Trends in Occupational Segregation by Gender in Japan: The Role of Oopulation Aging and Changes in Retirement Age

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Introduction

Occupational segregation by gender has long been a concern because it is a major cause of gender wage inequality in developed societies (Levanon et al. 2009; Petersen and Morgan 1995). Past studies have examined the causes and trends of occupational segregation by gender (Bianch and Rytina 1986; Blau et al 2013; Reskin et al. 1999; Weeden 1998).

In this study, we examine an understudied, but potentially important aspect of demographic change which may affect the trend of occupational segregation by gender - population aging. Industrial societies have seen not only an increase in elderly population, but also growing older-age labor force participation. Changes in age composition are thought to affect occupational distribution because age of workers might be strongly related to their occupational choice following two reasons. First, in societies where compulsory retirement system is widely adopted, occupational distribution significantly differs between before and after the retirement age. Second, even among working age population, age may matter for the occupational choice, especially in societies with seniority system which restricts younger population to be employed as managerial and administrative occupations.

Despite the potential importance of changes in age structure on the occupational distribution, previous studies did not necessarily focus on the possible heterogeneity of occupational structure by age. Moreover, some studies even limited their sample to working age population (Blau et al. 2013; Levanon et al. 2009). However, focusing on working age population ignores the growing older-age labor force and thus the restriction is increasingly less desirable to represent population in the labor market. Therefore, using a case which experiences one of the most dramatic increase in elderly workers in affluent countries, Japan, we reveal to what extent an increase in these population in the labor market contributes to changes in occupational segregation by gender over time.

Japanese contexts

Japan is a particularly interesting case to examine the impact of population aging on

occupational segregation by gender following three reasons. First, in Japan, not only the prevalence of elderly population has dramatically increased over the decades, the labor force participation rate is also higher than in other developed countries (OECD 2018). The latest governmental statistics show that 11.3% of workforce is explained by people aged 65 and over (Cabinet Office 2017) and the proportion of elderly population is projected to increase in the coming decades (NIPSSR 2017: 7) as Figure 1 shows.

[Figure 1 about here]

Second, retirement age system has been widely adopted among Japanese companies. Thus, the occupational structure is expected to be different between working age population and elderly population. In the past, the retirement age was about 55 years old. To increase the labor force participation among elderly population, Act on Stabilization of Employment of Elderly Persons was enforced in 1998 to extend the compulsory retirement age to 60 years old and above. Since then most firms and organizations have adopted 60 years old as the timing of retirement and retirees could be reemployed in their firms as part-time employees after age 60. As the Figure 2 presents, in 2000s and after the retirement age has been 60 years old in most Japanese companies.

[Figure 2 about here]

Third, the seniority system has been dominant in the Japanese labor market (Lincoln and McBride 1987) and it has not changed in recent years (Kambayashi and Kato 2017), which suggests that the occupational structure also depends on age groups in the working age population. For instance, Brinton and Ngo (1993), using a comparative study between Japan and the United States, argued that managerial and administrative occupations are more dominated among older population in Japan than in the U.S because of the late promotion to managerial position (Ishida et al. 2002). Importantly, since these managerial and administrative occupations are male

dominated, occupational segregation by gender is stronger in older ages than in younger ages in Japan (Brinton and Ngo 1993; Charles et al. 2004). Particularly, Brinton and Ngo (1993) presented that the index of segregation dramatically declines after age 65 in unskilled blue-collar occupations.

Research question and hypotheses

These studies suggest that the degree of segregation is lower among older population than in younger population in Japan, and growing contribution of older population in the labor market contributes to a decline in the occupational segregation. However, to our best knowledge, no studies examined this question based on empirical data. Is the degree of occupational segregation by gender different between before and after the retirement age? How does the population aging affect the degree of occupational segregation in the total population? Do the recent changes in employment practice, including an extension of the retirement age and increase in re-employment of retirees, decrease the negative impact of the older age population on occupational segregation by gender? In order to answer those research questions, therefore, we examine the role of population aging on trends in occupational segregation by gender in Japan.

