# Research Unit for Statistical and Empirical Analysis in Social Sciences (Hi-Stat)

# Work-Life Balance and Gender Differences in Self-Employment Income during the Start-up Stage in Japan

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# Work–life balance and gender differences in self-employment income during the start-up stage in Japan

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Abstract

This study investigates the determinants of the income levels of newly self-employed workers compared to those of employees, while focusing on the effects of gender and childcare. We argue that working mothers with preschool children prefer self-employment to paid employment, as such arrangements offer better work–life balance. Hence, we predict that self-employed working mothers earn lower incomes than their male counterparts, employed counterparts, and female self-employed worker counterparts who do not have preschool children. Empirical results based on anonymous micro data from Japanese employment statistics support our hypotheses.

1. Introduction

People switch from employment to self-employment by starting up a new business, and they do this for various reasons. Some workers pursue a business opportunity and aim to increase their profits or incomes, while others want to enhance personal utility by improving their work–life balance. The latter pattern is especially distinct among married female workers with preschool children (Hundley, 2000, 2001). Indeed, a number of studies suggest that women select self-employment because they want flexible work arrangements that allow them to balance career and family (e.g., Lombard, 2001; Macpherson, 1988).

Lucas (1978) and Evans and Jovanovic (1989) each propose basic models of occupation choice, in which each worker chooses between paid employment and self-employment, depending on which option will derive a higher expected utility. Assuming that the personal utility includes both pecuniary and nonpecuniary benefits—such as flexibility with respect to working location, hours, and intensity—it is reasonable for female workers engaged in childcare to prefer self-employment, as it will provide greater work flexibility, even though they can often expect lower incomes.

Regarding gender equality and childcare support, some major legal and institutional changes have been introduced in Japan since the 1990s: the formal introduction of childcare leave, in April 1992; partial payment of wages and salaries for employees during childcare leave and a public subsidy for employers that compensates for childcare leave, since October 1995; the amendment of the Equal Employment Opportunity Law, in April 1999; the Basic Law for a Gender-equal Society, in June 1999; and the government's Basic Plan for Gender Equality, in December 2000. Underpinning these changes is a clear trend regarding the Japanese household structure. According to the Labor Force Survey of the Ministry of Internal Affairs and Telecommunications, the number of households in which

both husbands and wives work increased drastically in the 1980s, while that in which only the husbands work decreased. The two structure types balanced in the first half of the 1990s. Since 1997, the former type has consistently predominated the latter, and the difference in their numbers has also been growing. However, to the best of our knowledge, few empirical studies have been conducted in Japan on the determinants of self-employment income, while focusing on gender differences and considering these institutional changes.

Therefore, this paper investigates the determinants of self-employment income during the start-up stage of a business, based on anonymous micro data from official Japanese statistics (Employment Status Survey) captured in three waves (1992, 1997, and 2002), comparing male and female self-employed workers and female workers in self-employment and paid employment. We pay special attention to female workers with preschool children who choose self-employment, comparing their income levels to those of self-employed male workers and female employees with preschool children under otherwise similar conditions. Moreover, we examine changes in the determinants of income differences between these groups during the post-bubble period of the 1990s.

The remainder of this paper is organized as follows. Section 2 provides an overview of previous empirical literature on the determinants of self-employment income. Section 3 develops a conceptual framework and presents the hypotheses for empirical analysis. Section 4 explains the data and estimation models. Section 5 provides descriptive statistics of the career choices made by male and female employees, as well as the income levels of self-employed males and females, compared to those of salaried employees. Section 6 reports and discusses the estimation results, and Section 7 concludes this paper.

2. Literature review

Besides survival and growth, income has been regarded as an important performance measure for start-up firms, in both the theoretical and empirical literature[1]. Using micro data, previous studies have mainly addressed the effects of owners' human capital, particularly formal education and job experience (e.g., Parker and Van Praag, 2006; Robinson and Sexton, 1994; Van Praag et al., 2009). With regard to the effect of education on founders' income levels, numerous studies have been executed in developing and developed countries, as surveyed in the meta-analyses of Van der Sluis et al. (2005) and (2008), respectively. In essence, previous empirical studies in this line suggest that self-employed workers enjoy a higher rate of return to formal education than do paid employees, even after controlling for selectivity and endogeneity bias (Parker, 2009).

Several studies examine gender differences in the performance of new firms (e.g., Fairie and Robb, 2009; Robb and Watson, 2012). However, empirical studies on the effect of gender and household structure on self-employment income are relatively scarce, in contrast to the rich literature on the gender gap in wages and salaries among employees (e.g., Blau and Kahn, 1997, 2006; Hersch and Stratton, 1997; Stratton, 2001). Using Japanese data, Genda and Kambayashi (2002) show that, after controlling for age and location effects and the sample-selection bias, female workers earn significantly less than male workers, and that this gender difference is larger among self-employed workers than among salaried employees. However, they do not consider the role of childcare for the lack of related data.

With regard to gender differences in the transition into self-employment, a number of studies suggest that women select self-employment because they seek flexible work arrangements that facilitate a balance of career and family (e.g., Lombard, 2001; Macpherson, 1988). Georgellis and Wall (2005) examine the factors of transition into self-employment and find that the determinants significantly differ between male and

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[1] This study focuses on the income levels of newly self-employed workers, to facilitate comparability of returns with employees.

female employees, suggesting that for women, self-employment is a close substitute for part-time work. Regarding the effect of childcare on women's entry into self-employment, Taniguchi (2002) obtains mixed results while using a longitudinal survey dataset from the United States, calling into question the view that self-employment allows working mothers to balance career and family concerns. Using data from 61 countries, Klyver et al. (2012) find that overall gender equality is associated with the gender gap in men's and women's self-employment choices.

Hundley (2000) provides the first systematic analysis of the gender gap in self-employment income versus wage and salary income. He argues that self-employed women earn less than their male counterparts because they have less energy available to devote to market work. Using a dataset comprising young Americans, he demonstrates that self-employed women's incomes decline with marriage, family size (number of children), and housework hours, while self-employed men's incomes increase with marriage and family size. He further finds that this pattern is similar, but less distinct, for male and female employees, which suggests that in self-employment, the relative incomes of female workers are more sensitive to family size.

Similarly, Hundley (2001) shows that both the number of young children and the number of housework hours negatively correlate with the average hourly earnings of self-employed women, but not of men. In contrast, Walker (2009) demonstrates that the housework efforts of self-employed women, rather than their housework hours, contribute to their lower incomes relative to those of their male counterparts.

Previous studies on gender differences in the choice of self-employment and self-employment income have focused on the United States, and little is known about East Asian countries, including Japan, where institutional environments are quite different from those of Western countries. The few exceptions—e.g., Genda and Kambayashi (2002) and

Harada (2003)—do not consider the effects of household structure and childcare; thus, one contribution of the current study is that it extends the representative empirical research by Hundley (2000) to the Japanese labor market and thus applies it to the Japanese context. In addition, we focus more directly on the role of childcare than does Hundley (2000), by comparing the income levels of self-employed women with preschool children to those of their male counterparts and to those of salaried female employees with preschool children. It is also noteworthy that we target the founders of start-up firms (i.e., within five years of operation), rather than self-employed workers in general, to consider explicitly changes to self-employment that are driven by their devotion to childcare.

Moreover, most studies—including those of Hundley (2000, 2001)—use cross-sectional data from a specific year or a short period. In contrast, a major advantage of the current study is that its dataset covers a relatively long period, in three cohorts. As mentioned, there were many legal improvements in Japan with regard to gender equality and childcare support during the 1990s. By using a dataset of three different cohorts, including one in the 1990s, we can consider the effects of these institutional changes on female workers in self-employment and paid employment, as well as gender differences in self-employment income[2].

Thus, the current study offers a number of contributions to the existing literature. First, although our research concept is based on Hundley's work, we focus more directly on the effect of childcare; we do so by comparing income levels, both between male and female self-employed workers with preschool children and between self-employed female workers with preschool children and those in paid employment. Second, our analysis targets the founders of new start-ups (i.e., *newly* self-employed workers), rather than self-employed

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[2] Previous studies empirically investigate the effects of the Equal Employment Opportunity Law, which was enforced in 1986 and strengthened in 1999, on gender wage gap (Abe, 2010), as well as the career opportunities and choices of female workers (Abe, 2011; Cannings and Lazonick, 1994). However, to the best of our knowledge, no empirical studies have addressed the impact of these legal improvements on self-employment in Japan.

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workers in general. Thus, we also explore in detail the relationship between occupation choice decision and childbirth/childcare by female employees, while considering the timing of quitting a job or switching to self-employment. Third, we estimate changes in the effects of gender and childcare on relative income levels across three different survey waves, in which the macroeconomic conditions, employment system, and institutions for gender equality and work–life balance changed considerably in Japan. Finally, to the best of our knowledge, this is the first study on this topic to use representative micro data from Japan, and so it may facilitate interesting comparisons to other developed countries.

3. Conceptual framework and hypotheses

As mentioned, we focus on differences in income between self-employed male and female workers, both with preschool children, and between self-employed female workers with preschool children and those in paid employment, while taking into consideration the effect of childcare. These research questions are in line with those of Hundley (2000, 2001).

Before examining the factors that contribute to gender differences in self-employment income, we explore the patterns of occupation choice (i.e., continuing as an employee, quitting a job, or switching to self-employment) in Japan, while comparing male and female employees and focusing on the effect of preschool children. Several studies suggest that women select self-employment because they seek flexible work that will facilitate life–work balance (e.g., Lombard, 2001; Macpherson, 1988). However, most working mothers in Japan choose to retire from the labor market to concentrate on childcare, rather than switch to self-employment. Therefore, it is important to determine, by using statistical data, how many female employees with preschool children quit their jobs to devote their efforts to childcare, how many switch to self-employment, and when they decide to make these

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changes. We examine these descriptive statistics later, in Section 5.

Hundley (2000) argues that gender differences in self-employment income are observed because married women and men enter self-employment for different reasons: "self-employment enables married women to devote considerable effort to household production while continuing in market work, albeit with lower earnings. This contrasts with the perspective provided by studies of self-employed men, which see self-employment as a vehicle for entrepreneurship enabling the capture of rewards for extra work and innovation" (p. 96). Thus, the income gap between male and female self-employed workers could be attributed to their different commitments to household and market work.

Based on the Labor Force Survey of Japan's Ministry of Internal Affairs and Telecommunications, a distinctive feature of the Japanese labor market is the M-form curve in a plot of change in the female labor force participation with age: it decreases considerably as women reach their thirties, as they retire from the labor market to devote themselves to childcare, then increases again after some years of devotion to childcare (Figure 1). In contrast, the labor force participation ratio of the male population is almost consistently 100%, from the late twenties to the early fifties.

