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Abstract

Using an original survey data of individuals, this paper presents empirical evidence on the relationship between occupational licenses and labor market outcomes. The novelty of this study is that it provides a distinction between the possession and actual use of licenses, as well as a distinction between monopolistic licenses and certifications. Occupational licenses have a large presence in the Japanese labor market. More than half of the respondents in this study hold monopolistic licenses or certifications, and nearly 40% of the respondents use either one of them in their current jobs. The use of licenses and certifications are particularly prevalent in the service sector, such as the health care and education industries. The possession of occupational licenses has positive impacts on the labor market attachment and wages of females and elderly people. On the other hand, occupational licensing may negatively affect market efficiency, through the creation of monopoly rents. While considering the importance of occupational licenses as a trend in the service economy, it is desirable to survey the possession and use of occupational licenses periodically.

Keywords: Occupational license, Labor market, Skill, Wage premium, Service sector
JEL Classification: J31, J44, L51

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Occupational Licenses and Labor Market Outcomes

1. Introduction

The purpose of this study is to present new empirical evidence on the relationship between occupational licenses and labor market outcomes in Japan.[1] Similar to other developed countries, occupational licenses, such as those obtained by physicians, lawyers, accountants, schoolteachers, nursery schoolteachers, barbers, hairdressers, and massage therapists are prevalent in Japan. The main purpose of the occupational licenses is to protect consumers from information asymmetry, inherent in these professions. Asymmetry of information, a sort of market failure, is a theoretical foundation of the occupational license system (LeLand, 1979; Shapiro, 1986). In the service sector, where information asymmetry between service providers and users is often serious, a large number of occupations are regulated by the licensing system. However, since the official labor statistics do not contain information on occupational licenses at an individual level, we conducted an original survey on individuals to collect data on the possession and use of occupational licenses.

Potentially, occupational licenses have benefits as well as costs. The benefits include preventing entry of low quality providers, enhancing human capital investments, and improving the average quality of services. On the other hand, licenses may create monopolistic rents through its effects to restrict competition among actual and potential suppliers. In particular, the monopolistic licensing system, which has a strong entry deterrence effect, may cause negative impacts on market efficiency and productivity improvements.

Since holding and use of occupational licenses are generally not surveyed by official statistics irrespective of the country, it is not easy to comprehend the actual situation and the economic effects of occupational licenses entirely. However, there are a large number of researches on specific licenses and survey-based cross-occupational studies (see, Kleiner, 2000, 2006, for surveys).[2] Previous studies closely related to this paper are empirical studies on wage premiums of occupational licenses, such as those of physicians, dentists, lawyers, barbers, hairdressers, and massage therapists. Recent studies include those of physicians and nurses (Kugler and Sauer, 2005; Law and Marks, 2013; Kleiner *et al*., 2016), dentists and dental hygienists (Kleiner and

[1] As explained later, the term “license” is used to include “monopolistic licenses” and “certifications” throughout this paper.

[2] Kleiner (2016) surveys the literature on occupational licenses in the health care sector. In the case of schoolteachers, there are a large number of studies on the different productivity impacts (measured by the achievement of students) of certified and uncertified teachers (see Hanushek and Rivkin, 2012, for a survey).

Kudrle, 2000; Wing and Marier, 2014), lawyers (Winston and Karpilow, 2016), schoolteachers (Angrist and Guryan, 2008), barbers (Timmons and Thornton, 2010), cosmetologists (Zapletal, 2017), and massage therapists (Thornton and Timmons, 2013), among others. If occupational licenses produce monopoly rents, those who have occupational licenses enjoy wage premiums, compared to those of similar characteristics (e.g., education and experience) without licenses. In fact, most studies indicate the existence of such wage premiums for license holders.

Although cross-occupational studies have been scarce, Kleiner and Krueger (2013) indicate that 35% of the employees in the United States were either licensed or certified by the government, and 29% were licensed. Regarding wage premiums, the study shows that licensing is associated with about 18% higher wages, though the effect of certification is small. They propose statistical agencies to measure and monitor the extent of occupational licensing for a large sample of individuals. Gittleman and Kleiner (2016), using a long panel of the NLSY79 (National Longitudinal Survey of Youth, Bureau of Labor Statistics), estimate wage premiums of occupational licenses, and report that the premium is between 7% and 12% in cross-sectional estimates, which is reduced between 2% and 3% when accounting for individual fixed-effects. However, their estimates depend on various assumptions in identifying the license holders, as the statistics do not have information on occupational licenses.[3]

The occupational licensing system is related to the issue of labor participation of females and elderly people. If licenses (or certifications) function as a signal of specific skills, they may contribute to improved matching of potential workers and actual jobs. In particular, females or elderly people holding restrictive licenses may find it easier to get new jobs after child rearing or compulsory retirement, respectively. In fact, a study in the United States indicates that occupational licensing laws helped females and black workers, particularly in occupations for which information about worker quality was difficult to ascertain (Law and Marks, 2009). In relation to this issue, a pharmacist, which is a licensed occupation, is regarded as the most egalitarian and family-friendly occupation, with a small gender earnings gap and low earnings dispersion (Goldin and Katz, 2016). Since this occupation has characteristics of temporal flexibility, and working part-time has little or no hourly wage penalty, female pharmacists do not take much time off after childbirth. [4]

Similar to other countries, occupational licenses are not surveyed in the official statistics of Japan, and empirical studies analyzing the impact of licenses on labor markets have been scarce.