In this study, we examine the following hypotheses. First, as prior studies on occupational segregation by gender argued, occupational segregation becomes stronger as age increases among working age population (Hypothesis 1). In contrast, among retirement age population, since male workers in a managerial position are retired and they are hired in a less segregated occupation, we expect to see the occupational segregation among this groups is lower than that of working age population (Hypothesis 2). As the retirement age is extended, however, occupational segregation among retirement age group is closer to that of working age population in recent years (Hypothesis 3). If the hypothesis 4 is correct, we also expect to see that population aging contributes to growing occupational segregation among working age population (Hypothesis 4), but it contributes to reducing segregation when we include the retirement age population (Hypothesis 5). If the hypothesis 3 is correct and occupational segregation among retirement age group is closer to that of working age population in recent years, we expect that the hypothesis 5

will not be supported.

Data and Methods

We use publicly available National census data, which was conducted every five years from 1985 to 2015.[1] We could add older census data to the analysis, but Census Bureau does not provide online databases for censuses before 1985. In this study, therefore, we present trends using older classification from 1985 to 2015. Aggregated census data used for analysis was obtained from government's website (https://www.e-stat.go.jp/). We divided the population into the following four groups: 15-29, 30-44, 45-59, and 60 and over.

Using detailed classification of occupational title, we are able to examine trends in occupational segregation at minor classification level. Although occupational classification of national census referred to the Japanese Standard Occupational Classification, each census added minor changes to the classification. Thus, we constructed a harmonized classification scheme that enables us to examine in trends in occupational segregation by gender over time. The occupational titles in these censuses are reclassified to 164 categories. [2]

To show the trends in occupational segregation, we used Duncan's dissimilarity index (Duncan and Duncan 1955). Suppose the number of female (male) workers in occupation j in time t is defined as F_{jt} (M_{jt}), then the dissimilarity index can be expressed as a sum of absolute difference between the proportion of female workers in a given occupation (F_{jt} / F_t) and that of male workers (M_{jt} / M_t).

$$D_t = \sum_{j=1}^{J} \left[100 \times \frac{1}{2} \times \left| \frac{F_{jt}}{F_t} - \frac{M_{jt}}{M_t} \right| \right]$$

Analytical strategy in this study is as follows. First, we examine an overall trend in

[1] One concern to cover the periods is that the Census Bureau of Japan conducted a huge occupational classification reform in 2009. Following the reform, occupational classification used in 2005 census is significantly different from 2010 and 2015 censuses.

[2] In the analysis, we omitted occupation titled "unclassified occupations."

occupational segregation by gender. Second, we look at trends in segregation by age groups. Third, we identify a contribution of population aging to changes in occupational segregation by comparing observed trends with that of counterfactual trends which keep population distribution constant over time.

Results

First, Figure 3 describes trends in occupational segregation by gender. Y axis on the left shows absolute value of segregation index, while the axis on the right shows % change from 1985. This figure presents that the occupational segregation increased from 1985 to 1995, and then it has declined over 20 years. In terms of % change compared with the value in 1985, the index in 2015 decreased by 4.27%.

Next, Figure 4 breaks the overall trends by age group. This figure clearly shows that the degree of occupational segregation in older age population (60 and over) is lower than that of working age population. Among the working age population, as expected the dissimilarity index is mostly higher in age 45-59 than other groups, except for young age group (15-29 years old) in 1980s and 1990s. This figure also presents that the trend of occupational segregation by gender is not stable. Particularly, the dissimilarity index among older age population gradually increases and converges to that of working age population, while that of young age group has declined dramatically over the decades. Although this study uses four age groups, we also presents trends among age 60-64 group, since this group, in which people are thought to experience retirement a few years ago, shows the most remarkable contrast with the working age population. Occupational segregation among this groups is higher than that of widely defined elderly population. Thus, it is fair to say that its occupational segregation is much similar to that of working age population, especially in recent years, which reflect a recent change in the retirement age. In terms of % change, the trend itself is largely similar to that of 60 and over. In contrast to the group of 60 and over, however, its occupational segregation suggests a declining trend in 2010s.