The M-form curve has been changing since the 1970s, as the female labor force participation as a whole has gradually increased; however, such patterns persist, and distinguish Japan from other developed countries. Moreover, using micro data from the same statistics used in this study, Nakamura and Ueda (1999) find that access to childcare support and short working hours help married women continue in their work. This suggests that, in Japan, childcare seriously affects the careers of female workers, but not of male workers, although the gender gap in labor force participation has been decreasing.

Indeed, according to a survey of the Ministry of Health, Labor, and Welfare in 2001, around 70% of working mothers retire from their jobs with the birth of their first child. Of

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those who find new jobs later, 65% work on a part-time basis (Cabinet Office, 2004).

Moreover, another survey by the same ministry in 2002 reveals that 64% of mothers (but only 0.3% of fathers) in paid employment took childcare leave. According to this survey, the burden of childcare is unequally shared between the parents: 86% of working mothers (and almost 100% of nonworking mothers) usually take care of their children, mainly by themselves, while the sharing of housework and childcare with working fathers does not significantly differ between working and nonworking mothers. Hence, we expect that, among the self-employed, female workers are more likely to devote themselves to childcare and thus earn lower incomes than their male counterparts.

We can also argue that female self-employed workers with preschool children earn lower incomes than those without preschool children, because the latter may have chosen self-employment to pursue business opportunities, while the former likely did so to devote themselves more to childcare. Similar arguments can also be applied to comparisons of self-employed female workers with preschool children and those in paid employment: the latter tend to be more career-oriented, while the former tend to be more family-oriented, and thus devote less effort to market work. Therefore, we propose the following hypotheses:

H1: <u>Female</u> self-employed workers with preschool children tend to earn lower incomes than their <u>male</u> counterparts.

H2: Female self-employed workers <u>with preschool children</u> tend to earn lower incomes than other female self-employed workers.

H3: Female <u>self-employed</u> workers with preschool children tend to earn lower incomes than female workers with preschool children in <u>paid employment</u>.

Finally, involvement in childcare may differentially affect gender income differences among the self-employed and among salaried employees. Female workers have a comparative advantage in childcare: they can adjust their working hours and intensity more

flexibly and according to their childcare needs when self-employed than when in paid employment. Thus, we can predict that the gender income difference in self-employment increases with the number of preschool children, to a larger extent than among employees; this gives rise to our fourth hypothesis:

H4: Male/female income differences among self-employed workers are more sensitive to the number of preschool children than those among employees.

Further, we will compare the estimation results of the same models across the 1992, 1997, and 2002 survey cohorts, using each cohort subsample separately. In this way, we can examine if, and to what extent, the gender gap among self-employed workers and the gap between female workers in self-employment and paid employment changed along with changes in the economic and institutional environment.

As mentioned, several legal and institutional changes were introduced in Japan in the 1990s, regarding gender equality and childcare support (e.g., childcare leave and compensation). Such improvements may have led to more female employees staying at work during and after childcare, rather than turning to self-employment. However, such changes may not have affected the income levels of self-employed female workers, especially those with preschool children, because improvements in gender equality and childcare support targeted only salaried employees. To the best of our knowledge, few empirical studies have been made on determinants of self-employment income, considering gender differences in childcare, and institutional changes; this study aims to fill this research gap.

4. Data and empirical models

We use anonymous micro data from the Employment Status Survey of Japan, in three

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waves (1992, 1997, and 2002)[3]. This statistical survey targets a random sample of 1 million adults (i.e., those older than 15) in Japan, or approximately 1% of the entire population. For academic use, the data of 80% of the individuals in the sample are made available as anonymous data, in that almost all location information has been stripped out. Individual-level data elements—such as age, income, and family size—are categorized into groups so that no individual can be identified.

Because this study's main objective is to analyze the determinants of income level among newly self-employed individuals and salaried employees, we exclude some individuals from our dataset. First, we exclude from the analysis those who are unemployed or students, and any other individual who is not in the labor market. Second, by focusing particularly on those who are newly self-employed, rather than on those who have been self-employed for some time, we also exclude self-employed workers who have been in their business for more than five years. Third, for clarity of comparison, we exclude self-employed workers with no previous job experience, as well as salaried employees who were previously self-employed. Thus, our final dataset comprises workers who had been self-employed for fewer than five years and salaried employees who had not been previously self-employed. The entire three-cohort sample includes approximately 1.2 million people.

We estimate the incomes of both newly self-employed workers and employees. Because information in our dataset on annual income is not available as absolute values, but only as categories (i.e., interval-coded), we employ interval regression (see Wooldridge 2010, pp. 783–785), rather than ordinary least squares (OLS) regressions[4]. A major

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[3] This official statistical survey has been carried out every five years since 1956 by Japan's Statistical Office of the Ministry of Internal Affairs and Telecommunications. Currently, micro data of these three survey years are available as anonymous data for academic and educational purposes.

[4] As a robustness check, we also conduct an ordered Probit estimation, which is often employed for the analysis of categorical data that feature intervals. Despite several similarities among these estimation models, a major difference is that the cut points are parameters used to estimate for the ordered Probit model, while

advantage of this estimation compared to ordered Probit estimation is that the estimated parameters contain the partial effects, as in OLS regressions.

Suppose that individual $i$'s unobserved annual income is determined by

(1)  $\quad I_i = \mathbf{z}_i \boldsymbol{\gamma} + v_i,$

where $\mathbf{z}$ is a vector of independent variables, $\boldsymbol{\gamma}$ is a vector of their coefficients, and $v_i$ is an error term. Assuming that the error term has a standard normal distribution—i.e. $v_i \sim N(0, \sigma^2)$ —we estimate $\boldsymbol{\gamma}$ and its variance $\sigma^2$. We define the observed ordinal variable *Income_i*, which represents worker $i$'s income level, as

*Income_i* = 0 if $I_i \leq k_1$

*Income_i* = 1 if $k_1 < I_i \leq k_2$

.......

*Income_i* = J if $I_i > k_J,$

where $I$ is unobservable individual income and $k_1 < k_2 < \cdots < k_J$ denote the known interval limits; we obtain the conditional probabilities Pr(*Income_i* = j | $\mathbf{z}$) for $j$ = 0, 1, … J. The log likelihood for a random draw $i$ is

$$l_i (\boldsymbol{\gamma}, \sigma) = 1[Income_i = 0] \ln \Phi \left( \frac{k_1 - \mathbf{z}_i \boldsymbol{\gamma}}{\sigma} \right) +$$

(2) $\qquad 1[Income_i = 1] \ln \left[ \Phi \left( \frac{k_2 - \mathbf{z}_i \boldsymbol{\gamma}}{\sigma} \right) - \Phi \left( \frac{k_1 - \mathbf{z}_i \boldsymbol{\gamma}}{\sigma} \right) \right] + \cdots +$

$$1[Income_i = J] \ln \left[ 1 - \Phi \left( \frac{k_J - \mathbf{z}_i \boldsymbol{\gamma}}{\sigma} \right) \right],$$

for $j$ = 1, 2, …, J. The parameters $\boldsymbol{\gamma}$ and $\sigma$ are estimated to maximize the log-likelihood function:

(3) $$\ln L = \sum_{i=1}^{N} l_i (\boldsymbol{\gamma}, \sigma).$$

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with interval regression, the interval endpoints are given. We provide the results of ordered Probit estimation in Appendix Table A2.

The vector of independent variables, **z**, includes a dummy that takes the value of 1 for females, and 0 otherwise (*Fem*); the number of preschool children (under six years of age) (*Child*); and their interaction term (*Fem_Child*). In addition, a dummy for new self-employment (*Self*) is included, which takes the value of 1 if the worker has become self-employed within the preceding five years, and 0 otherwise. To test our hypotheses, it is necessary to estimate not only the main effects on the income level, but also the interaction effects of being self-employed (*Self*), gender (*Fem*), and the number of preschool children (*Child*). We therefore include all possible interaction terms of *Self* with *Fem* and *Child* (*Self_Fem*, *Self_Child*, and *Self_Fem_Child*).

Independent variables also comprise some control variables for individual-level characteristics: education level (a dummy for university graduates, *UnivGrad*), age (dummies for 10 age groups), and household and family types (a dummy for each of household head, *HeadHH*; his or her spouse, *Spouse*; and being married, *Marriage*). There is also a control variable for regional characteristics (a dummy for the largest agglomeration regions[5], *Metro*), and survey year (cohort) dummies are also included in the model.

Further, to control for differences in the characteristics of previous and current jobs among self-employed workers, we include the interaction terms of the self-employment dummy and the dummies for firm age (from the second to the fifth year since start-up), employed years in the previous job (nine categories), employment status in the previous job (five types), firm size of the previous job (11 categories), the industry dummies for 10 sectors, and the dummy for the same sector in the current and previous jobs. In some specifications, we also include dummy variables for working days and hours (11 categories), to control for the effects of working hours on income level. Detailed definitions and the specifications of the variables are provided in Table A1 in the Appendix.

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[5] Regional characteristics are available only as a distinction between a location in one of the three largest agglomeration regions around Tokyo, Osaka, or Nagoya, and any other locations.

The switch from salaried employment to self-employment does not randomly occur, but it is rather endogenous. People select self-employment for various reasons. As mentioned, female employees with preschool children may prefer self-employment to paid employment, to achieve a better balance of career and childcare; if this is the case, the self-selection bias of female workers with preschool children is not negligible in our sample. However, we examine how much income level differs, for example, between female workers with preschool children in self-employment and salaried employment, not controlling for the preference for self-employment, but rather including it. This is because we argue that female self-employed workers with preschool children prefer flexible work at a low income, so that they can devote themselves to childcare.

Each employed worker with a preschool child has three occupational choices: remain an employed worker, quit the job (i.e., retire from the labor market) and devote himself/herself to childcare, and switch to self-employment to balance work and childcare. In Japan, most female employees quit their jobs around the birth of the first child, while only a small portion start up their businesses; those who remain employees after childbirth are assumed to have relatively good opportunities for a business career (and thus a high opportunity cost associated with a devotion to childcare). In this sense, the wages of female employees with preschool children in our sample may be positively biased, compared to their self-employed counterparts.

However, as we describe in detail in the following section, most female employees do not face such an occupational choice, but consider with childbirth whether to continue or quit their jobs, and choose between paid employment and self-employment after a few years, when the first child goes to kindergarten. Therefore, most of those who choose self-employment are expected to have a business career opportunity comparable to those who continue their careers as employed workers, rather than to those who quit their jobs at

childbirth. Therefore, we need not go beyond controlling for personal ability with the variables for age, formal education, and job experience in estimating the relative income levels of female self-employed workers with preschool children.

5. Descriptive statistics on career choice and income level

Before presenting and discussing the estimation results regarding income level, we demonstrate in this section some descriptive statistics pertaining to the career choices of employees, with special attention on female employees with preschool children. We are especially interested in how many choose self-employment as opposed to retirement, and when they make this career choice. Such a detailed description is important, because most female employees in Japan opt to retire from the labor market rather than start up a new business after childbirth, and also because they make this choice at different times.