[3] Other than the studies in the United States, Chi *et al*. (2017) analyze the relationship between occupational licenses and wages in China. They indicate that wage premiums of occupational licenses are between 11% and 13%, and that the difference between monopolistic licenses and certifications is statistically insignificant.

[4] However, Goldin and Katz (2016) argue that the egalitarian feature of a pharmacist is not the result of licensing requirements or regulations, but because of the labor market effects of changes in technology and the structure of the industry.

The study by Kawaguchi *et al*. (2014) is a rare example, which examines the impact of the amendment of the Building Standards Act in 2007 that introduced stringent regulations on the role of licensed architects on constructing large-scale buildings. They found that strengthening the regulation increased the wages of licensed architects by 30% and the transaction price of existing condominiums by 15%. They suggest that the licensing system should be adjusted to increase the supply of qualified architects to match increased demand.

Collectively, despite the practical importance of occupational licenses, quantitative evidence on the association between possession of license and the labor market outcomes has been limited. Considering this background, this study uses a sample from the original survey of 10,000 individuals, and presents new empirical evidence on occupational licenses in Japan. In this study, the term "license" is used to include both stringent "monopolistic licenses" and lenient "certifications."

Specifically, we study the individual characteristics of license holders, distribution of licenses by industry and occupation, the relationship between holding licenses and labor market attachment, and wage premiums arising from possession/use of occupational licenses. The novelties of this study are that 1) it does not present evidence on a specific licensing system, but those across industries and occupations, 2) it distinguishes monopolistic licenses and certifications, and 3) it analyzes the different effects of possession and use of occupational licenses on labor market outcomes.

According to the analysis, majority of the individuals possess an occupational license (including certification) and nearly 40% of the working population use occupational licenses in their current jobs, particularly those who work in the service sector such as health and welfare, education, transportation, and finance industries, where they intensively use licenses. Occupational licenses have a significant association with the labor market outcomes, and its association with the labor participation and wages are remarkable among females and elderly people. The estimated wage premiums are far greater for monopolistic licenses than for certifications, suggesting the existence of monopoly rents.

The remainder of this paper is structured as follows. Section 2 explains the survey design and specific questionnaires used in this study, followed by the method of analysis. Section 3 reports the results, and Section 4 concludes with policy implications, limitations of this study, and the issues to be addressed in future work.

2. Data and Method of Analysis

2.1. Survey Design

The data used in this study originate from the "Survey of Life and Consumption under the Changing Economic Structure and Policies," designed by the author of this paper and conducted by the Rakuten Research, Inc., which is contracted by the Research Institute of Economy, Trade and Industry (RIETI) in late 2016. The sample (responded) individuals are 10,000, who are randomly chosen from the 2.3 million registered monitors in Rakuten Research, Inc. stratified by gender, age, and region (prefecture) in accordance with the Population Estimates of 2014 (Statistics Bureau, Ministry of Internal Affairs and Communications), and excluding those who are younger than 20 years. It should be noted that the number of individuals surveyed in this study is larger than those surveyed in previous studies in the United States.[5] The distribution of the sample by individual characteristics (gender, age categories, education, major in university, and working status) is shown in column (1) of **Table 1**. For the subsample of individuals currently working (6,579 people), industry, occupation, and type of employment are presented in column (2) of this table.

The two main survey items used in this study are the possession and use of occupational licenses. The first question relates to the broadly defined license, including monopolistic licenses and certifications. The second question relates to monopolistic licenses. In this study, monopolistic licenses are considered to be those licenses in an occupation without which the worker is prohibited to undertake the job, based on the government's laws and regulations. Physicians, dentists, and lawyers are the representative examples of professions that require monopolistic licenses, and occupations necessary to conduct specific businesses, such as hazardous materials engineers, electrical chief engineers, and food sanitation supervisors are also categorized as occupations covered by the monopolistic licensing system. Licenses other than the monopolistic licenses are classified as certifications in this study. Certifications are administered by the government or private agencies; this is generally done through examinations and those who achieve the necessary level of skill and knowledge are certified.

The specific wordings of the questionnaires on occupational licenses are as follows. The first question is "Do you have an occupational license? Are you using the license in your current job? (Note: excluding ordinary driving license)." The choices to answer the questions are 1) "I have and am using it in my current job," 2) "I have, but am not using it in my current job," and 3) "I do not have any." The second question is "Do you have an occupational license legally required to conduct a job? Are you using the license in your current job? (Note: physicians, dentists, nurses, pharmacists, dental hygienists, lawyers, patent attorneys, tax accountants, architects, barbers, hairdressers, etc.)." The three choices are provided and are the same as the first questions'. Based

[5] For example, the number of individuals surveyed are about 1,600 in Kleiner and Krueger (2010) and about 2,500 in Kleiner and Krueger (2013).

on the responses to these questions on the possession/use of licenses, those who responded affirmatively to the first question and negatively to the second question are regarded as certification (only) holders.[6]