[Figure 3 about here]

[Figure 4 about here]

Next, we examine whether an increase in older age population in labor market contributes to decreasing occupational segregation in the total population. Figure 5 presents the result. As we saw in Figure 3, the dissimilarity index declined by 4.27% from 1985 to 2015. However, over the decades the prevalence of older population has increased from about 11.96% in 1985 to 21.59% in 2015, as Figure 5 shows. This figure presents two counterfactual results. Blue dashed line shows the result which makes the distribution of entire age group constant between 1985 and 2015, and the yellow dashes line only controlled the distribution of age 60 and over. An overall counterfactual attempts to identify the impact of population aging in general, and a counterfactual analysis superficially for elderly population aims to detect the impact of retirement. Both results show that counterfactual segregation index is higher than observed result. The index for overall counterfactual declined by 1.82% in 2015, while the decline for the specific counter factual was 3.10%, compared with the segregation index in 1985. As we saw in Figure 4, the occupational segregation among ages 60 and over is generally lower than other age groups. Therefore, we can conclude that an increase in this population contributed to an overall decline in occupational segregation. As Figure 5 shows, the counterfactual trends are almost identical in 1980s, 1990s, and early 2000s, which suggests that contribution of changes in age group distribution is driven by those who aged 60 and over. Actually, as Figure 4 indicates, occupational segregation index among working age population is much similar compared with its contrast with the elderly population. Although not shown, there has been a decrease in the younger population, which has relatively higher segregation index during these periods. Thus, when we make the population distribution of entire age group constant, the decrease in younger age population offset with the increase in of middle and older age population. Two counterfactual results, however, suggests a divergence in recent periods. This is because the occupational segregation among those

who aged 60 and over has converged to other age groups although its degree is still lower, which makes the contribution of changing age distribution more comparable to the observed results.

To better understanding which occupational group is a driver of the effect of population aging on decline in occupational segregation, Figure 6 and 7 present proportion of major occupational groups by periods, age, and gender. Figure 6 shows results of female workers and Figure 7 shows that of male workers. Changes in occupational distribution is remarkable among women rather than men. In particular, there has been a dramatic decline in agricultural workers among the group of 60 and over, from 34.73% in 1985 to 11.32% in 2015, while the proportion of clerical (from 7.79% to 17.56%) and service (from 11.57% to 22.33%) have increased by about 10% during the same period. The gender segregation in these agricultural occupations are generally lower than that of clerical or service workers in Japan, especially at older ages, which suggests that the recent increase in segregation among those who aged 60 and over is caused by changing occupational composition, that is, decline in agricultural jobs and increase in service and clerical related jobs.

Discussion

This study investigated trends in occupational segregation by gender in Japan focusing on the role of population aging. Occupational choice is age dependent, especially in societies with retirement age system. After retirement, elderly people opt out of the labor market, or seek a new occupation that is physically less intensive or enough flexible to balance work and life. These occupations are generally neither professional or manual, both of which are thought to be gender segregated. Thus, occupational segregation at older ages are lower than that of working age population. This age dependent nature led us to examining the contribution of population aging for the trends in occupational segregation.

Results indicated that occupational segregation by gender has decreased over time, and population aging contributed to the decline, which supported hypotheses in this study. Occupational segregation is related to age, but the relationship differs between before and after

retirement. Occupational segregation becomes higher as people age before retirement, while segregation among older ages after retirement is lower than that of working age population, which supported the hypothesis 1 and 2. As the retirement age extended, however, occupational distribution among this older age groups is increasingly similar to the distribution among working age population, supporting the hypothesis 3. Counterfactual analysis supported the hypothesis 5, which expected that an increase in retirement age population contributed to declining trends in occupational segregation, while the hypothesis 4 was not supported because there was no net effects of changing age composition among working age population.