Table 1 shows the changes in employment status during the preceding year (as a percentage of all observations), according to the age of the first child in the household when the survey was conducted. Most employees have no preschool children, which is regarded as the baseline. The upper rows show the data of the pooled sample, with the data for each survey cohort displayed below. The table also contrasts descriptive statistics for male and female employees.

For example, of the total (pooled) sample, 34.2% (27.5%) of the female employees chose to leave the labor market completely, just before (after) the birth of the first child and during the year preceding the survey; meanwhile, only 0.1% of female employees in pregnancy or with newborn babies became self-employed during the same period[6].

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[6] The age of the first child in Table 1 is the age when the survey was conducted. Since the survey asks for the change in occupation status during the preceding year or the tenure of the current occupation, the fact that a female employee had a newborn child (i.e., younger than one year) when the survey was conducted means that

However, when they continued to work as employees until the first child became one year or older, they mostly continued to work further as employees. It is noteworthy that the propensity for female employees to become self-employed slightly increased to 0.3% after the child became one year old, and increased considerably to 0.6% when the child became three years old (i.e., the age to enter kindergarten). This evidence suggests that the occupation choices of female workers are strongly contingent upon childcare, and that most delay becoming self-employed until their children have grown enough to go to a nursery or kindergarten.

In contrast, among male workers, the ratio of changes in employment status does not vary with the age of the first child. Most male employees (more than 99%) continued to be employees in the year preceding the survey. Thus, their occupation choices are not contingent upon childcare.

In comparing these statistics across the survey cohorts, we notice that the ratio of female employees who leave their jobs around childbirth clearly increased between 1997 and 2002. The increase in the ratio of employees who quit their jobs or started up new businesses can also be observed among male workers, but much less distinctively than among female workers.

The descriptive statistics presented here suggest that, unlike with male workers, female workers' occupation choices are strongly contingent upon childcare, but the decision to become self-employed is made at a stage later than that to leave employment altogether to devote themselves to childcare.

Table 2 first compares the average rates (%) of starting up a new business (becoming self-employed) during the five years preceding the survey, between genders and between those with and without preschool children. The second part of the table shows the average

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she left the occupation or started up a new business during her pregnancy.

income (millions of yen)[7] for each gender, divided between the employees and the self-employed, and within each group, those with and without preschool children.

The average figures in this table suggest that male workers are more likely to become self-employed than their female counterparts, regardless of whether or not they have preschool children. The table also shows that, for both male and female employees, those with preschool children are more likely to become self-employed than those without preschool children, but the difference between these groups is larger for female than for male workers.

Regarding average income, Table 2 shows that 1) male workers earn more than female workers, among both employees and the self-employed; 2) male workers earn more than female workers, whether with or without preschool children; 3) for both male and female workers, salaried employees earn more than those who are self-employed; and 4) among female workers, both for employees and the self-employed, those with preschool children earn *less* than those without preschool children, but this is not the case for males who are self-employed. These findings regarding income level are consistent with the hypotheses presented in the previous section; in the next section, we examine them more precisely, using multiple regression models.

Figures 2a to 2d compare the distribution of annual income between genders, in millions of yen, as measured from the midpoint of each income category. For example, the first interval (0, 0.5) denotes the income category between JPY 0 (no income, including deficit) and JPY 0.5 million. Figures 2a and 2b show the income distribution of employed workers without and with preschool children, while Figures 2c and 2d show those of newly self-employed workers without and with preschool children, respectively. The gender income difference is distinct in these figures, but it is noteworthy that newly self-employed

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[7] As mentioned, we could obtain only income data that were broken into categories, not absolute values. Therefore, when calculating average income, we use the median of each category.

women with preschool children concentrate in the lowest-income categories, and thus most of them earn less than JPY1 million per year.

Table 3 compares the distribution of sectors in which newly self-employed workers run their own businesses, between male and female workers and between those with and without preschool children within each gender. It is noteworthy that female self-employed workers concentrate in retail, restaurant, and consumer services, but also in business and professional services, compared to self-employed men. Moreover, large portions of self-employed women with preschool children work in retail (36%) and professional services (20%), while only 4% work in the restaurant sector. Unfortunately, a more detailed breakdown of sectors from the micro data is not possible.

One may expect that self-employed women, especially those with preschool children, are more likely to run businesses with their husbands as co-founders or co-owners, compared to female employees. However, according to Table 4, the occupation types of the husbands show a similar distribution between female employees and self-employed workers, while the ratio of self-employed husbands is higher among wives in paid employment than in self-employment. Moreover, in both groups, wives with preschool children are more likely to have husbands who work as employees than those without; therefore, we may assume that newly self-employed female workers, especially those with preschool children, are more likely to be supported by husbands who are in (relatively highly) paid employment.

However, Figure 3a does not provide evidence that the husbands of self-employed women earn more than those of female employees—nor do we see that the husbands of self-employed female workers with preschool children have higher incomes than those without preschool children. Thus, we cannot argue that the lower incomes of self-employed women, especially of those with preschool children, are supported and supplemented by

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their husbands' higher incomes. This does not change, even when we observe the distribution of household income instead of that of husbands' income (Figure 3b).

6. Estimation results and discussion

Table 5 presents the estimation results of the interval regression model for the pooled sample of the surveys in 1992, 1997, and 2002. The dependent variable is the natural logarithm of income level, ln(*Income*). We use the data in logarithm, given the income distribution of the pooled sample and because we can estimate the effects of independent dummy variables as percentage-changes in income[8]. Model 1 controls for demographic variables such as age and education of workers, and it includes survey cohort dummies. Model 2 additionally includes some controlling variables for previous and current jobs. Models 3 and 4 control for working days and hours, and thus estimate proxies for their effects on efficiency or productivity.

Each of the self-employment dummy (*Self*), the female dummy (*Female*), and the number of preschool children (*Child*) has statistically significant negative effects on income in all models. Each of the interactive terms has significant coefficients in the same sign in all models, except for *Fem_Child*. Therefore, the estimation results of the interval regression models are considerably robust.

We can calculate relative income differences among the types of workers, directly from the regression coefficients, because they indicate the marginal effects of independent

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[8] In this section, we provide the results with ln(*Income*) as the dependent variable, but we conduct also the ordered Probit estimations and the interval regression using the income level (without logarithm) as the dependent variable. The results of these estimations, especially those of the ordered Probit model, are quite similar to those of the interval regression analysis. We report in Appendix Table A2 the results of ordered Probit estimations.

variables in percentage[9]. For example, in Model 1, the male–female income difference of self-employed workers without preschool children (29.1%: sum of the coefficients of *Fem* and *Self_Fem* = –0.291) is significantly smaller than that of employees without preschool children (48.4%: coefficient of *Fem* = –0.484). At the same time, among female workers without preschool children, the income difference between the self-employed and employees (52.8%: sum of the coefficients of *Self* and *Self_Fem* = –0.528) is also significantly smaller than that among male workers without preschool children (72.1%: coefficient of *Self* = –0.721)[10]. We summarize in Table 6 the calculation of marginal effects as income gaps. For example, the gender income gap among newly self-employed workers without preschool children is 29.1% in Model 1, but it increases to 61.0% with the first (the second row) and to 92.9% (the third row) with the second preschool child. Moreover, the gender income gap of 61.0% for newly self-employed workers is reduced to 24.3% when we control for the characteristics of current and previous jobs and working days and hours (the second row in Model 4).

Based on these results, we can test our hypotheses. First, Hypothesis 1 is supported, because the sum of the coefficients of *Fem*, *Self_Fem*, *Fem_Child*, and *Self_Fem_Child* is negative in all models (the second row in the case of one child, the third row in the case of two children). Second, Hypothesis 2 is supported, because the sum of the coefficients of *Child*, *Self_Child*, *Fem_Child*, and *Self_Fem_Child* is negative in all models (the 13th row). Third, Hypothesis 3 is supported, because the sum of the coefficients of *Self*, *Self_Fem*, *Self_Child*, and *Self_Fem_Child* is negative in all models (the 8th and 9th rows). Fourth,

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[9] By differentiating the equation $lnY = a_0 + a_1 X$ with regard to $Y$, we obtain $\frac{1}{Y} = a_1 \frac{dX}{dY}$, and thus $\frac{dY}{Y} = a_1 dX$.

[10] The income difference between female workers in self-employment and paid employment can be calculated by differentiating the estimated model with regard to *Self*, while the comparable income difference for male workers is obtained by making *Fem* take a value of 0 and then differentiating the estimated model with regard to *Self*. The resulting difference-in-differences equals the sum of the coefficient of *Self_Fem* (0.224) and the product of the coefficient of *Self_Fem_Child* and the number of preschool children (–0.285*Child*).

Hypothesis 4 is supported, because the coefficient of *Self_Fem_Child* is significantly negative in all models (Table 5).

As suggested previously, in Models 3 and 4, we consider the effect of working days and/or hours by including in the set of independent variables dummies for working days and weekly working hours. This means that in these models, the coefficients of the other variables can be interpreted as the effects on productivity, rather than on income itself. While the results of Models 3 and 4 are generally similar to those of Model 2, the coefficients of the former models are mostly smaller than those of the latter. These results indicate that the income gap between men and women, between self-employed and employed workers, and between workers with and without preschool children become smaller when we control for working days and hours. Therefore, these results suggest that female workers and newly self-employed people work less than their aforementioned counterparts.

With regard to the control variables, we obtained the following results, which are mostly consistent with our expectations[11]: University graduates, married workers, and inhabitants of the largest cities tend to earn higher incomes than their counterparts. Additionally, heads of households are more likely to earn higher incomes than their spouses and other family members[12]. Income levels peak in the fifties. The level of experience in the current business (i.e., years of operation since start-up) has a positive effect, but the tenure in the former job has a negative effect on self-employment income[13]. Self-employed workers with managerial experience (executive officers in their previous job) tend to earn

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[11] We omitted these results from the tables to save space; they are available from the authors upon request.

[12] With regard to household structure, we did not control for the co-residence of working mothers with their own parents or parents-in-law. Previous studies suggest that such arrangements may strongly affect occupation choice and the work–life balance of female workers who have preschool children (Ogawa and Ermisch, 1996; Sasaki, 2002).

[13] The latter result is contrary to our expectation and also inconsistent with the results in the literature. The effect of experience in a previous job becomes negative and significant when it exceeds 20 years, which may imply that long duration of experience suppresses innovation and flexibility of thinking, and thus lowers income.

higher incomes, while those in nonregular employment earn lower incomes than those with other employment statuses in their previous job. Self-employed workers earn higher incomes when they start a business in the same industry sector as their previous work, than for any other sectors. Finally, the longer they work, the higher their income becomes.

These estimation results are mostly consistent with those of previous studies, especially those of Hundley (2000, 2001). The effects of gender, self-employment, and the number of preschool children on income level are in general similar between the United States and Japan, despite there being major differences in the institutional factors pertaining to their respective female labor markets. Unfortunately, however, an exact comparison is not possible, given the different estimation models and controls involved. Moreover, in Hundley (2000), the baseline is an unmarried female worker who is compared to a married female worker with a child, while children are not limited to those of preschool age.