In addition, this study uses information on the individual characteristics that were surveyed. Specifically, gender, age, education (seven categories), major in the university or graduate school (three categories: natural science/engineering, social science/humanities, and other fields), industry (14 industries), occupation (seven categories: administrative and managerial, professional and engineering, sales, clerical, manufacturing process, service, and other), type of employment (nine categories: executive of a company, self-employed, family-worker, regular employee, part-time employee, temporary employee, temporary agency worker, contract employee, and entrusted employee), annual income (tax inclusive) from the current job (16 categories), and weekly working hours (eight categories: 19 hours or less, 20-29 hours, 30-34 hours, 35-42 hours, 43-45 hours, 46-48 hours, 49-59 hours, and 60 hours or over) are used in the analysis.[7]

Among the above variables, the annual earnings (tax inclusive) are classified into 16 categories: 1) less than Japanese Yen (JPY) 0.5 million; 2) JPY 0.5 to 0.99 million; 3) JPY 1 to 1.49 million; 4) JPY 1.5 to 1.99 million; 5) JPY 2 to 2.49 million; 6) JPY 2.5 to 2.99 million; 7) JPY 3 to 3.99 million; 8) JPY 4 to 4.99 million; 9) JPY 5 to 5.99 million; 10) JPY 6 to 6.99 million; 11) JPY 7 to 7.99 million; 12) JPY 8 to 8.99 million; 13) JPY 9 to 9.99 million; 14) JPY 10 to 12.49 million; 15) JPY 12.5 to 14.99 million; and 16) JPY 15 million or more. The central values of the annual income classes are converted to the logarithmic form.[8] In this calculation, “less than JPY 0.5 million” and “JPY 15 million or more” are treated as JPY 250,000 and JPY 16.25 million, respectively.

2.2. Method of Analysis

First, we simply observe the possession and use of occupational licenses by individual characteristics (gender, age classes, and education), and for the subsample of those who work, the distribution of license holders/users by the industry and type of employment. We then analyze the

[6] Those who hold monopolistic licenses may also have some certifications. In this case, they are classified as the holders of monopolistic licenses.

[7] The categorization of industry, occupation, type of employment, and annual income classes are set consistently with those used in the Employment Status Survey (Ministry of Internal Affairs and Communications). Categorization of weekly working hours of the Employment Status Survey (12 categories) is finer than that of this study (eight categories).

[8] For example, Morikawa (2015, 2016) estimates wage functions by converting the annual income categories of the Employment Status Survey in a similar manner.

association between holding of occupational licenses and working status by estimating a probit model (separately for male and female subsamples), where "1" is assigned to those who are currently working and "0" otherwise, and use this as the dependent variable. The main explanatory variables are the two dummies holding occupational licenses (monopolistic licenses and certifications). The other explanatory variables included in the estimations are dummies for age classes in ten-year intervals (20-29, 30-39, 40-49, 50-59, 60-69, and 70 or older, where the reference category is 40-49), [9] and the dummies for six education categories (primary school or junior high school, senior high school, vocational school, junior (2-year) college, (4-year) college or university, and graduate school, where the reference category is senior high school). In short, the probit equation to be estimated is expressed as follows.

$$Pr\,(working=1) = F\,(ß_0 + \Sigma\, ß_1\, occupational\ license\ dummies + \Sigma\, ß_2\, age\ dummies + \Sigma\, ß_3\, education\ dummies) + \varepsilon \quad (1)$$

Finally, we estimate wage premiums of the occupational licenses separately for males and females engaged in work, by distinguishing the possession and use of occupational licenses. The dependent variable of the ordinary least squares (OLS) estimation is the annual income expressed in the natural log, and the main explanatory variables are the four dummies on the possession and use of licenses (monopolistic licenses and certifications). The reference category are those who are working and do not have any occupational license. Since the survey used in this study asked questions concerning the possession and use of licenses separately, it is possible to identify those who hold licenses, but do not use them in their job. The estimated coefficients for merely possessing (and not using) licenses can be interpreted to reflect the potential ability of individuals. On the other hand, the difference between the coefficients for possession and use can be interpreted as the effect of improved matching of current jobs and/or that of monopoly rents arising from restrictive licenses.

In the baseline wage equation, the control variables are dummies for age classes, education, weekly working hours, and the one-digit industry. Age and education dummies are the same as in equation (1). Considering the weekly working hours, the category "35-42 hours" is used as the reference and the reference industry is manufacturing. In short, the baseline OLS equation is as follows.

$$ln(earnings) = ß_0 + \Sigma\, ß_1\, occupational\ license\ dummies + \Sigma\, ß_2\, age\ dummies + \Sigma\, ß_3\, education\ dummies + \Sigma\, ß_4\, working\ hour\ dummies$$

[9] When replacing dummies for age classes to the raw figure of age and its square, the estimated coefficients for occupational licenses are essentially unchanged.

$$+ \Sigma ß_5 \, industry \, dummies + \varepsilon \qquad (2)$$

In addition to the above baseline estimate, dummies for occupation and type of employment are included as the explanatory variables in the expanded model. Among seven occupation categories, clerical occupation is used as the reference category, and among nine employment types, a regular employee is the reference category. Furthermore, separate estimations are conducted by employment type, in order to observe whether the relationship between the license and wages are different by employment type. Our focus in this analysis is on the difference between standard and non-standard employees.