Given the size of changes in occupational segregation by gender over 30 years, the contribution of population aging is not small to explain the overall trends. Importantly, the perspective on population aging is applicable to other affluent countries which also experienced an increase in elderly workers. As healthy life expectancy increases, people who are retired from their occupation have more exposure to re-employment. Thus, population aging is increasingly a crucial aspect we need to think about when applying a demographic perspective to understanding the labor market outcomes. By applying this perspective to occupational segregation by gender, this study added a new aspect, population aging, to explaining trends in occupational segregation by gender.

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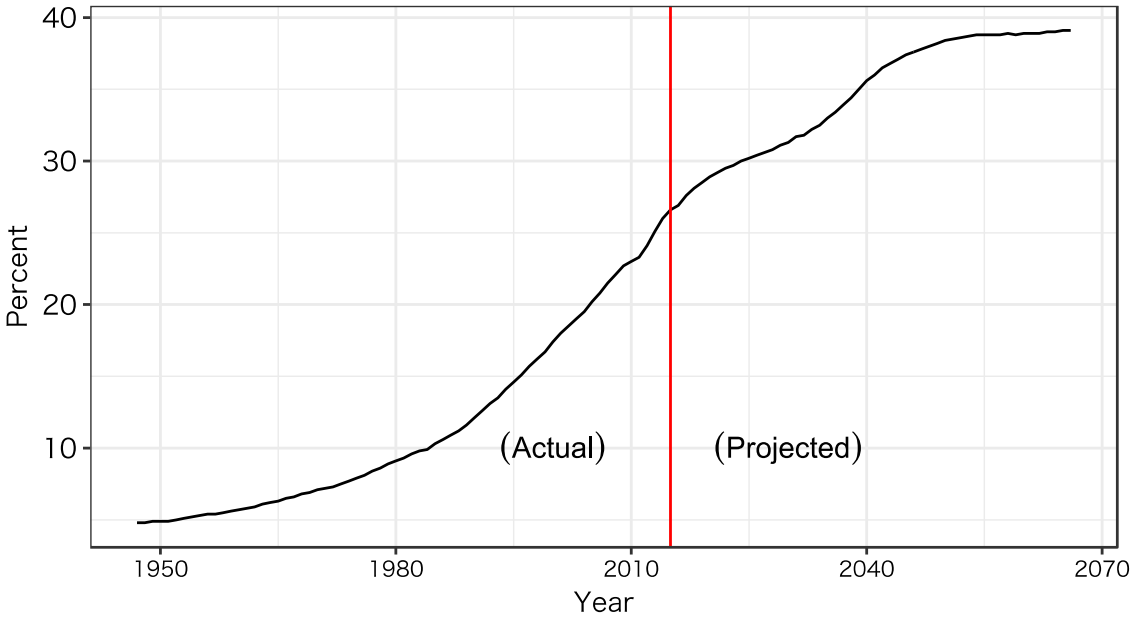

Figure 1. Trends in the proportion of elderly (aged 65 and over, overall): Medium-fertility and mortality settings

