International Journal of Social Science and Economic Research

ISSN: 2455-8834

Volume:08, Issue:01 "January 2023"

TIME-SERIES ANALYSIS OF FEMALE EMPLOYMENT IN JAPAN

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DOI: 10.46609/IJSSER.2023.v08i01.002 URL: https://doi.org/10.46609/IJSSER.2023.v08i01.002

Received: 5 Jan. 2023 / Accepted: 25 Jan. 2023 / Published: 31 Jan. 2023

ABSTRACT

In Japan, the declining birthrate and an aging population have made the labor supply by women very important. Numerous studies have analyzed the choice of women in having children or continuing to work. These studies provide very important insights into the employment choices of Japanese females. However, they mainly use micro data and focus only on specific time points. In this study, we investigate the effects of the average income, tax rate, and rate of advancement to university on employment behavior among Japanese women using time-series data. The results of multiple regression analyses suggest that male regular employment rate, average annual household income, female university advancement rate, and consumption tax rate have different effects on regular and non-regular employment rates of Japanese women. The male regular employment rate has positive effects on female regular employment rate, but it has no effect on female non-regular employment rate. The high household income seems to reduce the probability of women working as non-regular workers but does not seem to reduce the probability of them working as regular workers. The consumption tax rate has effects only on female non-regular employment rate. A high consumption tax rate promotes the female labor supply as non-regular workers.

Keywords: Female labor supply, Time-series data, Employment rate, Consumption tax rate, Japan

1. Introduction

In Japan, the declining birthrate and an aging population have made the labor supply by women very important. Figure 1 depicts the change in the percentages of women as regular and non-regular employees across the years. Until 2014, the percentage of regular employees was about

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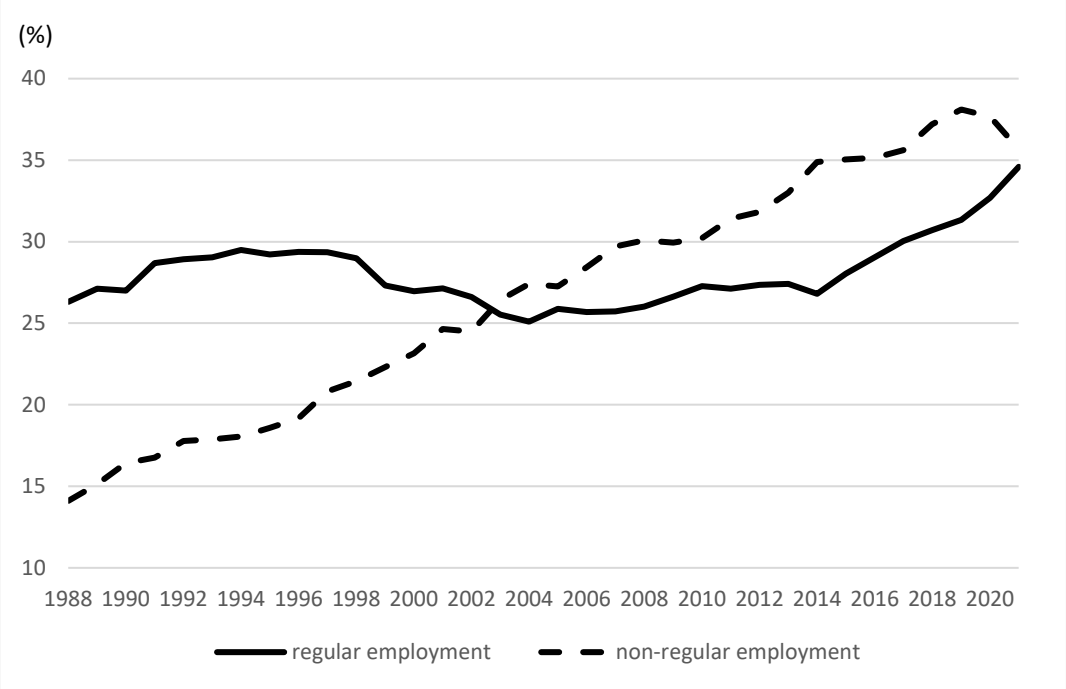
25%. Since then, this percentage has increased. In recent years, it has been around 35%. The percentage of non-regular employees was very low in 1988, at 15%. However, unlike the percentage of regular employees, that of non-regular employees has consistently increased. The percentage of women working in regular or non-regular employment was about 70% in 2020.