3. Results

3.1. Occupational Licenses in Japan: Overview

The percentages of those who possess occupational licenses by individual characteristics are summarized in **Table 2**. Among the sample, 55.9% have a license (including a certification) and 31.2% have a monopolistic license.[10] It is obvious from the figures that occupational licenses play an important role in the Japanese labor market. The percentage is higher among males than females, and the difference by gender is prominent for the monopolistic licenses. Considering age classes, although the percentages are lower among elderly people, the differences are small by age classes, particularly for the monopolistic licenses. Considering education, the general tendency is that, higher the education category, larger is the percentage holding occupational licenses, with the exception of professional school graduates. As anticipated, those who completed a professional school, show a high percentage of holding occupational licenses, particularly monopolistic licenses. While segmenting those who graduated from university or higher into their major fields, graduates of natural science and engineering show higher percentages of holding monopolistic licenses, partly because this category includes profession-oriented faculties, such as medical schools and pharmaceutical departments.

Table 3 is the tabulation results of whether the licenses are used or not. Among all the working individuals (6,579 people) in the sample, 37.6% use licenses in their current jobs (the first row, column (1)): certifications 14.9% and monopolistic licenses 22.7% (columns (2) and (3), respectively). The figures are not significantly different from those in the United States reported by Kleiner and Krueger (2013). Considering gender, the percentages are higher among male

[10] Those who responded as "I do not have any" to the question on the possession of license (including certification), but responded as holding a monopolistic license, are treated as the holder of a license.

workers.

Column (4) of Table 3 indicates the percentages of those who hold licenses, but do not use it in their jobs (unused license holders). The figures for the whole, male, and female workers are 29.6%, 27.9%, and 31.8%, respectively. Columns (5) and (6) provide a breakdown in terms of the type of licenses. In the case of certifications, the percentages of users and non-users are not significantly different (see columns (2) and (5)). On the other hand, the percentage of users is far higher than that of non-users among monopolistic license holders (see columns (3) and (6)). This comparison indicates that monopolistic licenses are more valuable than certifications in the labor market. Among female workers, the ratio of certification users is smaller than that of non-users, but monopolistic licenses tend to be used in their jobs, denoting that females often have unused certifications.

Considering the age classes, there are no significant differences among age groups for those who are in their 30s to 60s, but the ratio of those using licenses is relatively low among those in their 20s and 70s. Since the figures in this table are calculated for those who are currently working, it is not the result of the different labor participation rates. A plausible interpretation of the low usage rate in the 20s age group is that some occupational licenses are acquired a few years after starting to work, as the necessity to conduct the job increases. The low usage rate in the 70s age group possibly reflects the job changes after compulsory retirement in the early 60s.

Considering the education categories, similar to the findings from possession of occupational licenses, higher educational attainment is associated with the use of licenses, and those who graduated from professional schools tend to use licenses in their jobs. However, even among professional school graduates, more than 30% workers do not use their licenses. Considering the major field in university and graduate school, a pattern similar to the possession of licenses is observed. The difference in the license possession rates between natural sciences/engineering and social sciences/humanities correspond to the difference in the rates of using licenses. While holding certifications is higher in social sciences/humanities than in natural sciences/engineering, the use of certifications is not high in the former group.

Table 4 indicates the use of occupational licenses by the industry and type of employment. Considering the industry, those who are engaged in medical and welfare services show the highest percentages of users for both, broadly defined licenses (77.0%) and monopolistic licenses (57.8%). The reason behind the outstandingly high figure in this industry is due to a large number of occupations regulated by laws to protect consumers' safety. Following this industry, construction, education, transportation, finance, and insurance industries show a high percentage of license users. In contrast, the percentages are low in manufacturing, wholesale and retail, and restaurant and accommodation industries. In this table, figures for the broad service sector (from information and communications industry to other service industries) are also reported. The percentages of

those using broadly defined licenses and monopolistic licenses in the service sector are 40.4% and 25.3%, respectively, which is far higher than the percentages in the manufacturing industry (24.4% and 10.0%, respectively). However, the ratios are quite heterogeneous for the individual service industries.

Considering the type of employment, interestingly, executives of companies and self-employed individuals show a high percentage of occupational licenses usage, followed by regular employees and family workers of the self-employed. Executives of companies, including the founders and successors of small businesses, make use of their licenses while conducting their businesses. On the other hand, the percentages of license users are low among part-time employees, temporary workers, and temporary agency workers. These workers often hold occupational licenses, but the ratio of non-users is high (columns (4)), suggesting a mismatch in the labor market.

3.2. Occupational Licenses and Labor Participation

Cross-tabulation results for those holding occupational licenses and labor participation rates (percentages of those who are engaged in work) by gender and age class is presented in **Table 5**. The rate is higher for those who have occupational licenses, particularly holders of monopolistic licenses, irrespective of gender and age. For the whole sample (last row of the table), the rates of non-holders and holders are 54.3% and 74.8%, respectively (columns (1) and (2)). Separate figures for certifications and monopolistic licenses are 65.6% and 77.2%, respectively (columns (3) and (4)).

Columns (5) and (6) are the differences in labor participation rates, based on the possession of occupational licenses. Among males, the difference is relatively large in the 60s age group. On the other hand, among females, the difference is large in the 40s age group, but the gaps are larger than those of males throughout the age categories.[11]

The probit estimation results (equation (1)) on the probability of those engaged in work, controlling for age and education, are reported separately for male and female subsamples in **Table 6**. The figures in this table indicate marginal effects. The coefficients for occupational licenses are all positive and statistically significant at the 1% level. The marginal effects of holding certifications and monopolistic licenses are 10-14% and 15-22%, respectively (columns (1) and (2)).

