2008, approximately 13.5% of the UK workforce had to be licensed to perform their jobs or some particular aspect of their job. Licensing appears to affect a higher proportion of the workforce than the National Minimum Wage, which after its introduction had a direct impact on an estimated 5 per cent of the UK workforce (Low Pay Commission 2001). Finally, it is evident that although registration and licensing requirements are currently confined to a smaller proportion of the workforce compared to the US, that figure has consistently been rising the last several years.

## **The Effects of Occupational Licensing**

### *Quality Effects*

The arguments in favor of occupational licensing centre around the ‘improvement in quality’ effect it brings about. Occupational associations screen entrants to professions, barring those whose skills or character suggest propensity to produce low quality output. In addition, performance standards are regularly monitored and deviations can lead to punishments such as financial penalties or being stripped of the license to practice. Since entry and subsequent performance are monitored in these ways, quality of service should be maintained. However,

meaningful policing also requires that job incumbents cannot reenter the occupation by moving to a new organization or state. To ensure that, strict entry requirements must be enacted which in turn limit labor supply to the occupation and thus increase the price of labor in these occupations. Both the threat of being deprived of the right to exercise a profession with higher earnings provides an incentive for job incumbents to first invest in high levels of training to secure a license and adhere to professional standards thereafter. As such, licensing signals to consumers that the service they are receiving meets certain standards and therefore consumer uncertainty is minimized and demand for the service increases (Arrow 1971, Shapiro, 1986). Such a reassurance can be particularly useful if the services or products in question pose health and safety risks to consumers. Therefore a central justification for licensing is that it yields positive externalities to the society with respect to quality and human capital development. Further that the quality improvements are manifested for those least able to obtain information and with the lowest incomes.

Others have questioned such assumptions. According to Friedman (1962), occupational associations have an incentive to ensure tight restrictions to entry are maintained (as they result in higher fees to practitioners) as well as stifle complaints, innovation, and disciplinary procedures. As such, not only consumers are faced with higher prices, but also quality might be compromised as they switch to unlicensed and therefore cheaper practitioners. The difficulty in collecting good quality measures for many licensed occupations often restricts our ability to estimate the impact of licensing on both productivity and service quality. Where such evidence exists, it largely supports Friedman's hypothesis. In their study of mortgage brokers Kleiner and Todd (2008) find that occupational licensing results in negative outcomes for consumers such as a greater percentage of high interest rate mortgages. Similarly, Wanchek shows that state laws limiting the number of hygienists results in a reduction in consumer's access to dental care. Licensing of dentists was also found to have few effects on malpractice insurance rates or complaints to state licensing boards, but a positive impact on prices for certain dental services (Kleiner and Kudrle 2000). Overall, the evidence so far has failed to demonstrate a link between licensing and better quality services. If anything, consumers appear to be faced with higher prices without a corresponding increase in the productivity of practitioners.

## *Wage Effects*

Economic theory would predict that occupational licensing would simultaneously restrict the supply of labour to the occupation and enhance consumers' confidence that services are of superior quality. Such an outward shift in demand would lead to an increase in the wages of the licensed. By using the state to monitor entry to the profession and combining this with the legal requirement to hold a license in order to practice, competition from unlicensed practitioners is eliminated.

Evidence suggests that supply of practitioners in regulated occupations is indeed restricted by licensing. Kleiner (2006) finds that in states where librarians, respiratory therapists, dietitians and librarians were not licensed, those occupations grew 20 per cent faster compared to states that were licensed. In addition, once an occupation becomes licensed, the corresponding occupational association has the power further limit supply through various ways. For example, it can upgrade the educational and general requirements for entry, control examination pass rates and residency requirements before one can apply for a license. Further, they can capture work by unlicensed workers who may have tangential relationships to the licensed occupations, such as hair braiders who were required to obtain a license because their work was loosely related to the practice of cosmetologists (Kleiner and Krueger, 2009). By how much does licensing drive up wages?

