Has Abe's Womanomics Worked?

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The present paper estimates the effect of the Abe Cabinet's Womanomics policies that aimed to increase female labor supply and keep women on a career path. The policies are surveyed, and the effects are estimated using microdata from the *Labor Force Survey* combined with data at the prefectural level on day care provision. A *difference-in-difference* (DD) method is applied to uncover the impacts of the Abe Cabinet's policies. The rapid increase in the provision of infant care, especially in the urban area, has contributed to a strong increase in the labor participation of mothers with young children. In addition, DD method estimates show a strong increase in mothers with infants staying in *permanent-contract regular employment*. A significant shortening of work hours of workers, especially of parents with infants, is observed, which enabled working mothers to maintain their employment status. A change in the gender wage gap in the Japanese labor market is observed, but much progress is still required to close the large wage gap.

Key words: day care, female labor supply, gender wage gap, nonstandard work arrangement, parental leave

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1.　Introduction

Japan's working population is shrinking rapidly. Improvement of the birth rate and simultaneous increase of the female labor supply are essential for the Japanese economy to increase labor force. Successive Japanese governments rolled out policies to encourage both child bearing and increased labor supply by mothers from the 1990s with surprisingly little success. From around 2010, we have seen some changes in the scenery.

The Abe Cabinet was formed in late 2012 and announced that "Womanomics" was a key policy for economic growth. The core of the third arrow of *Abenomics'* "Japan

Revitalization Strategy" is promoting women's active participation in Japanese society. The present paper examines how well this policy has worked.

The main aims of Womanomics are: (i) to increase women in leadership positions, (ii) to eliminate childcare waiting lists by increasing the supply to childcare places, (iii) to encourage men to take more active roles in parenting, and (iv) to achieve better work and life balances and reduce the infamous long working hours of Japanese companies (Muraki, 2013). As we will see later, many of these policies had already been started before the Abe Cabinet took office. Was Abe more successful in the implementation of these policies than earlier administrations? On the whole, nonstandard employment has been on the increase throughout the 2000s in Japan, while the wage gap between *permanent-contract regular employees*[1] and nonstandard employees has been huge compared with other countries, even after controlling for such factors as educational attainment, tenure, and occupation (Nagase, 1997a, 2003a; Osawa *et al.,* 2012). Therefore, an increase of women in *permanent-contract regular employment* is an important indicator of women's career prospects that the present paper will focus on. The nonstandard employees (*hiseishain*) are hourly workers called "part-time," "arbeit (temporary)," "temporary dispatched," "fixed-term contract," and other workers. The largest share of nonstandard employees is made up of "part-time" and "arbeit," and this group will be called "hourly part-time."

The present paper finds that during the period 2013–2015, there was a substantial increase in the proportion of new mothers continuing to work as *permanent-contract regular employees.* The labor supply of mothers with infants has significantly increased since 2013 under the Abe administration for both *permanent-contract regular employees* and nonstandard employees. Apart from the impact of the changes in labor supply brought about by the favorable changes such as increase in child care leave allowance and reduction of living work hours introduced during the Abe administration, the strong growth in the provision of accredited infant care has had a significant effect on increasing the supply of maternal labor. The hours worked by mothers with infants, especially those in *permanent-contract regular employment,* have decreased substantially, and the hours worked by fathers and single males and females have decreased by smaller but significant amounts as well. These changes can be viewed as significant positive impacts of Abenomics. The number of women in leadership positions, however, is still very low as of 2015, although a major law was enacted in 2016, and we need to wait to see the effect of this new law. The structural factors retaining a gender income gap still remain a future challenge.

The structure of the present paper is organized as follows. The present paper will first give a short background introduction of the past measures taken by the Japanese government to increase female labor supply and to allow childbearing along with work. It will then provide detailed policies aimed at increasing work and life balance and increasing women on the career ladder in order to show descriptive analysis of outcome variables. Section 4 discusses the estimation strategy that is used to discover the impact of policy measures on labor supply, which will be explained on labor market outcomes, while Section 5 discusses the results. Section 6 provides some concluding remarks.