Columns (3) and (4) show the probability of being a standard worker. Since the data used in this study includes those who are not employed by companies, typically the self-employed, a

[11] The differences are large in the 20s age group for both males and females because the whole sample includes students in higher education.

"standard worker" in this table is the sum of standard employees, executives of companies, and the self-employed. The possession of occupational licenses is positively associated with the probability of being in a standard work. Although the coefficients on standard works are slightly larger than those on any other work among males (columns (1) and (3)), the opposite is true among females (columns (2) and (4)). Females holding occupational licenses often work as non-standard employees. This issue will be discussed further in the next subsection.

It should be mentioned here that the positive association between occupational licenses and labor participation rates do not necessarily mean causality. Some people make efforts to acquire licenses on the job for the purpose of conducting legally regulated jobs. In addition, license holders may have better unobservable skills, even among equally educated individuals. However, the observations from **Tables 5** and **6** suggest that the possession of licenses may have a favorable effect on labor participation, particularly among females and elderly individuals.

3.3. Occupational Licenses and Wages

This subsection reports the relationship between the possession/use of occupational licenses and wages (annual earnings). The OLS estimation results of the wage function (equation (2)), where the dependent variable is the annual earnings from work (expressed in a logarithm) is reported separately for males and females in **Table 7**. The samples in these estimations are those who are engaged in work (6,579 people). The explanatory variables of focus are the four dummies of the occupational license holders: 1) certification user, 2) monopolistic license user, 3) certification non-user, and 4) monopolistic license non-user.[12] The non-users are those who hold monopolistic licenses or certifications, but do not use them in their current jobs. The reference categories in the estimations are those who do not have any occupational licenses (including certifications). The baseline control variables are age category, education, industry, and weekly working hours (columns (1) and (3)). In the expanded model, occupation (one-digit) and type of employment are used as additional control variables (columns (2) and (4)).

According to the baseline estimation results, the wage premiums of certification users are 17.4 and 11.5 (log) points for male and female workers, respectively (columns (1) and (3)). The premiums of monopolistic license users are 29.6 points and 24.6 points, respectively. After accounting for basic individual characteristics, significant wage premiums are observed, particularly for monopolistic licenses. Greater wage premiums in monopolistic licenses than in certifications are in line with the findings in the United States (Kleiner and Krueger, 2013).

[12] A small number of individuals (195 people) are certification users and at the same time, monopolistic license non-users.

However, when occupation and type of employment are further controlled, the size of wage premiums drops substantially (columns (2) and (4)). The wage premiums of certification users are 7.4 points for male workers, and close to zero and statistically insignificant for female workers. In contrast, the coefficients for users of monopolistic licenses are still large and significant for both male and female workers at 19.3 and 10.7 points, respectively. The shrinking wage premiums of licenses, controlling for the occupation and type of employment, suggest that license holders are sorted into high wage occupations and employment types.

The wage premiums of non-users of license holders are far smaller than those of users, and statistically insignificant with an exception of male monopolistic license holders. The result indicates that the value of licenses is limited, unless utilized in the actual jobs.

Table 8 summarizes the gaps of wage premiums between users and non-users, based on the regression results presented above. The gaps are larger for monopolistic licenses (row B: 11.1-20.6 points for male workers and 15.3-26.6 points for female workers) than for certifications (row A: 5.1-15.8 points and 0.7-12.7 points, respectively). This difference between monopolistic licenses and certifications reported in the last row of the table, suggests the existence of monopoly rents generated from entry restrictions specific to the monopolistic licenses. Interestingly, the differences between monopolistic licenses and certifications are larger for females than for males. One possible interpretation is that in the monopolistic licenses mostly held and used by female workers (e.g., nurse, nursery schoolteacher), labor supply is insufficient to fill the demand for these types of workers.

Finally, **Table 9** summarizes the estimated wage premiums, based on separate estimations by the type of employment. Due to the sample size limitation, part-timers, temporary employees, temporary agency workers, contract employees, and entrusted employees are bundled as “non-standard workers” and the dummies for these types of employments are included in the regressions. The coefficients for the users of certifications are generally insignificant with an exception of self-employed males (column (1)). On the other hand, coefficients for the users of monopolistic licenses are generally positive and significant, with the exceptions of female company executives and the self-employed (column (2)). Irrespective of the types of employment, the coefficients for non-users of certifications are all insignificant (column (3)), although the coefficients for non-users of monopolistic licenses are positive and significant for male company executives and standard employees (column (4)).

The result that both male and female non-standard workers using monopolistic licenses in their current jobs have wage premiums, is worth paying attention. Even among non-standard workers, those who hold licenses essential for executing businesses earn higher wages. Interpreting from another aspect, monopolistic license holders can choose flexible working styles to balance family and market work. In contrast, certifications, which can function as a signal of workers’ skills, are

not highly valued in the actual labor market.

4. Conclusion

Based on the trend in the service economy, the occupational licensing system is important for the efficiency of the service industries and the functioning of the labor market. However, despite its importance, the impacts of the possession and use of occupational licenses on the labor market outcomes are understudied. This situation is not limited to Japan, and is mainly due to limited official statistics on occupational licensing. In this regard, we conducted an original survey on Japanese individuals and presented new findings on this issue. The novelties of this study are that 1) it presents evidence considering all occupations and industries, 2) it distinguishes monopolistic licenses and certifications, and 3) it analyzes the separate effects of merely holding and using occupational licenses on wages.