To examine whether licensing is associated with higher pay in the US, we have estimated log wage regressions. We augment a standard earnings equation to include a dummy variable indicating whether a license is required for the worker's job. We regard these estimates as mainly descriptive, since licensed workers may differ from unlicensed workers in unobserved ways, even after we condition on education and two digit occupation. If a dummy variable indicating license status is added to a standard wage equation, having a license is associated with approximately 18 percent higher hourly wages ( $p$ -value  $< 0.001$ )<sup>2</sup>. The cross-sectional effect of licensing is similar in magnitude to the estimated effect of belonging to a union (see Lewis, 1986), and greater than an additional year of schooling. The regression estimates also include educational attainment, gender, race, age, self employment,

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<sup>2</sup> The estimates in our analysis refer to log points as percentages, with percentages reflecting an intermediate base between the licensed and unlicensed groups (Halvorsen, and Palmquist 1980).

career experience and its square, union status, and no occupation dummy variables in some of the specification (Kleiner and Krueger, 2009).

A further distinguishing characteristic of the Westat survey is that the variable for career experience is the reported *actual* experience of the respondents rather than an estimate based on age and education (Blau and Kahn, 2008). Specifically, the question for experience was: “Since age 18, in how many years altogether have you worked for pay or profit? Please count all years in which you worked either all or part of the year.” The variable tracked well the traditional variable for experience used in human capital analysis.

We also examine if licensed occupations which perform more sophisticated cognitive work tasks, such as doing difficult math and reading assignments might be the reason for these wage premiums. If the wage premium is economic returns to higher cognitive abilities and tasks, then the licensing coefficient would decline. Moreover, are licensed or government-certified tasks more education-intensive, which would account for some of the wage premium obtained by regulated workers? In order to address this question using the data from the survey, we examine a question which asks the self-reported use of math and reading abilities of the practitioners. For example, the reading question asks: “What (is/was) the longest document that you typically read as part of your job?” And the math question asks: “How often (do/did) you solve problems at your jobs using advanced mathematics such as algebra, geometry, trigonometry, probability, or calculus?” We find that the inclusion of these factors is not associated with any change in the association of licensing with wages. On balance, our results lend support for the interpretation that occupational licensing serves as a means to enforce entry barriers to a profession that raise wages (Kleiner and Krueger, 2009).

To examine whether licensing is associated with higher pay in the UK, we use data from the 2008 Labour Force Survey (autumn quarter)<sup>3</sup>. Estimates of a standard earnings equation using ordinary least squares (OLS) log wage regressions show that when we include the standard earnings equation with a dummy variable indicating whether being licensed or registered is mandatory in order to practice the profession. The OLS regression estimates also include educational attainment, experience and experience-squared (since earnings decline in a nonlinear manner), sex, trade union membership and whether pay setting is determined by a collective agreement and sector of employment and is similar though not identical to the model estimated for the US. Due to the wage premium associated with working in the South East of England, we also control for location of employment. When the licensing dummy is entered to the wage equation, having a license is associated with approximately 13 per cent higher hourly pay ( $p < .001$ ). How does this finding compare with estimates of union membership wage premia? In the 1990s the premium stood at approximately 10 per cent (Blanchflower and Bryson 2003), but has since fallen considerably since . According to the most recent estimates, the premium for the period 2000-6 stood at 3 per cent (Blanchflower and Bryson 2009)<sup>4</sup>. Therefore, the wage premium associated with working in a regulated occupation in the UK is greater than the estimated effect of union membership.

Occupational licensing also bears many similarities to the pre-entry closed shop (Kleiner 2000). As with the pre-entry closed shop, only licensed individuals are allowed to practice the profession thus potentially restricting labor supply to the occupation. At its peak, an estimated 5.2 million individuals were covered by closed shop arrangements, falling to around 2.6 million before its outlawing (Dunn & Gennard 1984, Steward 1995). According to the evidence, the wage premium

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<sup>3</sup> The Labour Force Survey is a quarterly sample survey of approximately 53,000 private households in the UK randomly selected from the Postcode Address File (PAF). PAF is prepared by the post office and is stratified geographically. The survey collects information on respondents' personal circumstances and their labor market status. Each respondent is entered into 5 consecutive surveys meaning that there is approximately an 80% overlap in surveys for successive quarters. Each respondent is interviewed face to face in their first survey and via telephone interview, where possible, for the rest. The framework of the questionnaire follows that of other big national surveys, whose validity and representation is widely recognized, namely that of the census. The validity and reliability has been previously confirmed through past work.