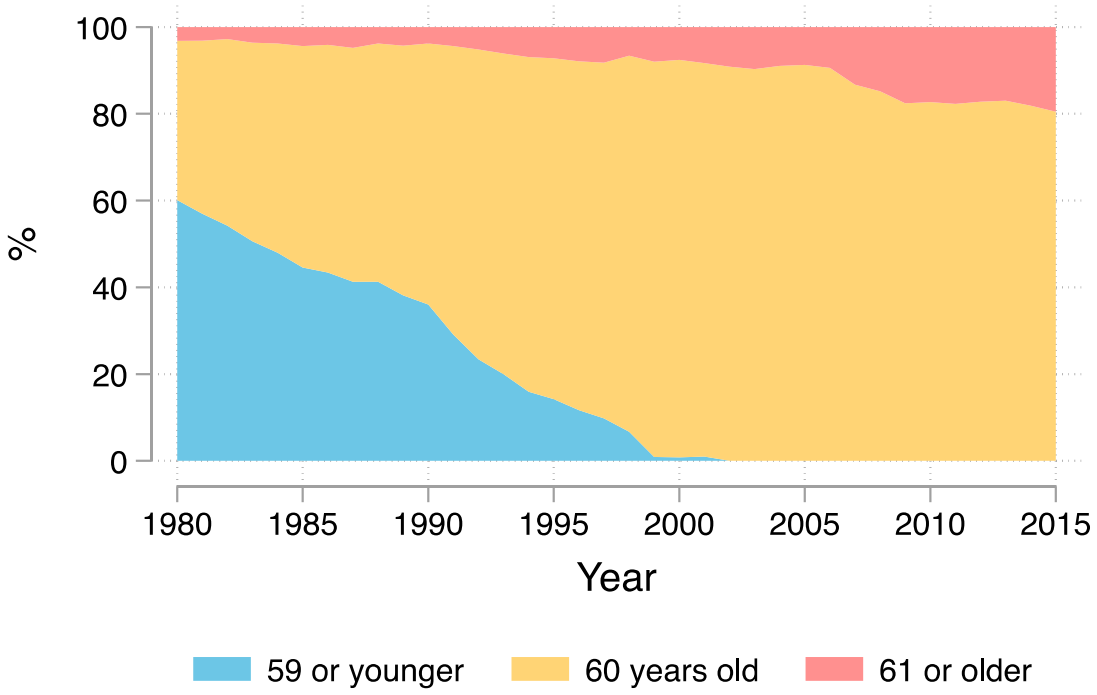

Figure 2. Changes in retirement age among Japanese companies

Source: Survey on Employment Management (before 2004) and General Survey on Working Conditions (since 2005), conducted by Ministry of Health, Labour and Welfare in Japan.

Notes: The Target population in this survey is the private enterprises with more than 30 regular workers at the headquarters. It had changed to private companies with more than 30 regular workers at the whole company in 2008, and changed to include private companies in the compound service industry, medical corporation, social welfare corporation, and various cooperatives in 2015.