The major findings of this study are as follows. First, majority of the individuals hold occupational licenses or certifications, and about 40% of the working population use occupational licenses in their current jobs. In particular, the figures are higher in the service sector, where more than 70% of the workforce in the health and welfare, education, transportation, and finance industries hold licenses or certifications. Generally, attaining higher education has a positive association with holding of licenses, and those who graduate from professional schools tend to hold and use occupational licenses.

Second, occupational licenses have a strong association with the labor participation rate, particularly among females of all age classes and males who are in their 60s or over. The association with the labor participation rate is stronger for monopolistic licenses than certifications. The result suggests that holding monopolistic licenses have favorable effects on labor participation of females after child rearing, and of elderly people after compulsory retirement.[13]

Third, although holding occupational licenses are associated with higher earnings, the prerequisite for wage premiums is the actual use of the licenses in the jobs. In other words, occupational licenses are not functioning as a signal of workers' potential ability, and it is important to improve matching of skills and actual jobs.

Fourth, the estimated wage premiums are greater for monopolistic licenses than that for certifications, suggesting that monopoly rents are contained in wage premiums.

Overall, occupational licenses have a beneficial impact on the labor market outcomes of

[13] The result for the females is consistent with the argument of Goldin and Katz (2016) that being a pharmacist is the most family-friendly occupation in the United States.

individuals, but may cause inefficiency in the goods/services markets.

The analysis of this paper presents new evidence on the facts and functions of the occupational licenses in Japan, but there are several limitations. First, the individual survey used in this paper does not have information on specific licenses, such as those of physicians, nurses, lawyers, and teachers. Therefore, the estimation results on the relationship with the labor market outcomes are an average for the various licenses. Thus, heterogeneity among the fields of licenses is beyond the scope of this study and is left for future research. Second, the selection bias that the sampled individuals have at least some information technology (IT) skills is unavoidable as the survey was conducted through the internet. Third, the wage premiums of occupational licenses may be underestimated due to the top-coding bias. Specifically, data on annual income is a response to the multiple-choice style questionnaire, where the highest category is "JPY 15 million or more," but some highly restrictive licenses may be associated with far higher earnings. Fourth, the observed cross-sectional association between occupational licenses and labor market outcomes is not necessarily an indication of causality. For example, among individuals of observably similar characteristics, those with better unobservable ability or with strong motivations may make efforts to acquire occupational licenses and self-select themselves into high wage jobs.

While considering the important role of occupational licenses in the service economy, as Kleiner and Krueger (2013) suggest in the United States, it is desirable to collect information on the possession and use of occupational licenses periodically in the official government statistics.

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Table 1. Composition of the Sample Individuals.

(1) All				(2) Engaged in work			
Individual characteristics		N	(%)	Industry, occupation,and employment type		N	(%)
Gender	Male	4,934	49.3%	Industry	Agriculture, forestry, and fishery	67	1.0%
	Female	5,066	50.7%		Construction	358	5.4%
Age	20s	1,323	13.2%		Manufacturing	1,080	16.4%
	30s	1,663	16.6%		Information and	280	4.3%
	40s	1,958	19.6%		Transport	257	3.9%
	50s	1,642	16.4%		Wholesale and retail	754	11.5%
	60s	2,848	28.5%		Finance and	287	4.4%
	70 or over	566	5.7%		Real estate	171	2.6%
Education	Primary school or junior high school	238	2.4%		Accommodations and restaurants	188	2.9%
	Senior high school	2,826	28.3%		Medical, health care and welfare	640	9.7%
	Vocational school	1,051	10.5%		Education	429	6.5%
	2-year junior college	1,214	12.1%		Services, NEC.	1,361	20.7%
	4-year university	4,135	41.4%		Government	426	6.5%
	Graduate school	536	5.4%		Other industries	281	4.3%
Major	Natural science	1,699	36.4%	Occupation	Managerial	771	11.7%
	Social science and humanities	2,778	59.5%		Professional and engineering	1,653	25.1%
	Other fields	194	4.2%		Sales	534	8.1%
Working status	Working	6,579	65.8%		Clerical	1,675	25.5%
	Not working	3,421	34.2%		Manufacturing process	468	7.1%
					Service	1,239	18.8%
					Other	239	3.6%
				Employment type	Executive of company	389	5.9%
					Self-employed	686	10.4%
					Family-worker	116	1.8%
					Standard employee	3,294	50.1%
					Part time employee	1,019	15.5%
					Temporary employee	379	5.8%
					Temporary agency workers	185	2.8%
					Contract employee	383	5.8%
					Entrusted employee	128	2.0%

Note: The sample size is 10,000.

Table 2. Holding of Occupational Licenses by Individual Characteristics.

	(1) License	(2) Certification	(3) Monopolistic license
All	55.9%	24.7%	31.2%
Male	59.9%	24.7%	35.2%
Female	52.0%	24.6%	27.4%
20s	53.3%	26.8%	26.5%
30s	62.5%	29.6%	32.8%
40s	61.0%	29.8%	31.2%
50s	59.1%	24.8%	34.3%
60s	51.5%	19.5%	32.1%
70 or over	37.3%	12.7%	24.6%
Primary school or junior high school	34.9%	16.8%	18.1%
Senior high school	44.3%	23.8%	20.5%
Vocational school	68.7%	27.5%	41.2%
2-year junior college	58.5%	25.5%	33.0%
4-year university	60.1%	25.2%	34.8%
Graduate school	63.1%	20.3%	42.7%
Natural science	65.3%	22.1%	43.3%
Social science and humanities	57.6%	26.4%	31.2%
Other fields	57.7%	22.7%	35.1%

Notes: The sample size is 10,000, including those who are not currently engaged in work. (1) License is composed of certification (2) and monopolistic license (3).