Figure 1. Percentage of female workers as regular and non-regular employees



Source: Statistics Bureau, Ministry of Internal Affairs and Communications [1]
Statistics Bureau, Ministry of Internal Affairs and Communications [2]

Before the labor supply by women increased in Japan, an M-shaped curve was obvious. According to the Japan Institute for Labour Policy and Training [3], many Japanese women quit working after marriage or childbirth temporarily. After their children enter kindergarten or elementary school, they re-enter the job market. As a result of this work pattern, the Japanese female labor force participation rate resembles an "M." However, as pointed out by Seike and Kazekami [4], in recent years, the M-shaped curve has become gentler.

As shown in Figure 2, the average annual income has not increased but rather decreased after the collapse of the financial bubble in the 1990s.This period of long-term economic slow down has been dubbed "the lost three decades" in Japan. Considering the household budget, it is conceivable that women do not have a choice but to work to compensate for the decrease in men's income.

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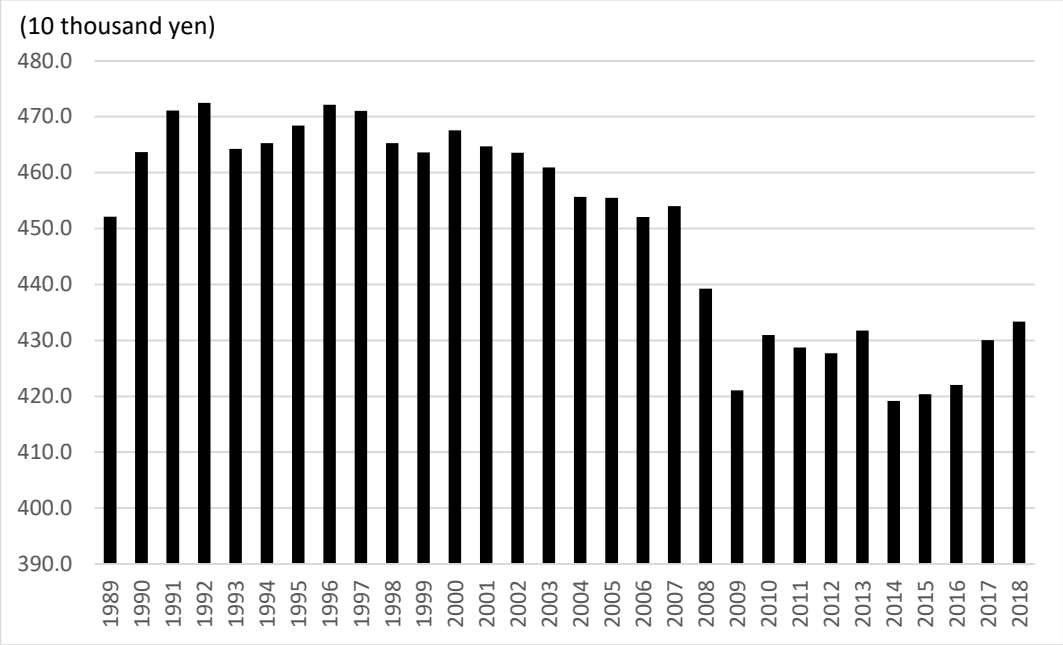
We display the changes in the ratio of life courses planned by Japanese women in Figure 3. It is believed that women plan to continue working to utilize the accumulation of human capital as the number of women going on to university increases.[1]However, a certain percentage of those planning on becoming full-time homemakers also exist. It can be seen that the percentage of those who plan to balance marriage and a career is increasing. However, do women who plan to balance marriage and a career desire to continue work because they like to work? This may be because there is no prospect of an increase in her husband's annual income, the increasing burden of taxes and social insurance premiums because of the declining birth rate and aging population, and the education costs of her children because of the popularization of university education.

Figure 2. Average annual income (real values)



Source: Ministry of Health, Labour and Welfare [6]

According to the National Tax Administration Agency [7], Japan introduced a 3% consumption tax in 1989, increasing it to 5% in 1997, 8% in 2014, and 10% in 2019. Moreover, as indicated by the Ministry of Finance [8], the national burden rate, which is the ratio of the mandatory public burden, including the tax and social security burden, to national income, was 48% in 2021. These facts indicate that disposable income further decreases. To make matter worse, as per the Japan Student Services Organization [9], the rate of receiving education loans among

[1]See Maruyama [5] for detail.