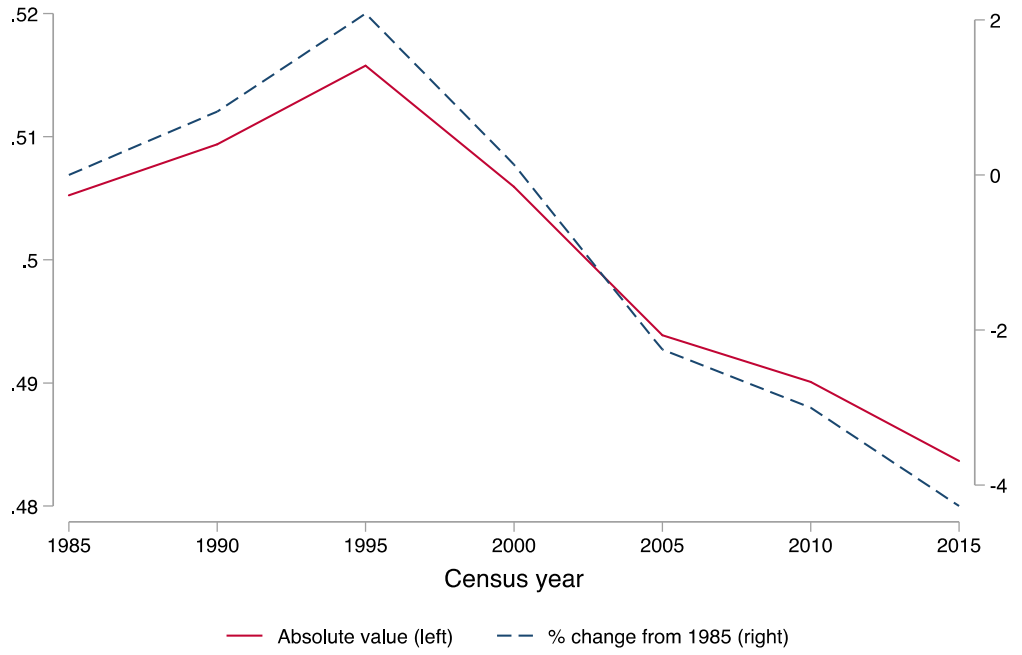

Figure 3. Trends in occupational segregation by gender

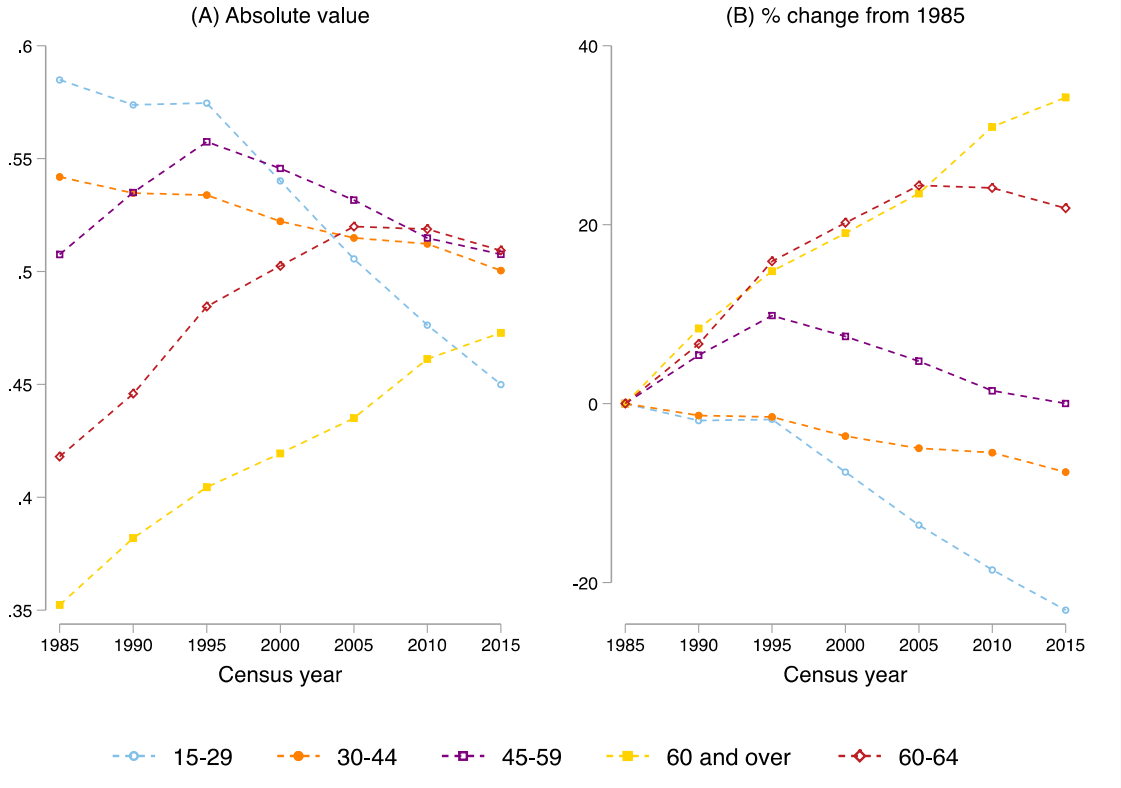

Figure 4. Trends in occupational