2.   General background: low maternal labor supply until early 2000s and subsequent change

After the total fertility rate fell to 1.57 in 1989, the Japanese government sought to increase the birth rate by reducing the opportunity cost of children for working women. The main measures implemented in the 1990s and early 2000s were the introduction of a childcare leave program, its later enhancement, and an increase in the number of accredited childcare places.

Notwithstanding these policies, changes in maternal labor supply were small until around 2005. According to the results of *National Fertility Surveys*, although the childcare leave program enacted in 1992 allowed those parents with leave entitlements to take 1 year's leave without losing their jobs, around 40% of new mothers continued to quit their jobs until the early 2000s due to marriage and then childbirth, just as they did in the 1980s and 1990s (Nagase, 1999; Nagase & Moriizumi, 2013). Asai (2015) estimates the effect of the increase in the childcare leave allowance implemented in 2001 among those with leave entitlements but finds no impact on maternal labor supply or work continuation. Abe (2010, 2011) shows that despite the implementation of the Equal Employment Law in 1986 and its enhancement in 1997, and further amendments in 2007 and 2017, the ratio of women in *permanent-contract regular employee* positions, where income often increases with tenure, never increased among women in their mid-30s–40s. Teramura (2014) analyzes corporate culture pushing women workers to quit upon marriage and childbirth. Eunmi and Brinton (2015) also point to the importance of workplace culture for women to take childcare leave. Evidence from the Ministry of Health, Labor and Welfare's (MHLW) 2004 *Longitudinal Survey of Adults of 21st Century* indicates that only 27% of *permanent-contract regular employees* and less than 20% of all workers replied that they felt the childcare leave program was accessible and easy to use (Nagase, 2014). Marriage and childbirth continued to be delayed and deferred while more women stayed single and worked (Iwasawa, 2004).

Many studies such as Unayama (2011) find strong positive effects of day care provision on female employment at marriage and at childbirth. Nagase (2007), however, points out that the actual increase in infant care was quite limited in urban centers where demand was mounting. Asai *et al.* (2015) find that childcare provision increased maternal employment in nuclear families but not in extended families, where day care seems to have substituted informal childcare provided by grandparents.

The government acknowledged the importance of changing work culture for both males and females in the early 2000s, and the Basic Act for Measures to Cope with Society's Declining Birth Rate of 2003 mandated municipalities as well as firms with more than 300 employees to produce action plans to help employees who were raising children. The Cabinet Office introduced an award system for firms with high work–life balance awareness that allowed these firms to display a government certification ("*Kurumin*" mark) on their products, even though the criteria for the award itself involved implicit gender division at Japanese companies, such as a female use of childcare leave exceeding 70% and "at least one male child care leave user." In late 2007,

the government, the national headquarters of the employer organizations, and the unions created a "work and life balance charter" stating that having a work–life balance was necessary. Despite this menu of policies, the *National Fertility Survey* of 2010, which shows the 5-year average of the ratio of new mothers in the workforce, revealed that there was almost no increase in the ratio of women who continued work when their first child was aged one.

Around 2009, statistics finally started showing that maternal employment was increasing. For example, the MHLW's *Longitudinal Survey of Children of the 21st Century* showed that new mothers' employment increased from 24.6% in the 2001 baby cohort survey to 36.6% in the 2010 baby cohort survey. The *National Fertility Survey* of 2015 also showed that the maternal employment rate of mothers with a first child aged one rose from 29.1% in the period 2005–2009 to 38.3% in the period 2010–2014.

Using the difference-in-difference (DD) method, Nagase (2014, 2015) found that the 2009 short-hour option mandate that allowed workers with a child younger than 3 years to reduce work hours to 6 hours a day, which was extended to firms with more than 100 employees from 2010 and to all firms from 2012, had a significant and powerful effect on inducing change by increasing marriages, first childbirths, and work continuation as well. However, Nagase also found that it did not have a significant effect on the second or third births.