<sup>4</sup> There are variations across different types of workers and workplaces.

associated with the pre-entry closed shop was higher than that associated with union recognition (Metcalf and Steward 1992). Steward (1995) finds that in 1984 the pre-entry closed shop wage differential stood at approximately 17% only slightly higher than our estimated wage differential for licensing.

Previous research in the US has demonstrated that the licensing wage differential is higher for occupations that have high educational and training requirements compared to their low wage and low education counterparts (Kleiner 2006). To test whether this is also true in the UK case, we introduce a dummy variable to represent the interaction between licensing and qualifications into our standard log wage regression. We find that the effect of licensing on wages appears to be smaller for low wage occupations. Whereas the wage differential for unionization is lower for high skill and high education jobs, in the case of licensing it is those occupations that benefit most. As such, licensing contributes to income inequality by raising the wages of individuals who are already in the upper quartiles of the income distribution. Similar to the US, the variance of earnings is not reduced by occupational regulation (Kleiner and Krueger, 2009).

#### *Policy Implications for US Health Care Costs*

In the US one of the major areas of policy discussion and analysis is the raising costs of health care and the reasons for it. Occupational licensing is disproportionately focused on health care, with about 76 percent of non physician health care workers being required to have a license from the government (PDII, 2008). One proposal for reducing health care costs is that the federal government no longer pays a premium for health care costs due to licensing, except for physicians. Table 2 gives the potential implications for health care costs using a conservative estimate that 15 percent of the licensing wage effect is increasing costs with little to no increase in productivity (Kleiner and Krueger, 2009). Using these assumptions the impact of reducing the payment due to potential licensing rents to health care workers would reallocate health care cost from providers of the service to consumers by approximately \$102 billion in 2008. Further, the lost output or deadweight loss would be between 24 to 30 billion dollars for that same year.

The policy implications within this sector of the US economy of licensing are large in dollar terms but are still less than one percent of overall health care costs. The evidence presented in Table 2 suggest that the main influence of licensing for health care workers, who are not physicians, is to raise costs without any measurable effect on the quality of service received by consumers. The implications are a large reallocation effect to relatively high paid workers and lost output in an economically important and highly politically visible sector of the US economy (Kleiner, 2006).

### *Conclusions*

We compare occupational licensing in the UK and the US. Although the potential labor market effects of occupational licensing are well documented in the literature, empirical work has often lagged behind, especially in the case of the UK. To our knowledge, this is the first attempt to map the ‘occupational licensing’ agenda in the UK, estimate its effects at a macro-level, and compare it to the US, where such data is already available. In the US, occupational licensing is already a dominant labor market institution affecting approximately 29 per cent of the workforce. Although less common in the UK, the evidence presented here shows that its importance is increasing. Whereas in the US licensing is predominantly a state-level phenomenon, in the UK it takes place at a national level.

We show that in both countries occupational licensing has a large impact on wage determination. The wage premium associated with licensing stands at approximately 18 per cent in the US and 13 per cent in the UK. For both countries, this is higher than the estimated effect of union membership. Interestingly, in the UK licensing has the opposite effect on income inequality compared to unionization. In particular, licensing raises the wages of high skilled and high paid individuals thus exacerbating the existing disparity in the distribution of earnings in the UK. Such a finding confirms previous US estimates, and it is therefore consistent within both contexts.

Our results also validate the view that licensing has a monopoly effect via restricting labor supply to the occupation and thereby increasing wages. In the case of the US, we show that professional associations exert substantial influence in the regulatory process through intense lobbying and campaigning in the first instance as

well as through entry standards , for example changing pass rates for licensing exams. The situation appears to be somewhat different in the UK. Evidence from dentistry shows that it is government's funding decisions that determine entry to dental schools whereas entry grades are determined by supply and demand for places at a given time (Jetha 2002). All dental school graduates are eligible to a license which is granted by the General Dental Council. Although barriers to entry exist in terms of gaining a place in a dental school and get a license, they are beyond the control of the relevant professional body.

Finally, the policy implications of occupational licensing extend to many areas. Here we focus on the US health care system. We show that approximately \$102 billion would be reallocated from providers to consumers if the licensing rents were reduced. Therefore, licensing increases costs without any evidence of a corresponding increase in the quality of service.