segregation by gender and age

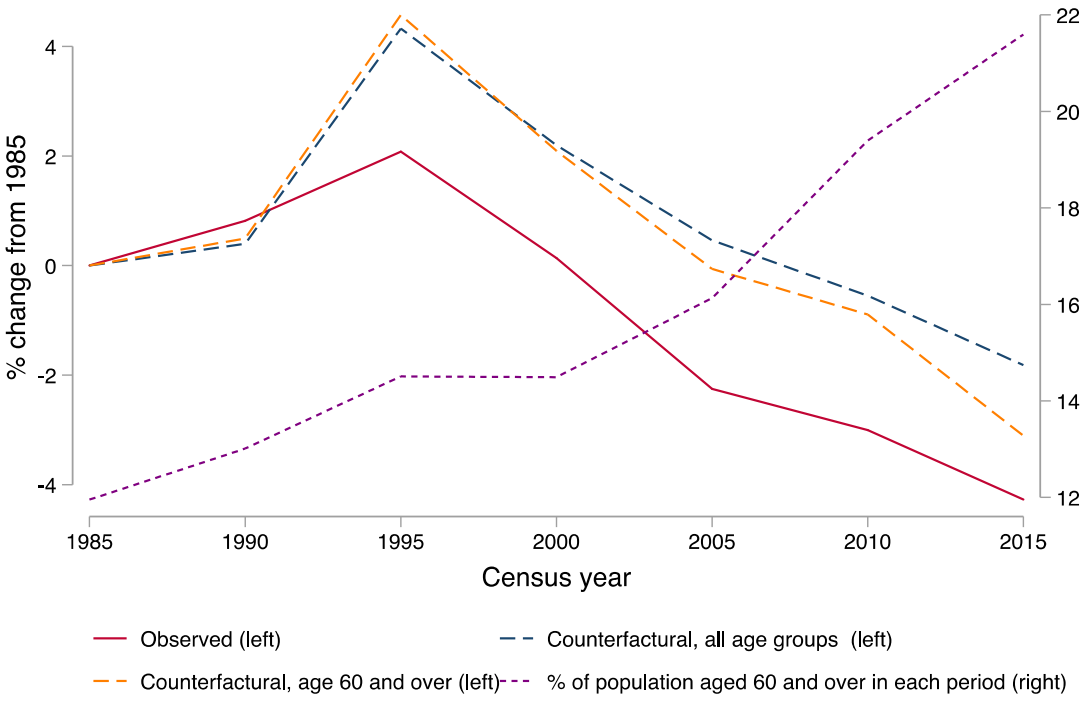

Figure 5. Results of counter factual analysis

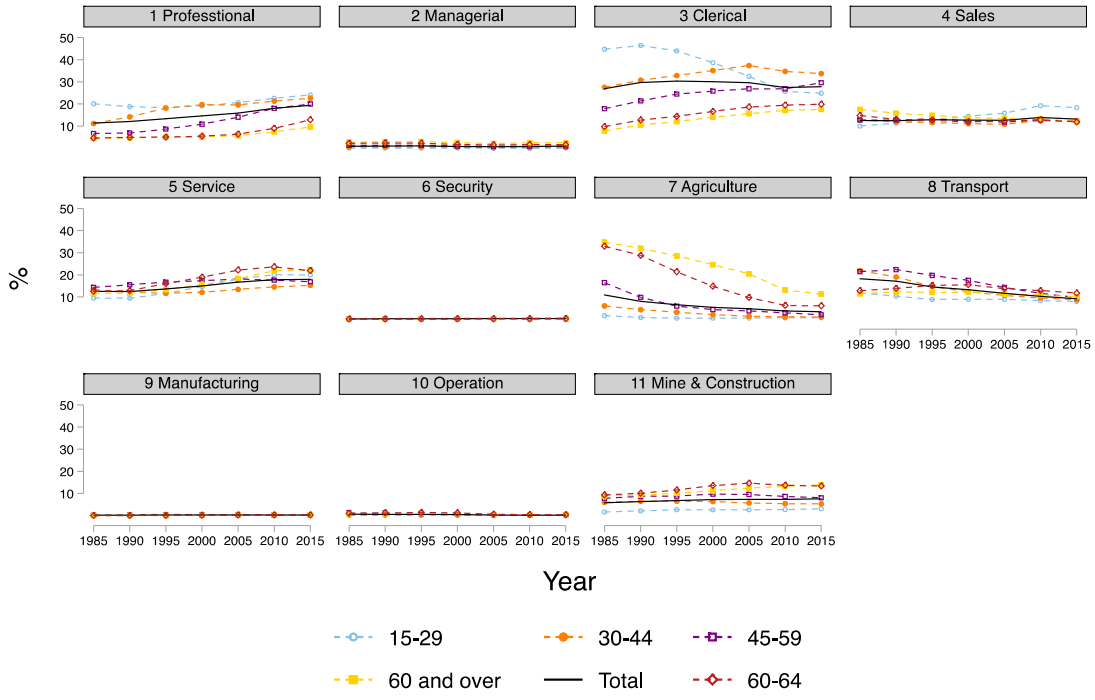