As mentioned, the sample in the current study comprises workers who have been in self-employment for less than five years. With regard to the effect of childcare, we implicitly assume that several female workers switch from paid to self-employment *after* the birth of the first child, to obtain greater flexibility in work. However, by definition, our sample may also include self-employed workers who started up their businesses *before* the birth of their first child. In this regard, we may argue that self-employed women with preschool children tend to prefer, all else being equal, more flexibility in work to higher income, as such arrangements allow them to devote themselves to childcare, regardless of whether they switched to self-employment before or after the childbirth. Nevertheless, some empirical checks would need to be in place.

To cope with this problem empirically, we check whether self-employed workers started up their businesses before or after the childbirth—indeed, we find both patterns—and include in the estimation a dummy variable that takes the value of 1 if they

started up *before* childbirth and 0 otherwise, and its interactive term with the female dummy. We use this interactive term to take the gender difference in childcare explicitly into consideration. The results in Table 7 are quite similar to those in Table 5, while the new variables do not show significant effects on income level. These results suggest that self-employed women with preschool children tend to select the work flexibility that self-employment offers, even if doing so means a lower income, regardless of the timing of the childbirth.

We apply another robustness check by using a question item from the survey regarding the reason for leaving the previous job. Here we pay special attention to two particular reasons—namely, "marriage or childcare" and "to pursue economic opportunity"—and include the related dummy variables and interactive terms with the female dummy and the number of preschool children. Table 8 shows that the results do not change considerably with these new variables, and that only the interactive terms of the reason "marriage or childcare" and the female dummy and/or the number of preschool children are negative and significant. These results suggest that the *reason* for starting up a business significantly affects income level and that, specifically, self-employed women with preschool children earn lower incomes when they leave their previous jobs to start up a business and devote themselves more to childcare[14].

Finally, we check the structural change in the time series across the three survey cohorts of 1992, 1997, and 2002. We generate estimation results through the models that include the interactive terms of the major independent variables (*Self*, *Female*, *Children*, *Self_Fem*, *Self_Child*, *Fem_Child*, and *Self_Fem_Child*) with cohort dummies for 1997 and 2002, taking the 1992 cohort as the baseline reference (Table 9). For clarification, we

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[14] We implicitly assume that female self-employed workers intentionally accept a lower income in order to attain better work–life balance. However, in fact, we cannot clearly distinguish between intended and unintended low income from self-employment. The latter case reflects business failures, and Figures 3a and 3b suggest that such cases may not be negligible.

calculate the marginal effects of the variables for each cohort and its differences between 1992 and 1997, as well as those between 1992 and 2002. To save space, we report in Table 8 only the marginal effects based on the estimation results of Model 1 in Table 9, which do not control for working days and hours.

Table 10 provides the following evidence. First, the gender income gap significantly decreased for workers without preschool children and for employees with preschool children, especially between 1992 and 1997, but not for newly self-employed workers with preschool children. Second, the income gap between employees and newly self-employed workers without preschool children significantly changed between 1992 and 2002, for both male and female workers. Third, the negative effects of the number of preschool children on income significantly decreased for both male and female employees, but not for self-employed women. At least the first and the third pieces of evidence suggest that the institutional and policy changes in the 1990s with regard to childcare leave and gender equality in fact contributed to a reduction in the gender income gap among employees and supporting employees with preschool children[15], but that they did not change the income levels of self-employed women with preschool children relative to their male counterparts, other female self-employed workers, or female workers with preschool children in paid employment[16].

7. Concluding remarks

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[15]  Abe (2010) finds no evidence that the Equal Employment Opportunity Law contributed to reductions in the gender wage gap among university graduates. Differences between her results and those of the current study may be attributed to their use of different datasets, estimation methods, observation periods, and units of analysis (i.e., aggregated versus micro data).

[16]  It is noteworthy that we did not directly analyze the effects of legal, institutional, or macroeconomic changes during the observation period, but estimated changes across three survey cohorts. To address this issue more explicitly, future research may employ different estimation approaches, such as a semiparametric difference-in-differences estimation (Abadie, 2005).

In this paper, we investigated the determinants of self-employment income level in the early stages (i.e., within five years) of becoming self-employed. We used anonymous micro data from Japan's Employment Status Survey, focusing in particular on gender differences among self-employed workers and on the difference between self-employed and salaried female workers, while considering the effect of childcare. We argued that female workers with preschool children give priority to work flexibility, and thus their incomes tend to be lower than those of their male counterparts and female workers who do not have any preschool children. This is because they devote less time and effort to market work and more to housework and childcare than do the members of the other groups. Moreover, we also predicted that male–female income differences among self-employed workers are more sensitive to the number of preschool children than are those among employees.

We tested our hypotheses using interval regression models and obtained results that support those hypotheses. We found that female self-employed workers with preschool children tend to earn lower incomes than their male counterparts, other female self-employed workers, and female workers with preschool children in paid employment. Moreover, gender income differences among self-employed workers are more sensitive to the number of preschool children than among those of employees. Regarding self-employed workers, we checked the robustness of these results by controlling for working days and hours and using additional information on the timing of childbirth and the reasons for leaving the previous job. Finally, in comparing the results from different cohorts, we saw significant differences in the changes in gender income gap between self-employed and employed workers with preschool children, reflecting institutional and legal changes in the 1990s regarding gender equality and childcare support.

This paper has some shortcomings that can be largely attributed to data constraints. First, precise estimations are impossible, because most variables are available only as

categories, rather than as absolute values—although we tried to obtain proxy estimations through interval regression. Second, although we used micro data from the three different cohorts, panel data analysis was not possible, because the sample of workers in each was different from the other two. Despite these problems, this study contributes to the existing literature as the first in-depth empirical study of self-employment income using Japanese micro data and comparing three different cohorts, while in particular focusing on the role of childcare in decision-making vis-à-vis employment.

On the whole, our findings suggest that self-employment may provide working mothers with preschool children with work flexibility and an opportunity to achieve better work–life balance. In this respect, policymakers should be more aware of this role of self-employment as an occupational choice, when designing support policy that addresses work–life balance and childcare.

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**Figure 1: Labor Force Participation Ratio (%) in Japan, by Age (2000)**
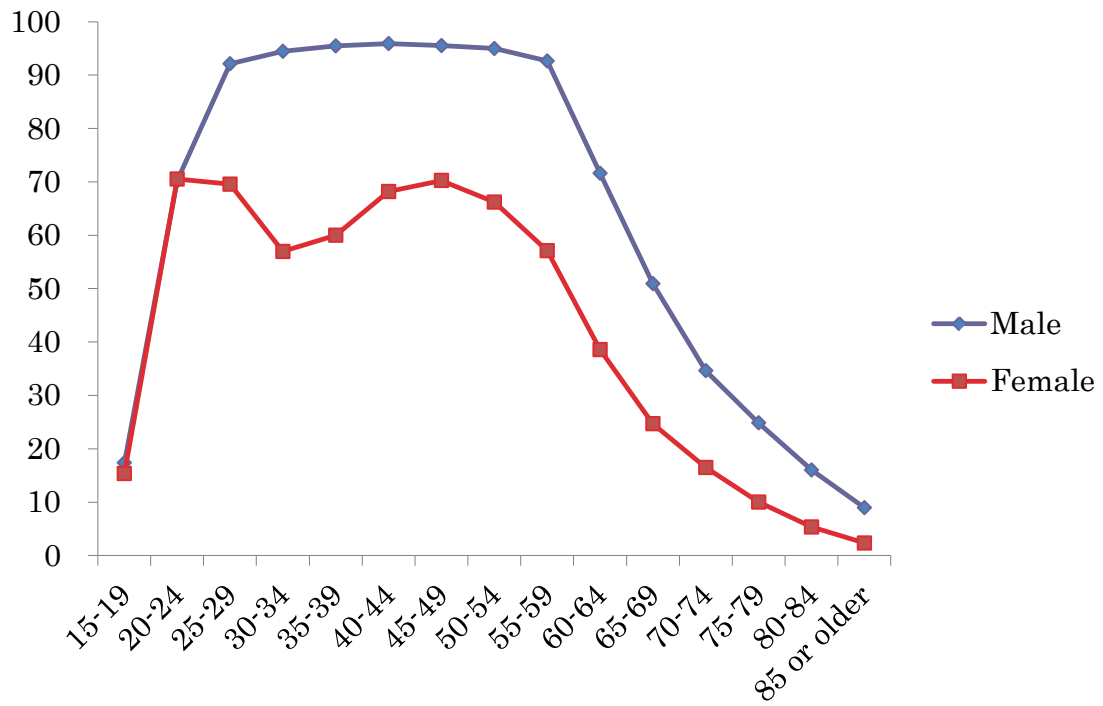


**Source: Census of Population 2000**

**Figure 2a: Income Distribution of Employees *without* Preschool Children (%, millions of yen)**



Male   Female
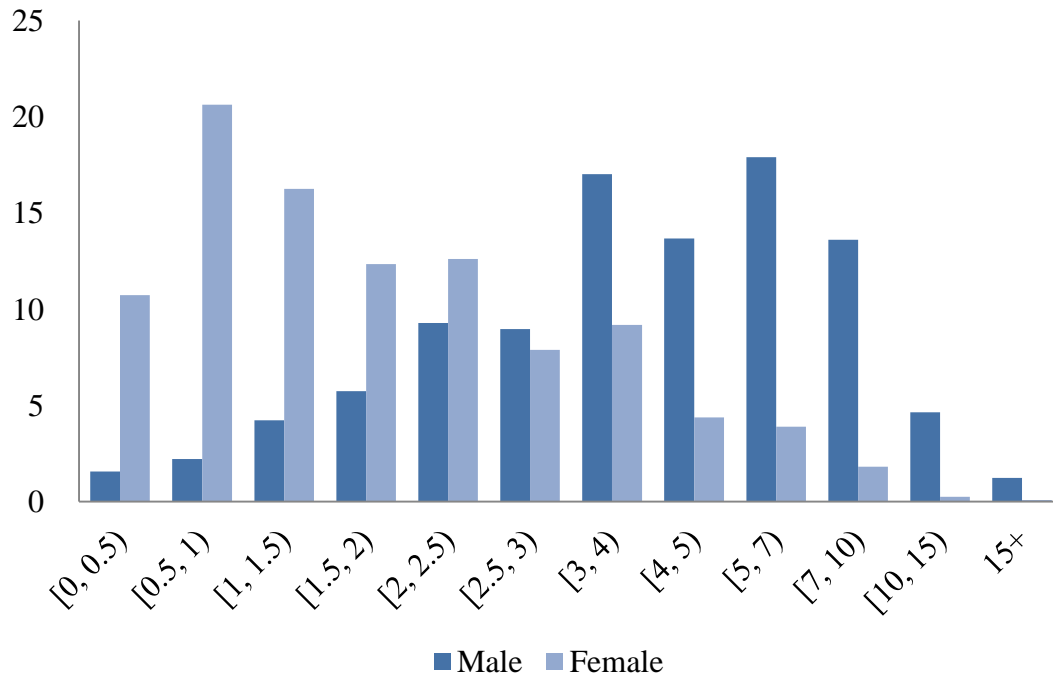
**Figure 2b: Income Distribution of Employees *with* Preschool Children (%, millions of yen)**