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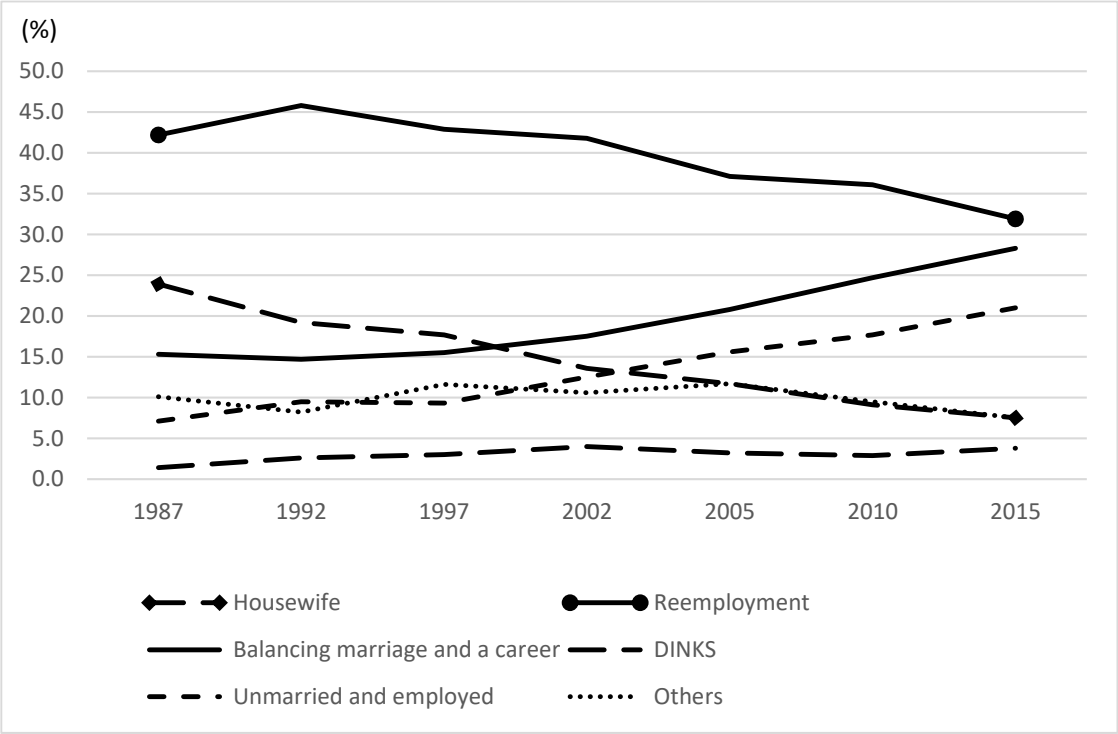
university students is as high as 49.6%.Hence, it can be anticipated that the number of women who will have to work in the labor market to pay off education loans after graduating from university is increasing.[2]

Figure 3. Life course that is likely to be realized, not ideal



Source: Ministry of Health, Labour and Welfare [6]

Notes: "Reemployment" means withdrawing from employment because of marriage or birth, and working again after caring for the child.

"DINKS" means married but continuing to work for life without having a child.

Thus, we investigate the effects of the average income, tax rate, and rate of advancement to university on employment behavior among Japanese women using time-series data. The rest of this paper is organized as follows. The relevant literature is discussed in Section 2. The data and variables used in estimations are described in Section 3, and the estimation results are presented in Section 4. Finally, Section 5 summarizes the major findings.

2. Literature Review

[2]According to National Council of Workers' Welfare [10], the average borrowing amount is 3.24 million yen.

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In this section, we review previous studies that have investigated employment behavior among Japanese women.

Maruyama [5]hypothesized that highly educated people with high human capital are likely to continue working after childbirth to earn a high income.[3] However, using micro data, she revealed that Japanese women with high education did not return to work after childbirth. Moreover, she found that although the Equal Employment Opportunity Law encouraged unmarried women to enter the workforce, it had no significant effect on the continuation of employment for married women. From the estimation results of logistic regressions, she stated that the husband's annual income did not have a significant effect on whether the wife would continue working after the birth of the first child; however, a woman who lived with her parents was 4.4 times more likely to work.

Hirao [11] used micro data from the School Distinct Survey of 819 mothers of fourth and fifth graders. Her results suggest that education had negative effect on the rate of returning to the labor market because highly educated women tend to marry men with high incomes. In other words, women who married men with high income do not have to work. She also found that this effect is stronger among four-year college graduates.