Table 3. Use of Occupational Licenses by Individual Characteristics.

	User			Non-user		
	(1) License	(2) Certification	(3) Monopolistic license	(4) License	(5) Certification	(6) Monopolistic license
All	37.6%	14.9%	22.7%	29.6%	15.6%	14.0%
Male	41.4%	16.3%	25.1%	27.9%	14.0%	13.9%
Female	32.2%	12.8%	19.4%	31.8%	17.8%	14.0%
20s	33.5%	14.1%	19.5%	30.8%	18.4%	12.4%
30s	41.3%	17.1%	24.2%	30.1%	17.6%	12.5%
40s	37.9%	16.9%	21.0%	30.6%	16.8%	13.8%
50s	38.0%	14.3%	23.7%	28.2%	14.2%	14.0%
60s	37.0%	11.8%	25.2%	28.4%	12.1%	16.4%
70 or over	24.1%	6.5%	17.6%	27.8%	8.3%	19.4%
Primary school or junior high school	30.4%	12.6%	17.8%	20.7%	11.9%	8.9%
Senior high school	31.5%	15.0%	16.5%	26.8%	15.6%	11.2%
Vocational school	46.3%	15.6%	30.7%	31.8%	17.2%	14.6%
2-year junior college	35.4%	14.1%	21.3%	33.8%	16.4%	17.4%
4-year university	38.8%	15.3%	23.6%	29.8%	15.3%	14.5%
Graduate school	42.0%	12.3%	29.8%	30.9%	15.5%	15.5%
Natural science	47.1%	14.8%	32.3%	29.1%	13.9%	15.2%
Social science and humanities	34.2%	15.0%	19.2%	30.7%	16.2%	14.5%
Other fields	42.0%	13.4%	28.6%	26.9%	15.1%	11.8%

Note: Sample comprises those who are engaged in work (N=6,579).

Table 4. Use of Occupational Licenses by Industry and Type of Employment.

	User			Non-user		
	(1) License	(2) Certification	(3) Monopolistic license	(4) License	(5) Certification	(6) Monopolistic license
Agriculture, forestry, and fishery	31.3%	17.9%	13.4%	22.4%	13.4%	9.0%
Construction	62.6%	21.5%	41.1%	22.6%	7.3%	15.4%
Manufacturing	24.4%	14.4%	10.0%	35.6%	20.2%	15.5%
Information and communications	30.4%	24.6%	5.7%	38.9%	25.0%	13.9%
Transport	48.6%	18.7%	30.0%	24.5%	12.8%	11.7%
Wholesale and retail	18.6%	9.4%	9.2%	31.4%	17.5%	13.9%
Finance and insurance	46.7%	23.0%	23.7%	28.9%	16.7%	12.2%
Real estate	40.4%	7.6%	32.7%	29.2%	13.5%	15.8%
Accommodations and restaurants	13.8%	6.4%	7.4%	34.0%	20.7%	13.3%
Medical, health care and welfare	77.0%	19.2%	57.8%	16.7%	8.0%	8.8%
Education	56.2%	14.7%	41.5%	24.0%	11.7%	12.4%
Services, NEC.	33.3%	14.5%	18.8%	30.4%	15.6%	14.8%
Government	27.9%	10.8%	17.1%	34.5%	14.6%	20.0%
Other industries	27.8%	9.3%	18.5%	31.3%	19.2%	12.1%
[Whole services]	40.4%	15.2%	25.3%	28.2%	15.1%	13.1%
Executive of company	50.1%	16.5%	33.7%	21.1%	9.0%	12.1%
Self-employed	43.6%	14.0%	29.6%	25.5%	11.4%	14.1%
Family-worker	33.6%	13.8%	19.8%	24.1%	13.8%	10.3%
Standard employee	44.5%	18.5%	26.0%	28.8%	15.0%	13.8%
Part-time employee	22.7%	9.3%	13.3%	33.9%	19.4%	14.4%
Temporary employee	14.5%	5.5%	9.0%	34.8%	17.7%	17.2%
Temporary agency workers	16.2%	10.3%	5.9%	34.6%	22.2%	12.4%
Contract employee	30.8%	11.0%	19.8%	31.9%	18.8%	13.1%
Entrusted employee	29.7%	10.9%	18.8%	39.1%	19.5%	19.5%

Note: Sample comprises those who are engaged in work (N=6,579).

Table 5. Differences in Labor Participation Rates by Occupational License Holding.