Figure 1 shows the trends of women in employment by selected marital status using data from the *Labor Force Survey*. A strong rise in the labor participation of mothers with children aged 0–3 years after 2009, and further increase after 2012, can be observed. We can say that the main reason for the rise in the average labor participation rate of women aged 25–39 years during 2002–2015 was not because of the rise of single women but because of the rise of married women in employment.

Figure 1 Labor force participation rates for females aged 25–39 years.
Source: Computed by the author using microdata from the *Labor Force Survey*.

One important point to check is whether or not these mothers with a child aged 0–3 years were working as *permanent-contract regular employees* or as nonstandard employment workers.

Figure 2 shows the percentage of women who worked as *permanent-contract regular employees.* The remaining women either work in nonstandard work arrangements or are out of the labor force. Even though the percentage of women who worked as *permanent-contract regular employees* was still 40% in 2015, the rise in permanent-contract regular women employees who were university graduates with one child aged between 0 and 3 years is substantial. However, the work stability of single women with a high school education or less is deteriorating. For women who are high school graduates who never married and are aged 25–39 years, the percentage of *permanent-contract regular employees* dropped from 50% in 2002 to nearly 35% in 2015. On average, nearly one in two single women was either in nonstandard work or out of the labor force in 2015. They may be in economic hardship since the income of nonstandard workers who are paid by the hour has been designed to be "additional help" to the household budget, when it was initiated as hourly paid part-time work for married women, and not as a means to support one's own living.
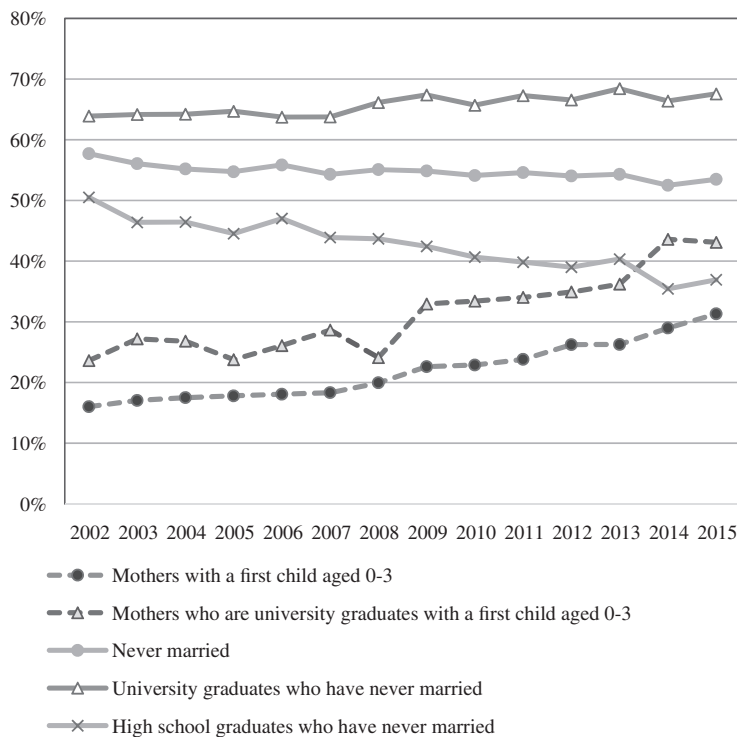

Figure 2 Percentage of *Permanent-contract regular employees* by educational attainment and by marital status for women aged 25–39 years.
Source: Computed by the author using microdata from the *Labor Force Survey.*

Even though we see some favorable developments, for second births, Nagase and Brinton (2017) find that an increase in the time fathers spent on household work had a significant effect for dual-earning couples but that the actual time fathers devoted to household work was far from enough to compensate for the negative effect of women at work on birth timing. They also found that the labor practices at large firms reduce paternal involvement in domestic work. Mizuochi (2010) also found that when fathers involvement in household work increases, it increases the family's intention to have another child.