Male   Female
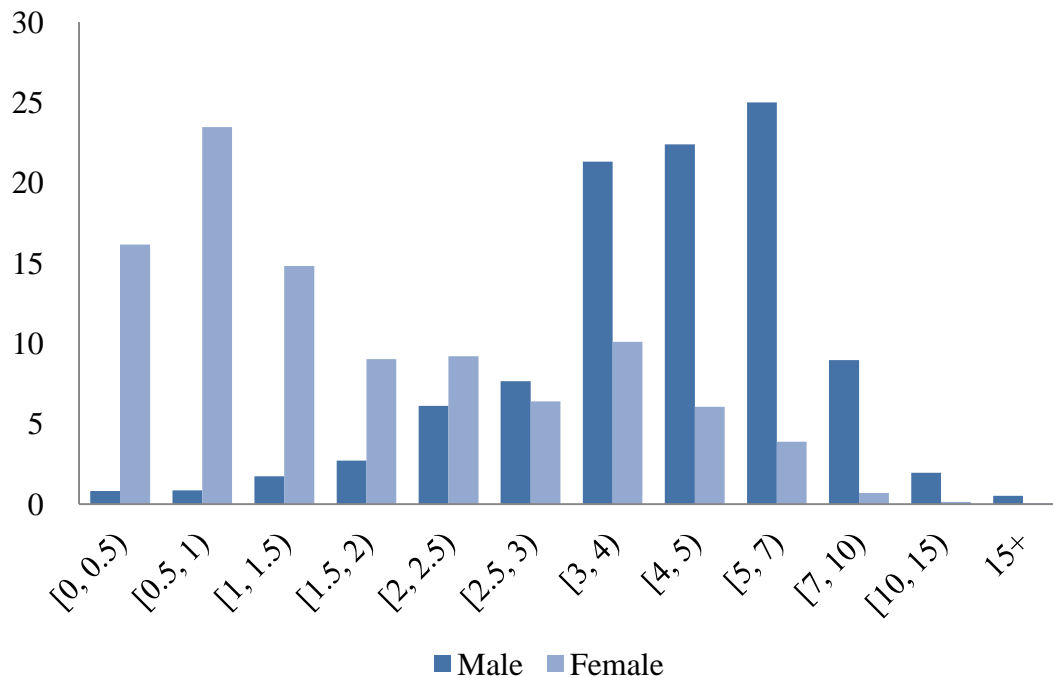
**Figure 2c: Income Distribution of Self-employed Workers *without* Preschool Children (%, millions of yen)**



Male    Female
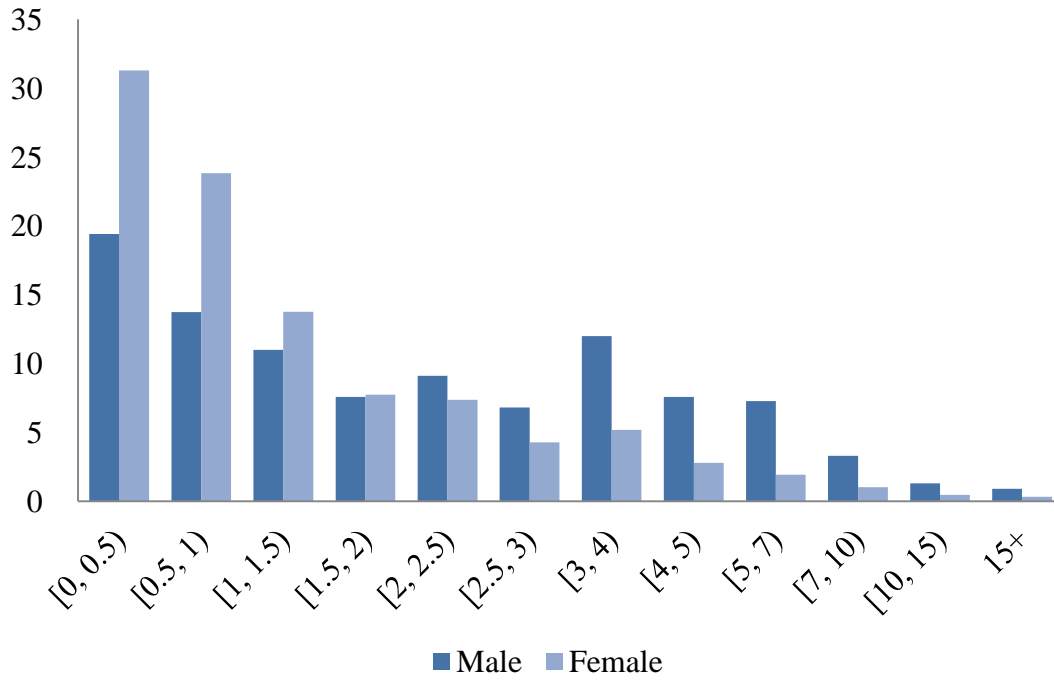
**Figure 2d: Income Distribution of Self-employed Workers *with* Preschool Children (%, millions of yen)**



Male    Female
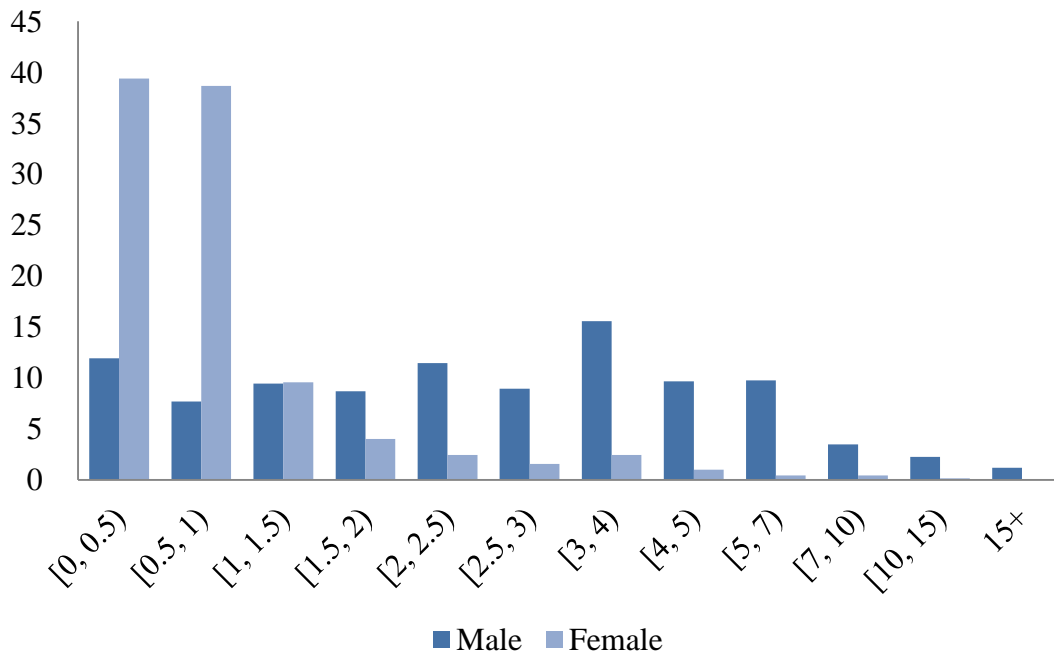
**Figure 3a: Distribution of Husbands' Annual Income (%, millions of yen), by Types of Female Worker**



Legend:
- Employees: without children
- Employees: 1 or more children
- Newly self-employed: without children
- Newly self-employed: 1 or more children
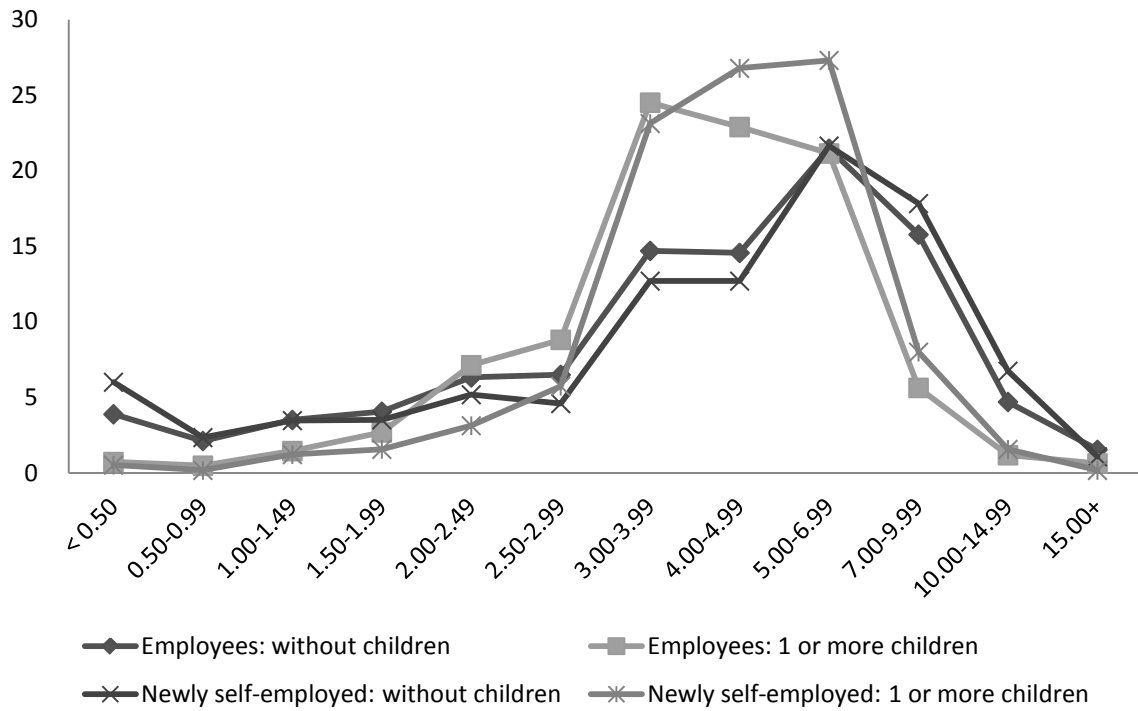
**Figure 3b: Distribution of Household Annual Income (%, millions of yen), by Types of Female Worker**