The study of occupational licensing as a labor market intermediary institution has received some attention in the US. This is the first study to look at its effects in the UK. Our preliminary findings answer some initial questions, but also raise many others. In particular, how does the licensing premium vary across occupations and industries? Is there a wage premium associated with certification? To what extent licensing results in better consumer protection and higher quality of services? The answer to such questions will enable us to more fully evaluate the impact of licensing, beyond its wage effects that we develop in our analysis.

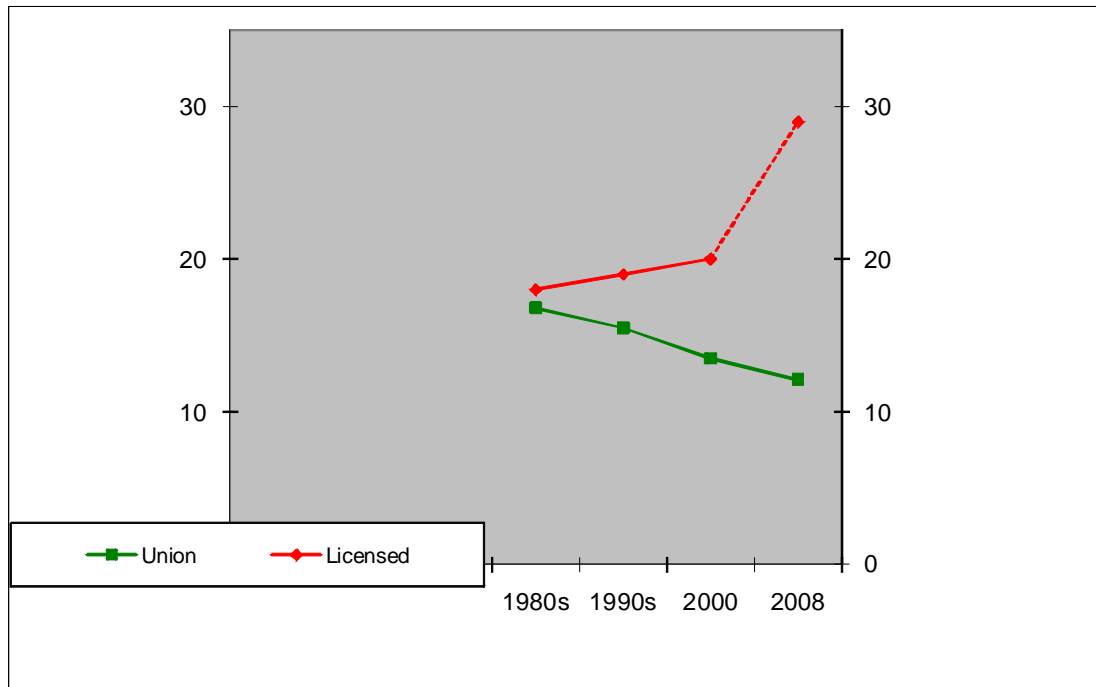
Despite this, a number of conclusions can be drawn from this preliminary analysis. The lack of any positive effects of licensing on the quality of services received by the consumers, combined with the higher price paid for such services means that the case for occupational licensing is yet to be made. Governments and regulatory bodies are advised to carefully scrutinize any proposals for occupational licensing given that the evidence demonstrates the existence of a strong element of self-interest behind requests by occupations to be licensed. Consumers are also advised to be cautious when campaigning for the introduction of licensing arrangements for certain occupations (see Fernie this volume).

Second, before embarking on licensing, governments and policy makers should examine the alternatives. Skeptics of occupational licensing have argued that less

restrictive approaches can yield the same benefits. For example, certification might be a more efficient way of ensuring that consumers are protected from malpractice. Such a system would reduce information asymmetries between providers and purchasers of services while not interfering with supply and demand of labor to various occupations. It further enables consumers to choose whether they are prepared to pay a premium for someone whose skills have been checked by the government or a professional body.