3. Womanomics and its targets

This section reviews government policy in four areas: childcare (Section 3.1), work–life balance (Section 3.2), tax and social security policies to increase married part-time workers' hours worked (Section 3.3), and policies to increase the number of women leaders (Section 3.4). Any positive effects on *permanent-contract regular employment* have the potential long-run effect of keeping women in higher-paying jobs and on the promotion ladder. For this reason, childcare leave and the government's family-friendly policies have been directed mainly toward helping mothers continue to work in *permanent-contract regular employment*. To achieve this aim, the Abe Cabinet's policies have been to: (i) speed up increases in daycare supply, (ii) increase the childcare allowance for childcare leave users for the first 6 months of leave from 50% to 67% of the salary, and (iii) strongly advocate family-friendly firm culture. The Abe Cabinet has also advocated wage increases and a reduction of long overtime hours.

3.1 Childcare provision policy in Japan

The government started its supply of accredited and subsidized childcare early after World War II to provide for children affected by the war. During the rapid economic growth of the 1960s, however, the Social Security Council announced that the government should suppress the supply of subsidized infant care so that infants are cared for in an intimate environment. In the years to come, the provision of infant care was suppressed, while the subsidized day care for children aged over 3 years was increased (Nagase, 1997b).

Child day care and kindergarten are managed by different ministries in Japan; thus, accredited day care facilities are treated as welfare facilities and fall under the administration of MHLW, while kindergartens, which are considered to be schools, fall under the administration of the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Government subsidies for child day care facilities were larger than those for kindergartens. Kindergartens are facilities for children aged 3–6 years, whose opening hours were basically 4 hours a day. In order to attend accredited day care, a child had to lack family care, such as having both parents working or being ill, and no other relatives to take care of the child. However, in Nagase's (2003b) survey of 3300 municipalities conducted in 1997, which concerned day care and kindergarten care provision[2]

and had a response rate of 64%, she found large regional variations in the use of accredited day care and kindergarten provision, which went far beyond the general rules and the regional differences in maternal employment rates. In general, subsidized accredited day care was found to be more prevalent in the rural area because more women worked as family workers and also because of higher governmental subsidy outlays. In urban areas, kindergartens were more prominent. The provision of infant care was suppressed in all regions in 1997, providing much less than 10% of the zero-year-old population. In urban metropolitan areas, where the provision rate of kindergarten was higher than that of day care, the ratio of stay-at-home mothers remained high.

The drop in fertility rates made the MHLW change its policy to start increasing the supply of accredited infant day care through the so-called Angel Plan of 1994–1999, the New Angel Plan of 2000–2004, and the Renewed Angels Plan of 2005–2009. The increase in supply was slow, especially in urban areas, despite the higher demand and lower supply, while the increase in places for infants in rural areas performed better (Nagase, 2007).

In 2008, a clear long-term governmental target concerning childcare provision was finally made, namely, the long-term target of increasing the ratio of childcare places for children aged under 3 years from 20% at the time to 38% by 2017.[3] For the first time, municipalities recognized the clear national target for infant day care provision.

Another impetus for change was the establishment of three new laws concerning childcare in August 2012. The Noda government promised that the budget for aiding childcare supply would be increased when the consumption tax law passed and that it would introduce new subsidies that not only cover accredited day care but also kindergartens if the mother worked. Although the consumption tax was not increased as planned, the reform went forward, and the Abe Cabinet ensured that day care availability increased by a further 200,000 places between 2013 and 2015 and another 200,000 places 2017.

Increasing day care places for infants, however, has not been straightforward. Table 1 provides information on the trends in some selected densely populated prefectures and rural prefectures. In 2002, the percentage of accredited day care places for the 2-year-old population was only 26% in Tokyo, 13% in Kanagawa, and 14% in Saitama, the three prefectures in the larger Tokyo metropolitan area where work opportunities are abundant. However, the percentage was as high as 40% in Tottori and 42% in Shimane, both rural prefectures.