Legend: Employees: without children — Employees: 1 or more children — Newly self-employed: without children — Newly self-employed: 1 or more children
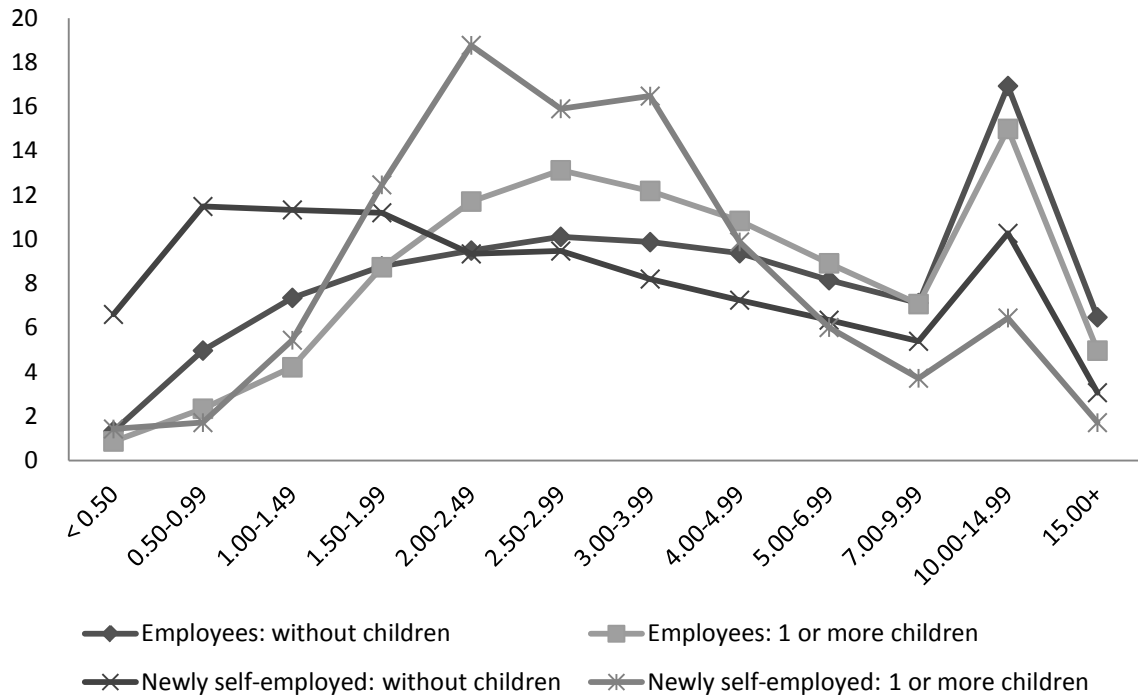
**Table 1: Changes in Employment Status of the Sample Employees during the Preceding Year**

| | | | Male | | | | Female | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Continuing employees (%) | Change to self-employed (%) | Change to jobless (%) | # of obs. | Continuing employees (%) | Change to self-employed (%) | Change to jobless (%) | # of obs. |
| Total | Age of the first child | 0 | 99.3 | 0.3 | 0.5 | 9,703 | 63.8 | 0.1 | 36.2 | 6,022 |
| | | 1 | 99.3 | 0.3 | 0.4 | 10,409 | 68.8 | 0.1 | 31.1 | 5,707 |
| | | 2 | 99.3 | 0.2 | 0.5 | 11,137 | 92.5 | 0.2 | 7.3 | 5,045 |
| | | 3 | 99.3 | 0.2 | 0.5 | 11,507 | 95.0 | 0.2 | 4.8 | 5,290 |
| | | 4 | 99.2 | 0.3 | 0.5 | 11,240 | 95.1 | 0.5 | 4.5 | 5,368 |
| | | 5 | 99.3 | 0.2 | 0.5 | 11,553 | 96.2 | 0.3 | 3.5 | 6,153 |
| | No preschool children | | 98.1 | 0.2 | 1.7 | 579,441 | 97.1 | 0.1 | 2.8 | 485,481 |
| 1992 | Age of the first child | 0 | 99.3 | 0.4 | 0.4 | 3,284 | 68.4 | 0.1 | 31.5 | 1,929 |
| | | 1 | 99.4 | 0.3 | 0.3 | 3,675 | 72.7 | 0.1 | 27.2 | 2,005 |
| | | 2 | 99.5 | 0.2 | 0.4 | 3,957 | 92.8 | 0.1 | 7.1 | 1,885 |
| | | 3 | 99.5 | 0.1 | 0.4 | 4,173 | 95.9 | 0.1 | 4.0 | 1,954 |
| | | 4 | 99.3 | 0.4 | 0.4 | 4,236 | 95.9 | 0.4 | 3.7 | 2,072 |
| | | 5 | 99.3 | 0.3 | 0.4 | 4,336 | 97.2 | 0.2 | 2.6 | 2,358 |
| | No preschool children | | 98.9 | 0.2 | 0.9 | 203,296 | 98.1 | 0.1 | 1.8 | 171,834 |
| 1997 | Age of the first child | 0 | 99.5 | 0.2 | 0.3 | 3,297 | 68.6 | 0.1 | 31.3 | 1,810 |
| | | 1 | 99.4 | 0.3 | 0.3 | 3,442 | 72.4 | 0.1 | 27.6 | 1,673 |
| | | 2 | 99.4 | 0.2 | 0.4 | 3,775 | 93.9 | 0.4 | 5.7 | 1,601 |
| | | 3 | 99.5 | 0.3 | 0.2 | 3,907 | 95.8 | 0.5 | 3.7 | 1,696 |
| | | 4 | 99.4 | 0.3 | 0.3 | 3,656 | 96.9 | 0.5 | 2.6 | 1,649 |
| | | 5 | 99.5 | 0.2 | 0.3 | 3,865 | 96.7 | 0.4 | 2.9 | 2,012 |
| | No preschool children | | 98.6 | 0.2 | 1.1 | 198,992 | 97.9 | 0.1 | 2.0 | 162,362 |
| 2002 | Age of the first child | 0 | 99.1 | 0.2 | 0.7 | 3,122 | 56.0 | 0.0 | 44.0 | 2,283 |
| | | 1 | 99.1 | 0.2 | 0.8 | 3,292 | 62.1 | 0.0 | 37.8 | 2,029 |
| | | 2 | 99.0 | 0.3 | 0.7 | 3,405 | 90.7 | 0.2 | 9.1 | 1,559 |
| | | 3 | 98.9 | 0.1 | 1.0 | 3,427 | 93.0 | 0.1 | 7.0 | 1,640 |
| | | 4 | 99.0 | 0.1 | 0.9 | 3,348 | 92.2 | 0.5 | 7.3 | 1,647 |
| | | 5 | 99.0 | 0.2 | 0.8 | 3,352 | 94.3 | 0.2 | 5.5 | 1,783 |
| | No preschool children | | 96.6 | 0.2 | 3.1 | 177,153 | 95.0 | 0.1 | 4.9 | 151,285 |

**Table 2: Descriptive Statistics of the Ratio of Newly Self-employed and the Average Annual Income of Male and Female Workers**

**Ratio of newly self-employed (%)**

|  | Total | Male | Female |
|---|---|---|---|
| Total | 1.5 | 2.1 | 0.9 |
| No preschool children | 1.5 | 2.0 | 0.8 |
| 1 or more preschool children | 1.9 | 2.2 | 1.3 |

**Average annual income (millions of yen)**

|  | Total | Male | Female |
|---|---|---|---|
| Total | 3.6 | 4.8 | 2.0 |
| Employees | 3.6 | 4.9 | 2.0 |
| No preschool children | 3.6 | 4.9 | 2.1 |
| 1 or more preschool children | 3.8 | 4.8 | 1.9 |
| Newly self-employed | 2.4 | 2.7 | 1.4 |
| No preschool children | 2.3 | 2.6 | 1.5 |
| 1 or more preschool children | 2.7 | 3.2 | 0.9 |

**Table 3: Sector-based Structure of Newly Self-employed Workers (%)**

|  |  | Construction | Manufacturing | Wholesale | Retail | Restaurant | Consumer service | Professional service | Business service | Others |
|---|---|---|---|---|---|---|---|---|---|---|
| All |  | 8.4 | 5.0 | 2.4 | 12.8 | 9.6 | 5.2 | 10.0 | 7.9 | 38.8 |
| Male |  | 11.1 | 5.8 | 3.0 | 10.3 | 7.1 | 2.5 | 7.4 | 6.5 | 46.3 |
| Female |  | 0.4 | 2.6 | 0.9 | 20.1 | 17.0 | 13.0 | 17.5 | 12.0 | 16.7 |
| Male | without preschool children | 9.5 | 5.9 | 3.0 | 10.1 | 6.8 | 2.6 | 7.5 | 7.1 | 47.5 |
|  | 1 or more preschool children | 19.0 | 4.9 | 2.9 | 11.6 | 8.3 | 2.1 | 6.8 | 3.9 | 40.6 |
| Female | without preschool children | 0.4 | 2.7 | 0.8 | 17.1 | 19.4 | 13.6 | 16.9 | 12.2 | 16.8 |
|  | 1 or more preschool children | 0.1 | 1.6 | 1.1 | 36.3 | 4.1 | 9.6 | 20.4 | 10.4 | 16.3 |

## Table 4: Types of Female Workers and Occupation Types of Their Husbands

| (%) | | Husband's occupation type | | | |
|---|---|---|---|---|---|
| Types of female workers | | Self-employed | Family worker | Employee | Un-employed |
| Employees | without children | 19.1 | 0.8 | 72.8 | 7.3 |
| | 1 or more children | 9.9 | 2.7 | 86.2 | 1.2 |
| Newly self-employed | without children | 13.1 | 2.0 | 73.1 | 11.8 |
| | 1 or more children | 5.9 | 0.7 | 93.1 | 0.3 |
| Total | | 18.0 | 1.0 | 74.3 | 6.7 |

## Table 5: Estimation Results of Interval Regression Models (Pooled Sample)

Dependent variable: ln(*Income*)

| Models | [1] | [2] | [3] | [4] |
|---|---|---|---|---|
| *Self* | –0.721*** | –1.008*** | –0.450*** | –0.643*** |
| | [0.00851] | [0.0317] | [0.00791] | [0.0300] |
| *Female* | –0.484*** | –0.476*** | –0.387*** | –0.380*** |
| | [0.00183] | [0.00184] | [0.00158] | [0.00159] |
| *Children* | –0.0247*** | –0.0225*** | –0.0280*** | –0.0261*** |
| | [0.00126] | [0.00126] | [0.00117] | [0.00117] |
| *Self_Fem* | 0.193*** | 0.149*** | 0.218*** | 0.245*** |
| | [0.0174] | [0.0203] | [0.0160] | [0.0189] |
| *Self_Child* | 0.120*** | 0.0567*** | 0.0601*** | 0.0260* |
| | [0.0128] | [0.0125] | [0.0120] | [0.0121] |
| *Fem_Child* | –0.0288*** | –0.0330*** | 0.0155*** | 0.0129*** |
| | [0.00291] | [0.00294] | [0.00239] | [0.00241] |
| *Self_Fem_Child* | –0.290*** | –0.204*** | –0.162*** | –0.122*** |
| | [0.0286] | [0.0285] | [0.0253] | [0.0254] |
| *ln(_sigma)* | –0.424*** | –0.436*** | –0.582*** | –0.595*** |
| | [0.000835] | [0.000860] | [0.000930] | [0.000958] |
| Controls for demographics | Yes | Yes | Yes | Yes |
| Controls for current and previous jobs | | Yes | | Yes |
| Working day/hour dummies | | | Yes | Yes |
| Cohort dummies | Yes | Yes | Yes | Yes |
| Number of observations | 1,230,234 | 1,165,494 | 1,227,298 | 1,162,991 |