Kanomata [12] also used micro data based on women born in 1935-1995 and tested the theses of gender division of labor, work and family balance, and discriminatory employment by employers. He revealed that while the gender division of labor hypothesis applied to Japanese women, the theses of work and family balance and discriminatory employment by employers did not apply to the Japanese women born in 1935-1995. From these results, he argued that many women born in 1935-1995 had no job according to the norms of gender division of labor.

Nishimura [13] revealed that career interruption during child rearing produces a larger wage differential for a highly educated married couple than that for a poorly educated one. She stated that for highly educated women, part-time work widens the wage gap between them and their husbands, and since there are few rewarding jobs, they end up not choosing to work.

These existing studies provide very important insights into the employment choices of Japanese women. However, they mainly used micro data and focused only on specific time points. Using cross-section data can not include the effect of macroeconomic indicators because all survey respondents face the same values of macroeconomic indicators simultaneously. In this study, we investigate the effects of macroeconomic indicators such as consumption tax rate and the male non-regular employment rate on female employment rate by using time-series data. In the next section, we explain the data using regression estimations.

[3]Nishimura [13] also suggested the same hypothesis.

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3. Data

For our estimations, we use aggregated macro data published by the Japanese government. For the data on female employment rates, we use regular or non-regular employment rates as a dependent variable from *Labour Force Survey* and *Population Estimates*, both published by Statistics Bureau, Ministry of Internal Affairs and Communications.[4]

To verify the effects of the husbands' income as indicated in previous studies, we adopt rates of male regular employment and lagged average annual household income. The data of average annual household income are available from Ministry of Health, Labour and Welfare [14].

The data of rate of advancement to four-year university of women is published by the Ministry of Education, Culture, Sports, Science and Technology [15]. The values of consumption tax rate are as follows: 0% before 1989, 3% from 1989 to 1996, 5% from 1997 to 2013, 8% from 2014 to 2018, and 10% from 2019. Table 1 reports the descriptive statistics used to analyze the Japanese female employment rate. Using these data, we estimate the following equation.

$$\begin{aligned} &Female\ Employment\ Rate_t \\ &\quad = \beta_0 + \beta_1 Male\ Employment_t + \beta_2 Annual\ Income_{t-1} \\ &\quad + \beta_3 Consumption\ Tax_t + \beta_4 Female\ University\ Rate_t + \varepsilon \end{aligned} \tag{1}$$

A high, regular employment rate for men might mean that Japanese economy is prospering. If so, demand for regular employment for women also increases and the coefficient of regular employment rate for men becomes positive. However, if male regular employment increases, women might not have to work as regular workers. Thus, the sign of the coefficient of regular employment rate for men is in determinant.

As previous studies argued, high annual household income might reduce the labor supply of women. So, the sign of the coefficient of average annual household income is probably negative. However, because high consumption tax rate reduces disposable income and encourages female labor supply, we expect that the coefficient of consumption tax rate is positive. As stated in Section 1, we expect the coefficient of university advancement rate to be positive because high university advancement rate means that many students use education loans and must pay them back.

[4]To calculate the regular and non-regular employment rate of women, we first subtracted the number of women aged above 65 years from the number of women aged above 15 years. Second, we also subtracted the number of women who go to school from these. This value is used as a denominator and the number of regular or non-regular female workers under 65 years old is used as a numerator.

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Table 1. Descriptive statistics

Variables	Observation	Mean	Std. dev.	Min	Max
regular employment rate (female)	33	27.87	1.80	25.09	32.69
non-regular employment rate (female)	33	26.37	7.36	14.11	38.11
regular employment rate (male)	33	63.50	2.29	59.66	67.25
average annual household income (lag)	31	588.44	45.48	528.90	664.20
consumption tax rate	33	5.12	2.18	0	10
university advancement rate (female)	33	34.67	12.28	14.40	50.90

4. Estimation Results

We use the multiple regression analysis to estimate equation (1). First, we show the estimation results that use female regular employment rate as a dependent variable. In models 1 and 2, the coefficient of male regular employment rate is positive and statistically significant. This means that when male regular employment is high, female regular employment rate is also high. High male regular employment might imply that labor demand exceeds labor supply and needs more female regular workers.

The coefficient of female university advancement rate is also positive and statistically significant in models 1 and 2. Briefly, increasing university enrollment of women promotes their regular employment. However, the size of this coefficient is very small. Thus, women may be more likely to find regular employment after graduating from university but may quit it due to marriage or childbirth and do not return the labor market as regular workers.