		(1)	(2)	(3)	(4)	(5)	(6)
		Non-holder	Holder	Certification	Monopolistic license	(2) - (1)	(4) - (1)
Male	20s	65.5%	90.6%	87.2%	95.2%	25.1%	29.8%
	30s	83.2%	96.3%	96.8%	96.3%	13.0%	13.1%
	40s	87.0%	96.5%	95.8%	97.5%	9.4%	10.4%
	50s	87.7%	95.9%	95.2%	96.8%	8.3%	9.2%
	60s	50.9%	65.2%	60.1%	69.6%	14.3%	18.7%
	70 or over	17.9%	25.0%	28.0%	26.1%	7.1%	8.2%
	Total	66.5%	84.8%	84.9%	86.0%	18.3%	19.5%
Female	20s	57.9%	77.8%	75.6%	82.5%	19.9%	24.6%
	30s	60.5%	71.1%	67.3%	78.0%	10.6%	17.6%
	40s	63.1%	76.5%	72.6%	83.1%	13.4%	20.0%
	50s	57.4%	70.6%	69.0%	73.4%	13.2%	16.0%
	60s	23.9%	42.5%	43.7%	43.8%	18.6%	19.9%
	70 or over	13.5%	24.2%	7.7%	31.4%	10.8%	18.0%
	Total	44.4%	63.7%	63.4%	66.2%	19.3%	21.8%
	All	54.3%	74.8%	65.6%	77.2%	20.5%	22.9%

Note: The sample size is 10,000 including those who are not currently engaged in work.

Table 6. Holding of Occupational Licenses and the Probability of Labor Participation.

	Probability of working		Probablity of standard work	
	(1) Male	(2) Female	(3) Male	(4) Female
Certification	10.5% ***	13.7% ***	13.2% ***	10.2% ***
	(0.0114)	(0.0171)	(0.0164)	(0.0157)
Monopolistic license	15.0% ***	21.5% ***	21.0% ***	17.9% ***
	(0.0109)	(0.0169)	(0.0152)	(0.0163)
Age	yes	yes	yes	yes
Education	yes	yes	yes	yes
Observations	4,934	5,066	4,934	5,066

Notes: Probit estimation results indicating marginal effects. The figures in parentheses are the standard errors. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The reference category is the non-holder. The “standard workers” include standard employees, executives of companies, and the self-employed.

Table 7. Holding and Use of Occupational Licenses and Earnings.

	(1) Male	(2) Male	(3) Female	(4) Female
Certification user	0.1741 ***	0.0740 ***	0.1153 ***	0.0048
	(0.0327)	(0.0291)	(0.0430)	(0.0387)
Monopolistic license user	0.2955 ***	0.1933 ***	0.2461 ***	0.1070 ***
	(0.0307)	(0.0278)	(0.0425)	(0.0407)
Certification non-user	0.0161	0.0231	-0.0120	-0.0025
	(0.0345)	(0.0304)	(0.0378)	(0.0337)
Monopolistic license non-user	0.0897 ***	0.0821 ***	-0.0195	-0.0456
	(0.0339)	(0.0299)	(0.0410)	(0.0367)
Age	yes	yes	yes	yes
Education	yes	yes	yes	yes
Industry	yes	yes	yes	yes
Occupation	no	yes	no	yes
Employment type	no	yes	no	yes
Weekly working hours	yes	yes	yes	yes
Observations	3,821	3,821	2,758	2,758
Adj-R^2	0.3179	0.4707	0.4215	0.5426

Notes: OLS estimation results with standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8. Different Wage Premiums between Users and Non-users of Licenses.

	(1) Male	(2) Male	(3) Female	(4) Female
A. Certification	0.1581	0.0510	0.1274	0.0073
B. Monopolistic license	0.2058	0.1112	0.2656	0.1526
C. B - A	0.0477	0.0602	0.1382	0.1453

Notes: Calculated from the estimation results reported in Table 7. Columns (2) and (4) are the results using occupations and employment types as additional control variables.

Table 9. Wage Premiums of Occupational Licenses by Employment Type.

A. Male	(1) Executive of companies	(2) Self-employed	(3) Standard employee	(4) Non-standard employee
Certification user	0.0528	0.4027 ***	0.0375	0.1400
	(0.1065)	(0.1393)	(0.0286)	(0.0964)
Monopolistic license user	0.2591 ***	0.5491 ***	0.0977 ***	0.3514 ***
	(0.1003)	(0.1128)	(0.0284)	(0.0814)
Certification non-user	0.0599	0.1111	0.0115	-0.0224
	(0.1497)	(0.1566)	(0.0310)	(0.0711)
Monopolistic license non-user	0.2703 **	0.1895	0.0822 ***	0.0247
	(0.1201)	(0.1364)	(0.0308)	(0.0730)
Observations	299	491	2,308	689
B. Female	(1) Executive of companies	(2) Self-employed	(3) Standard employee	(4) Non-standard employee
Certification user	-0.1313	-0.1101	0.0708	0.0148
	(0.3738)	(0.2144)	(0.0445)	(0.0569)
Monopolistic license user	0.1354	-0.0119	0.1459 ***	0.1740 ***
	(0.2774)	(0.2277)	(0.0456)	(0.0566)
Certification non-user	0.1733	-0.3343	-0.0157	-0.0061
	(0.2902)	(0.2240)	(0.0462)	(0.0418)
Monopolistic license non-user	0.1433	0.0898	-0.0463	-0.0646
	(0.3093)	(0.2176)	(0.0469)	(0.0477)
Observations	90	195	986	1,405

Notes: OLS estimation results with standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The explanatory dummy variables included are age, education, industry, and weekly working hours. Non-standard workers are part-timers, temporary employees, temporary agency workers, contract employees, and entrusted employees.