Robust standard errors in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

**Table 6: Estimated Marginal Effects (Pooled Sample; 1%/100 Change in Income)**

| | Models | [1] | | [2] | | [3] | | [4] | |
|---|---|---|---|---|---|---|---|---|---|
| | Female/male gap within: | | | | | | | | |
| [1] | Newly self-employed without preschool children | –0.291*** | [0.017] | –0.327*** | [0.020] | –0.169*** | [0.016] | –0.135*** | [0.019] |
| [2] | Newly self-employed with 1 preschool child | –0.610*** | [0.027] | –0.564*** | [0.028] | –0.315*** | [0.024] | –0.243*** | [0.026] |
| [3] | Newly self-employed with 2 preschool children | –0.929*** | [0.052] | –0.802*** | [0.053] | –0.462*** | [0.046] | –0.352*** | [0.048] |
| [4] | Employees without preschool children | –0.484*** | [0.002] | –0.476*** | [0.002] | –0.387*** | [0.002] | –0.380*** | [0.002] |
| [5] | Employees with 1 preschool child | –0.513*** | [0.003] | –0.509*** | [0.003] | –0.371*** | [0.003] | –0.367*** | [0.003] |
| [6] | Employees with 2 preschool children | –0.541*** | [0.006] | –0.542*** | [0.006] | –0.356*** | [0.005] | –0.354*** | [0.005] |
| | Newly self-employed/employee gap within: | | | | | | | | |
| [7] | Female without preschool children | –0.528*** | [0.015] | | | –0.232*** | [0.014] | | |
| [8] | Female with 1 preschool child | –0.698*** | [0.024] | | | –0.334*** | [0.021] | | |
| [9] | Female with 2 preschool children | –0.868*** | [0.047] | | | –0.436*** | [0.041] | | |
| [10] | Male without preschool children | –0.721*** | [0.009] | | | –0.450*** | [0.008] | | |
| [11] | Male with 1 preschool child | –0.601*** | [0.012] | | | –0.390*** | [0.011] | | |
| [12] | Male with 2 preschool children | –0.481*** | [0.023] | | | –0.330*** | [0.022] | | |
| | Effects of the number of preschool children within: | | | | | | | | |
| [13] | Female self-employed | –0.224*** | [0.025] | –0.203*** | [0.026] | –0.114*** | [0.022] | –0.109*** | [0.022] |
| [14] | Female employees | –0.053*** | [0.003] | –0.056*** | [0.003] | –0.012*** | [0.002] | –0.013*** | [0.002] |
| [15] | Male newly self-employed | 0.095*** | [0.013] | 0.034** | [0.012] | 0.032** | [0.012] | 0.000 | [0.012] |
| [16] | Male employees | –0.025*** | [0.001] | –0.022*** | [0.001] | –0.028*** | [0.001] | –0.026*** | [0.001] |
| | Control variables: | | | | | | | | |
| [17] | Demographics | Yes | | Yes | | Yes | | Yes | |
| [18] | Current and previous job | | | Yes | | | | Yes | |
| [19] | Working day/hour dummies | | | | | Yes | | Yes | |
| [20] | Cohort dummies | Yes | | Yes | | Yes | | Yes | |

Robust standard errors in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

**Table 7: Estimation Results Controlling for the Timing of Childbirth (Pooled Sample)**

Dependent variable: ln(*Income*)

| Models | [1] | [2] | [3] | [4] |
|---|---|---|---|---|
| *Self* | −1.008*** | −1.006*** | −0.747*** | −0.643*** |
| | [0.0317] | [0.0317] | [0.0301] | [0.0301] |
| *Female* | −0.476*** | −0.476*** | −0.430*** | −0.380*** |
| | [0.00184] | [0.00184] | [0.00167] | [0.00159] |
| *Children* | −0.0225*** | −0.0224*** | −0.0242*** | −0.0261*** |
| | [0.00126] | [0.00126] | [0.00120] | [0.00117] |
| *Self_Fem* | 0.149*** | 0.149*** | 0.239*** | 0.245*** |
| | [0.0203] | [0.0203] | [0.0192] | [0.0189] |
| *Self_Child* | 0.0567*** | 0.0465* | 0.0404* | 0.025 |
| | [0.0125] | [0.0187] | [0.0179] | [0.0181] |
| *Fem_Child* | −0.0330*** | −0.0329*** | −0.001 | 0.0129*** |
| | [0.00294] | [0.00294] | [0.00264] | [0.00241] |
| *Self_Fem_Child* | −0.204*** | −0.203*** | −0.213*** | −0.122*** |
| | [0.0285] | [0.0361] | [0.0339] | [0.0321] |
| *Startup before Childbirth* | | 0.027 | −0.008 | 0.001 |
| | | [0.0353] | [0.0339] | [0.0344] |
| *Female × Startup before Childbirth* | | 0.002 | 0.120 | 0.004 |
| | | [0.0793] | [0.0747] | [0.0727] |
| *ln(_sigma)* | −0.436*** | −0.436*** | −0.530*** | −0.595*** |
| | [0.000860] | [0.000860] | [0.000885] | [0.000958] |
| Controls for demographics | Yes | Yes | Yes | Yes |
| Controls for current and previous jobs | Yes | Yes | Yes | Yes |
| Working day dummies | | | Yes | |
| Working day/hour dummies | | | | Yes |
| Cohort dummies | Yes | Yes | Yes | Yes |
| Number of observations | 1,165,494 | 1,165,268 | 1,163,864 | 1,162,784 |

Robust standard errors in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

**Table 8: Effects of the Reasons for Job Turnover (Pooled Sample)**

Dependent variable: ln(*Income*)

| Models | [1] | [2] | [3] | [4] | [5] |
|---|---|---|---|---|---|
| *Self* | −1.008*** | −0.984*** | −1.000*** | −1.007*** | −1.007*** |
| | [0.0317] | [0.0313] | [0.0316] | [0.0317] | [0.0317] |
| *Female* | −0.476*** | −0.481*** | −0.476*** | −0.476*** | −0.476*** |
| | [0.00184] | [0.00182] | [0.00184] | [0.00184] | [0.00184] |
| *Children* | −0.0225*** | | −0.0227*** | −0.0225*** | −0.0225*** |
| | [0.00126] | | [0.00126] | [0.00126] | [0.00126] |
| *Self_Fem* | 0.149*** | 0.203*** | 0.222*** | 0.153*** | 0.154*** |
| | [0.0203] | [0.0205] | [0.0211] | [0.0204] | [0.0204] |
| *Self_Child* | 0.0567*** | | 0.0531*** | 0.0548*** | 0.0543** |
| | [0.0125] | | [0.0125] | [0.0126] | [0.0169] |
| *Fem_Child* | −0.0330*** | | −0.0330*** | −0.0330*** | −0.0330*** |
| | [0.00294] | | [0.00294] | [0.00294] | [0.00294] |
| *Self_Fem_Child* | −0.204*** | | −0.0822** | −0.0987** | −0.068 |
| | [0.0285] | | [0.0298] | [0.0373] | [0.0457] |
| *Male × Turnover for marriage or childcare* | | 0.219 | 0.195 | | |
| | | [0.132] | [0.132] | | |
| *Female × Turnover for marriage or childcare* | | −0.471*** | −0.441*** | | |
| | | [0.0328] | [0.0352] | | |
| *Male × Preschool children × Turnover for marriage or childcare* | | | | 0.264 | 0.264 |
| | | | | [0.164] | [0.165] |
| *Female × Preschool children × Turnover for marriage or childcare* | | | | −0.271*** | −0.313*** |
| | | | | [0.0607] | [0.0695] |
| *Male × Preschool children × Turnover to pursue economic opportunities* | | | | | 0.001 |
| | | | | | [0.0316] |
| *Female × Preschool children × Turnover to pursue economic opportunities* | | | | | −0.126 |
| | | | | | [0.0949] |
| *ln(sigma)* | −0.436*** | −0.436*** | −0.436*** | −0.436*** | −0.436*** |
| | [0.000860] | [0.000860] | [0.000860] | [0.000860] | [0.000860] |
| Controls for demographics | Yes | Yes | Yes | Yes | Yes |
| Controls for current and previous jobs | Yes | Yes | Yes | Yes | Yes |
| Cohort dummies | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 1,165,494 | 1,165,599 | 1,165,471 | 1,165,471 | 1,165,471 |