In model 3, we exclude the male regular employment rate from the independent variables. The result indicates that the coefficient of lagged average annual household income is positive and statistically significant. However, the coefficient of female university advancement rate is insignificant and the value of R-square is low. Thus, average annual household income seems to have small effect on the female regular employment rate. The result also suggests that consumption tax rate does not have any effect on women's choices of regular employment.

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Table 2. Estimation results (regular employment rate)

Dependent Variable	Model 1		Model 2		Model 3	
regular employment rate (female)	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
regular employment rate (male)	0.6817 ***	0.1303	0.7470 ***	0.0711	–	–
average annual household income (lag)	0.0012	0.0076	–	–	0.0347 ***	0.0087
consumption tax rate	0.1258	0.1312	0.2054	0.1351	0.3007	0.2290
university advancement rate (female)	0.0584 **	0.0283	0.0597 **	0.0263	0.0545	0.0446
constant	-18.8655 ***	5.0352	-22.6766 ***	4.8636	3.9156	6.3808
R-squared	0.7687		0.8091		0.5454	
Observation	31		33		31	

Note: Standard errors are robust.

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level

Next, we show the estimation results that use female non-regular employment rate as a dependent variable. In Table 3, unlike the results of female regular employment rate, male regular employment rate does not have any effect on the female non-regular employment rate. However, like in model 6, the coefficient of lagged average annual household income has a significant negative effect on the female non-regular employment rate and the value of R-square is the highest in Table 3. Thus, as pointed in previous studies, the higher the household income, the lesser the probability of women working as non-regular workers.[5]

Concerning consumption tax rate, this coefficient is positive and statistically significant. The consumption tax rate promotes the female labor supply as non-regular workers. In other words, women who are not working due to childcare or other reasons may return to non-regular employment so that they can compensate for the loss of disposable income due to the consumption tax hike. Takeshita, Noji, and Hatano [16]revealed that those who responded sensitively to the consumption tax hike were women whose income was low and whose spouse's income was high. To paraphrase their results, part-time female college graduates reacted sensitively to the consumption tax hike. The results of this study are consistent with their findings.

Unlike the results from Table 2, the coefficient of female university advancement rate is large. Women who are university graduates might return to the labor market as non-regular workers. They are also more likely to meet men with the same educational background while attending university and work in workplaces where there are many men who are university graduate as

[5]Another interpretation is that the high annual household income is the result of women working as regular workers, which had a negative impact on the female non-regular employment rate.

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well. Naturally, they would be more likely to marry men with higher incomes. As pointed out in previous studies, since their husbands have high income, they may not be troubled with money even if they quit their jobs after marriage or childbirth and do not return to work as regular employees.[6]

Table 3. Estimation results (non-regular employment rate)

Dependent Variable	Model 4		Model 5		Model 6	
non-regular employment rate (female)	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Srr.
regular employment rate (male)	-0.0505	0.1246	-0.1095	0.0859	–	–
average annual household income (lag)	-0.0104	0.0080	–	–	-0.0129 **	0.0052
consumption tax rate	0.8340 ***	0.1531	0.8035 ***	0.1463	0.8211 ***	0.1480
university advancement rate (female)	0.4253 ***	0.0373	0.4608 ***	0.0326	0.4256 ***	0.0368
constant	16.6195 ***	5.7255	13.2239 **	5.8279	14.9332 ***	3.6129
R-squared	0.88269		0.90952		0.9862	
Observation	31		33		31	

Note: Standard errors are robust.

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level

5. Conclusion

In this study, we investigated the effects of average income, tax rate, and rate of advancement to university on employment behavior among Japanese women using time-series data. The results of multiple regression analyses suggest that the male regular employment rate, average annual household income, female university advancement rate, and consumption tax rate have different effects on regular and non-regular employment rates of Japanese women. Male regular employment rate has positive effects on female regular employment rate, but it has no effect on female non-regular employment rate. High household income seems to reduce the probability of women working as non-regular workers, but does not seem to reduce the probability of them working as regular workers. The consumption tax rate has effects only on female non-regular employment rate. A high consumption tax rate promotes the female labor supply as non-regular workers.

[6]According to Uchikoshi [17], the intergenerational succession of educational assortative marriage has strengthened because of an increase in the association of intergenerational assortative marriage at middle and high levels of education.

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We investigated Japanese female employment rate using time-series data. However, we could not examine the motivation of people applying to become non-regular workers, or the reason for current regular worker turnover. Future research can investigate these topics.

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