Figure 6. Proportion of major occupations by age groups (female)

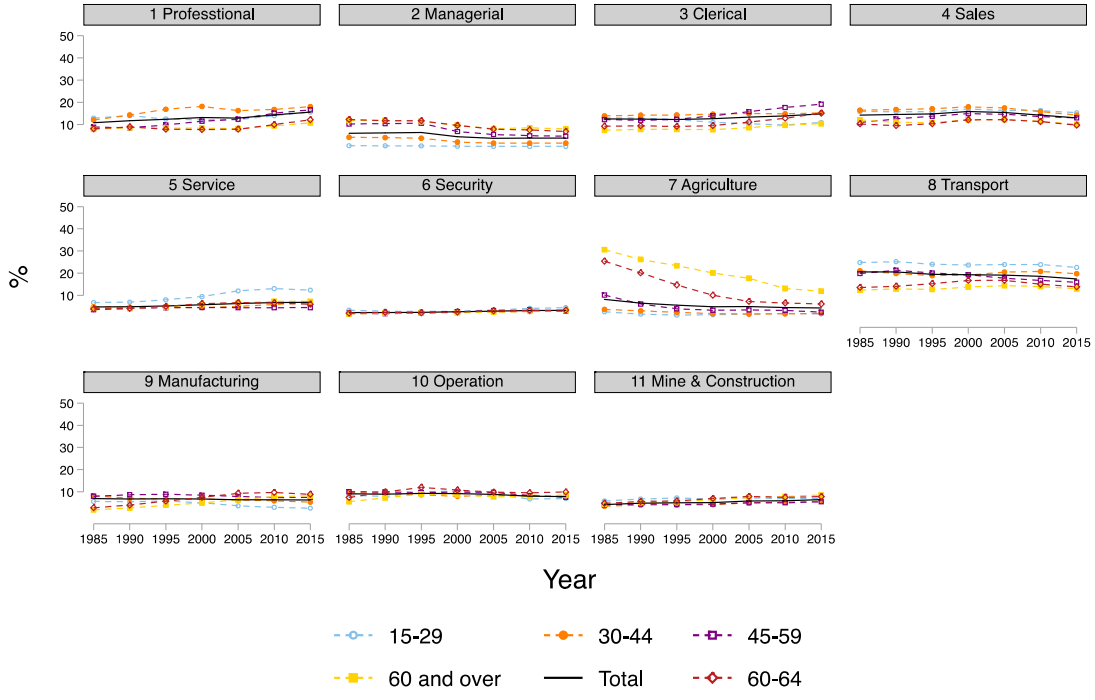

Figure 7. Proportion of major occupations by age groups (male)