Not only was the provision of childcare low in metropolitan areas, but the growth of infant care was also slow till 2008 despite the series of "Angel Plans." Table 1 shows that over the period 2002–2007, the rate of increase in childcare places for children aged 2 years was 6% and 8% in Tottori and Shimane, respectively, which already had 2-year-old day care provision ratios of over 40% of the relevant child population, while the growth rate was only 8% in Saitama and a mere 3% in Tokyo. Tokyo prefecture introduced the less-costly Tokyo Metropolitan Government Certified childcare places, which are not included in these data. However, even when those non-accredited childcare places are included, the growth of childcare places in Tokyo was slow (Nagase,

Table 1 Growth rate of registered childcare places for 2-year-olds in selected prefectures

	Growth rate (%)†			Childcare places to child population for two year old‡	
	2002 ⇔2007	2008⇔2012	2013⇔2015	2002	2015
Densely populated prefectures					
Tokyo	3	5	8	0.26	0.35
Kanagawa	10	5	8	0.13	0.29
Saitama	8	4	8	0.14	0.28
Chiba	6	4	8	0.16	0.30
Prefectures with declining populations					
Wakayama	5	2	3	0.24	0.41
Tottori	6	2	3	0.40	0.62
Shimane	8	3	4	0.42	0.75
Akita	7	0	0	0.31	0.63

Note: †The "growth rate" is the annual growth rate of the three-interval period. ‡Childcare Places to Child Population is computed as the ratio of the number of accredited day care places for 2-year-olds obtained from MHLW's *Survey of Social Welfare Institutions* divided by estimates of the number of 2-year-old children derived from the *Population Census.*
Source: Computed by the author using data from the Statistics Office's *Population Census* and the MHLW *Survey of Social Welfare Institutions.*

2007). The reason for this is the tenure-based salaries of public servants, which made publicly provided infant care rather costly (Shu, 2002; Shimizutani & Noguchi, 2004). Richer municipalities were more likely to operate infant care facilities with public servants (Nagase, 2003b). Although municipalities tried to replace municipally run accredited day care with privately run accredited daycare,[4] they faced opposition from both labor unions and parents associations, and making changes required time. Rural prefectures, however, could easily expand the number of infant care places because of open spaces generated by the decling number of children caused by demographic change.

Local governments in urban areas aimed for a higher growth of child care places after the common national target was introduced in 2008, and the system changed after a new child law was implemented in 2013, as can be seen in the third and fourth columns (2008 ⇔ 2012 and 2013 ⇔ 2015) in Table 1 where we can observe higher growth in metropolitan prefectures compared with rural prefectures. The two columns on the far right of Table 1 also show that the ratio of childcare places per children increases when the infant population declines. For example, the provision ratio for Akita more than doubled between 2002 and 2015 and reached over 60% despite the extremely low growth in actual infant care places.

3.2 Policies to encourage fathers to achieve a better work–life balance

After taking over office, the Abe Cabinet has been advocating work with no or smaller amounts of overtime and has encouraged fathers to have a greater involvement in child rearing.