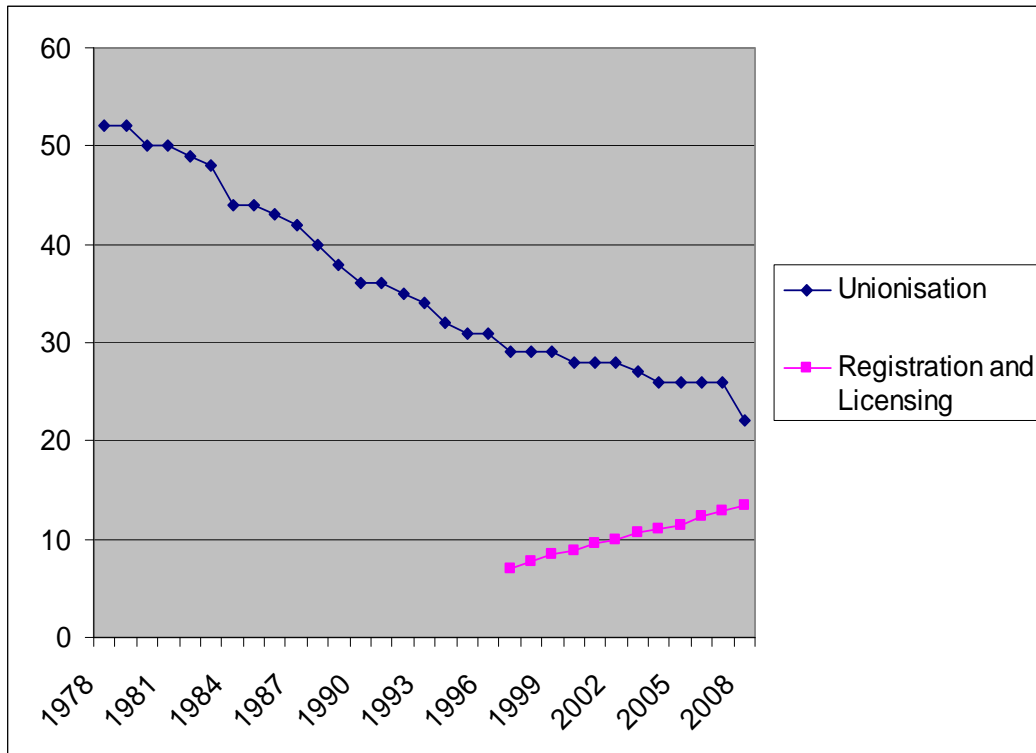
Thirdly, the effect of occupational licensing on wage disparity highlights another negative byproduct that this type of regulation could have. Having an unequal reward weighting across the wage distribution suggests that the wage benefits of occupational licensing are felt by those who are already reaping high returns from education and professional qualifications. As such, a stark warning should go to any government wishing to extend occupational licensing policies to professions typically in the upper quartiles of the income distribution. This is especially the case if these higher incomes are coming at the expense of relatively lower income consumers who now must pay higher price for these services. Moreover, this is an issue for policy makers who are particularly concerned with government exacerbating the currently observed trend of increasing wage inequality in the UK (see Machin this volume).

Figure 1: Comparisons in the Time-Trends of Two Labor Market Institutions in the US, 1980-2008: Licensing and Unionization\*



\*The line from 2000 to 2008 shows the value from state estimates of licensing to the Gallup Survey and Westat Survey results, and the union membership estimates are from the CPS.

Figure 2: Comparisons of two Labor Market Institutions: Licensing and Unionization in the UK



Source: 2008 Labour Force Survey

Table 1: Simulations of the Effects of Licensing on US Health Care Costs

*Estimates of US Health Care Expenditures*

Health care expenditures are 17% of GDP, approximately \$2.4 trillion (Kaiser Foundation, 2007)

Labor accounts for 60% of Health care spending ( Schwieters and Harper, 2007)

Therefore, health care labor costs are about \$1.44 trillion.

*If the US Federal Government were unwilling to pay the licensing wage premium for all health care workers who are not doctors?*

Physicians and clinical services account for 21.2% of total health care expenditures. This would mean that physicians account for  $(\$2.4 \text{ trillion}) \times (0.212) = \$0.51 \text{ trillion}$ .

Thus, total health care labor costs, net of physicians is  $\$1.44 \text{ trillion} - \$0.51 \text{ trillion} = \$0.93 \text{ trillion}$ .

Using basic demand analysis, this means that if 76% of health care employees are licensed (Using the PDII generated estimates) and the lower range estimate of the wage premium is about 15%, (Kleiner and Krueger, 2010), then the reallocation effect would be  $0.11 \times \$0.93 \text{ trillion} = \$102 \text{ billion}$ , and the Dead Weight Loss should be about \$30 billion (e.g. \$24 billion if only 80 percent is deadweight).

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