Robust standard errors in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

## Table 9: Differences among Cohorts (Interval Regression Models)

Dependent variable: ln(*Income)*

|  |  | [1] |  | [2] |  | [3] |  | [4] |  |
|---|---|---|---|---|---|---|---|---|---|
| *Self* |  | –0.590*** | [0.014] | –0.952*** | [0.051] | –0.353*** | [0.013] | –0.593*** | [0.048] |
| *Female* |  | –0.496*** | [0.003] | –0.487*** | [0.003] | –0.420*** | [0.003] | –0.413*** | [0.003] |
| *Children* |  | –0.033*** | [0.002] | –0.030*** | [0.002] | –0.034*** | [0.002] | –0.032*** | [0.002] |
| *Self_Fem* |  | 0.183*** | [0.029] | 0.106** | [0.034] | 0.219*** | [0.026] | 0.211*** | [0.031] |
| *Self_Child* |  | 0.047* | [0.019] | 0.012 | [0.018] | 0.018 | [0.018] | –0.002 | [0.018] |
| *Fem_Child* |  | –0.040*** | [0.005] | –0.045*** | [0.005] | 0.003 | [0.004] | –0.001 | [0.004] |
| *Self_Fem_Child* |  | –0.251*** | [0.048] | –0.159*** | [0.047] | –0.173*** | [0.041] | –0.127** | [0.041] |
| *Y97* | *Self* | –0.162*** | [0.020] | –0.075 | [0.075] | –0.117*** | [0.019] | –0.081 | [0.071] |
| × | *Female* | 0.025*** | [0.004] | 0.024*** | [0.004] | 0.063*** | [0.004] | 0.062*** | [0.004] |
|  | *Children* | 0.016*** | [0.003] | 0.014*** | [0.003] | 0.012*** | [0.003] | 0.011*** | [0.003] |
|  | *Self_Fem* | –0.060 | [0.041] | –0.026 | [0.047] | –0.039 | [0.037] | 0.010 | [0.044] |
|  | *Self_Child* | 0.101*** | [0.030] | 0.057* | [0.028] | 0.051 | [0.028] | 0.026 | [0.028] |
|  | *Fem_Child* | 0.010 | [0.007] | 0.013 | [0.007] | 0.011* | [0.006] | 0.014* | [0.006] |
|  | *Self_Fem_Child* | –0.057 | [0.068] | –0.051 | [0.067] | 0.047 | [0.059] | 0.045 | [0.059] |
| *Y02* | *Self* | –0.260*** | [0.021] | –0.091 | [0.079] | –0.203*** | [0.019] | –0.074 | [0.074] |
| × | *Female* | 0.018*** | [0.005] | 0.015** | [0.005] | 0.052*** | [0.004] | 0.050*** | [0.004] |
|  | *Children* | 0.013*** | [0.003] | 0.013*** | [0.003] | 0.008** | [0.003] | 0.008** | [0.003] |
|  | *Self_Fem* | 0.100* | [0.044] | 0.178*** | [0.052] | 0.039 | [0.041] | 0.103* | [0.048] |
|  | *Self_Child* | 0.123*** | [0.033] | 0.081* | [0.033] | 0.073* | [0.031] | 0.052 | [0.031] |
|  | *Fem_Child* | 0.030*** | [0.007] | 0.032*** | [0.007] | 0.034*** | [0.006] | 0.036*** | [0.006] |
|  | *Self_Fem_Child* | –0.058 | [0.071] | –0.106 | [0.072] | –0.016 | [0.064] | –0.038 | [0.066] |
| *ln(sigma)* |  | –0.427*** | [0.001] | –0.438*** | [0.001] | –0.586*** | [0.001] | –0.600*** | [0.001] |
| Cohort dummies × Controls for demographics |  | Yes |  | Yes |  | Yes |  | Yes |  |
| Cohort dummies × Controls for current and previous jobs |  |  |  | Yes |  |  |  | Yes |  |
| Cohort dummies × Working day/hour dummies |  |  |  |  |  | Yes |  | Yes |  |
| Number of observations |  | 1,230,234 |  | 1,165,494 |  | 1,227,298 |  | 1,162,991 |  |

Robust standard errors in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

**Table 10: Comparison of Marginal Effects between Cohorts**

**(interval regression models without controlling for current and previous jobs and working days and hours: 1%/100 change in income)**

| | | Y92 | | Y97 | | Y02 | | Diff.: Y97–Y92 | | Diff.: Y02–Y92 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Female/male gap within: | | | | | | | | | | |
| [1] | Newly self–employed without preschool children | –0.313*** | [0.029] | –0.348*** | [0.029] | –0.195*** | [0.034] | –0.035 | [0.041] | 0.118** | [0.044] |
| [2] | Newly self–employed with 1 preschool child | –0.604*** | [0.046] | –0.686*** | [0.045] | –0.514*** | [0.049] | –0.082 | [0.064] | 0.090 | [0.067] |
| [3] | Newly self–employed with 2 preschool children | –0.895*** | [0.089] | –1.023*** | [0.088] | –0.832*** | [0.095] | –0.128 | [0.125] | 0.063 | [0.130] |
| [4] | Employees without preschool children | –0.496*** | [0.003] | –0.472*** | [0.003] | –0.478*** | [0.003] | 0.025*** | [0.004] | 0.018*** | [0.005] |
| [5] | Employees with 1 preschool child | –0.536*** | [0.005] | –0.501*** | [0.006] | –0.488*** | [0.006] | 0.035*** | [0.008] | 0.048*** | [0.008] |
| [6] | Employees with 2 preschool children | –0.576*** | [0.009] | –0.530*** | [0.010] | –0.498*** | [0.011] | 0.045** | [0.014] | 0.078*** | [0.014] |
| | Newly self-employed/employee gap within: | | | | | | | | | | |
| [7] | Female without preschool children | –0.407*** | [0.025] | –0.628*** | [0.025] | –0.567*** | [0.030] | –0.221*** | [0.035] | –0.161*** | [0.039] |
| [8] | Female with 1 preschool child | –0.610*** | [0.042] | –0.787*** | [0.040] | –0.705*** | [0.042] | –0.177** | [0.058] | –0.095 | [0.059] |
| [9] | Female with 2 preschool children | –0.814*** | [0.082] | –0.947*** | [0.078] | –0.843*** | [0.081] | –0.133 | [0.114] | –0.029 | [0.116] |
| [10] | Male without preschool children | –0.590*** | [0.014] | –0.751*** | [0.015] | –0.850*** | [0.016] | –0.162*** | [0.020] | –0.260*** | [0.021] |
| [11] | Male with 1 preschool child | –0.542*** | [0.018] | –0.603*** | [0.021] | –0.679*** | [0.026] | –0.060* | [0.028] | –0.137*** | [0.031] |
| [12] | Male with 2 preschool children | –0.495*** | [0.034] | –0.454*** | [0.042] | –0.509*** | [0.050] | 0.041 | [0.054] | –0.014 | [0.061] |
| | Effects of the number of preschool children within: | | | | | | | | | | |
| [13] | Female newly self-employed | –0.276*** | [0.044] | –0.206*** | [0.042] | –0.167*** | [0.045] | 0.070 | [0.061] | 0.109 | [0.063] |
| [14] | Female employees | –0.073*** | [0.004] | –0.046*** | [0.005] | –0.029*** | [0.005] | 0.026*** | [0.007] | 0.043*** | [0.007] |
| [15] | Male newly self-employed | 0.015 | [0.019] | 0.132*** | [0.023] | 0.151*** | [0.027] | 0.117*** | [0.030] | 0.136*** | [0.033] |
| [16] | Male employees | –0.033*** | [0.002] | –0.017*** | [0.002] | –0.020*** | [0.002] | 0.016*** | [0.003] | 0.013*** | [0.003] |

Robust standard errors in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

# Appendix

## Table A1: Definition of Variables

| Variable | Definition |
|---|---|
| *Income* | Income levels of workers: ordinal variable in 12 categories (less than JPY0.5 million, JPY0.5–0.99 million, JPY1–1.49 million, JPY1.5–1.99 million, JPY2–2.49 million, JPY2.5–2.99 million, JPY3–3.99 million, JPY4–4.99 million, JPY5–6.99 million, JPY7−9.99 million, JPY10–14.99 million, and JPY15 million+) |
| *Self* | Self-employment dummy variable: a value of 1 for self-employed workers within five years since start-up, and 0 for employees |
| *Fem* | Female dummy variable: a value of 1 for female and 0 for male workers |
| *Child* | Number of preschool children (up to five years old) |
| *UnivGrad* | Dummy variable: a value of 1 one for university graduates, and 0 otherwise |
| *Age* | Worker's age in 10 groups (15–24 / 25–29 / 30–34 / 35–39 / 40–44* / 45–49 / 50–54 /55–59 /60–64 / 65+), each of them corresponding to a dummy variable |
| *HeadHH* | Dummy variable: a value of 1 for heads of households, and 0 otherwise |
| *Spouse* | Dummy variable: a value of 1 for spouses of the household heads, and 0 otherwise |
| *Marriage* | Dummy variable: a value of 1 if the worker is married, and 0 otherwise |
| *Metro* | Dummy variable: a value of 1 for the inhabitants of the three largest cities in Japan (Tokyo, Osaka, or Nagoya), and 0 otherwise |
| *Year* | Set of year dummies: a value of 1 for each survey year (1992* / 1997 / 2002), and 0 otherwise |
| *Duration* | Set of five dummy variables: a value of one for each group of business duration since start-up (1* / 2 / 3 / 4 / 5 years), and 0 otherwise |
| *PrevTenure* | Set of nine dummy variables: a value of 1 for each group of experience in the previous job (less than 1 year / 1–2 years / 3–4 / 5–9* / 10–14 / 15–19 / 20–24 / 25–29 / 30+ years), and 0 otherwise |
| *PrevPosition* | Set of five dummy variables: a value of 1 for each category of previous job position (regular workers* / nonregular (part-time) workers / executive officers / self-employed / others), and 0 otherwise |
| *PrevSize* | Set of 11 dummy variables: a value of 1 for each employee size group of the previous job (1–4* / 5–9 / 10–19 / 20–29 / 30–49 / 50–99 / 100–299 / 30–499 / 500–999 / 1,000+ employees / public agency), and 0 otherwise |
| *SameSector* | Dummy variable: a value of 1 if the business sector of the self-employed is the same as in the previous job, and 0 otherwise |
| *Sector* | Set of 10 dummy variables: a value of 1 for each sector (construction / manufacturing / wholesale / retail / restaurant / consumer service / business service / medical service / educational service / others*), and 0 otherwise |
| *Working days* | Set of six dummy variables: one for each category of working days (working fewer than 50 days a year* / 50–99 / 100–149 / 150–199 / 200–249 / 250 days or more), and 0 otherwise |
| *Working days/hours* | Set of 11 dummy variables: one for each category of working days or hours (nonregular worker working fewer than 50 days a year* / 50–99 / 100–149 / 150+ days / regular worker working fewer than 15 hours a week / 15–21 hours a week / 22–34 / 43–45 / 46–48 / 49–59 / 60 hours+ a week), and 0 otherwise |

\* The names of the control variables do not appear in the estimation results tables.

**Table A2: Estimation Results of Ordered Probit Models (Pooled Sample)**

Dependent variable: *Income*

| Models | [1] | [2] | [3] | [4] |
|---|---|---|---|---|
| *Self* | –1.106*** | –1.507*** | –1.248*** | –1.153*** |
| | [0.0125] | [0.0466] | [0.0487] | [0.0519] |
| *Female* | –0.738*** | –0.737*** | –0.730*** | –0.693*** |
| | [0.00274] | [0.00278] | [0.00280] | [0.00287] |
| *Children* | –0.0527*** | –0.0488*** | –0.0521*** | –0.0557*** |
| | [0.00211] | [0.00215] | [0.00220] | [0.00224] |
| *Self_Fem* | 0.395*** | 0.346*** | 0.487*** | 0.512*** |
| | [0.0246] | [0.0296] | [0.0308] | [0.0324] |
| *Self_Child* | 0.189*** | 0.0975*** | 0.0739*** | 0.0565** |
| | [0.0193] | [0.0191] | [0.0202] | [0.0214] |
| *Fem_Child* | 0.00329 | –0.00413 | 0.0324*** | 0.0504*** |
| | [0.00413] | [0.00422] | [0.00422] | [0.00416] |
| *Self_Fem_Child* | –0.403*** | –0.287*** | –0.277*** | –0.203*** |
| | [0.0399] | [0.0404] | [0.0424] | [0.0429] |
| Controls for demographics | Yes | Yes | Yes | Yes |
| Controls for current and previous jobs | | Yes | Yes | Yes |
| Working day dummies | | | Yes | |
| Working day/hour dummies | | | | Yes |
| Cohort dummies | Yes | Yes | Yes | Yes |
| Number of observations | 1,230,234 | 1,165,494 | 1,164,074 | 1,162,991 |

Robust standard errors in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.