Through an amendment of the Labor Standards Law (*Rodo Kijun Ho*) in 1987, the 40-hour work week became universal in April 1994. According to *Labor Force Survey*, however, the percentage of male workers with over 60 weekly work hours remained over 20% in the early 2000s and continued to be nearly 20% around 2010 for male *permanent-contract regular employees* in their 30s and 40s. Article 36 of Labor Standards Law was rather lenient in relation to overtime work if an employer and his or her employee representatives made a written agreement, which was reported to the Labor Standard Office and which provided that the employer paid an overtime premium. Sasajima (2016) states that a 25% overtime premium is not enough as it excludes bonus payments and makes overtime work less costly than new hires. The Abe Cabinet has been advocating reductions in the amount of overtime work. Figure 3 shows the changes in the average weekly work hours of *permanent-contract regular employees* in the child-rearing age band of 25–39 years by gender and marital status over the period 2002–2015. Average hours worked appear to decline for males and also for single
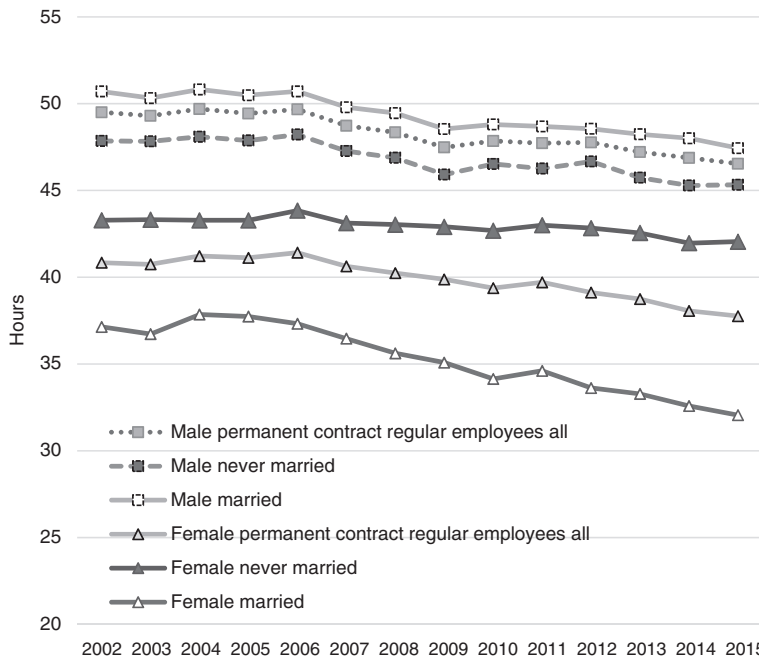

Figure 3 Weekly hours worked by *Permanent-contract regular employees* aged 25–39 years. Source: Computed by the author using microdata from the *Labor Force Survey*.

females after 2013. The change is even more pronounced for married females, whose average work hours were around 32 hours per week in 2015 (including those taking leave).

The standard period of childcare leave was until the child in question reached his or her first birthday. In order to encourage the use of childcare leave benefits, if fathers took the leave, the leave was extended till the child is 14 months old, 2 months more from 2009.[5] In most urban areas, however, from April 2005, parents were given an extension of 6 months to the standard leave period of 12 months if the mother could not go back to work 12 months after the child's birth due to a lack of accredited child care facilities. This meant that the leave extension for fathers did not have much impact.[6]

Starting after April 2014, the Abe government increased the leave allowance, which is paid out of employment insurance funds for the first 6 months of child care, from 50% to 67% of the recipient's pre-child birth monthly standard income. This had a real impact not only for mothers but also for fathers. If both the father and mother avail the leave, both can have 67% of child care allowance for the first 6 months, up from 50% previously.

The availing of leave by fathers, however, is still negligible. According to MHLW's *Basic Survey of Gender Equality in Employment Management (Koyou Kinto Kihon Chosa),* which surveys private enterprise with more than five employees, the percentage ratio of fathers taking child care leave was 1.23% in 2008, 1.72% in 2009, 2.6% in 2015, and 3.16% in 2016.

3.3 Policies to increase married part-time workers' hours worked

The current tax and social security protection favoring low-earning dependent wives has long provided an incentive for part-time workers to earn less than around 1 million yen per year (roughly US$8000; Abe, 2002; Nagase, 2002; Akabayashi, 2006; Abe & Oishi, 2009). Under this system, spouses with earned income below 1.03 million yen per year do not pay national income tax, and their spouses can also claim a spouse deduction. Spouses of wage and salary earners are also exempted from paying social security-related payments for pensions, health, and long-term care insurance if their annual income is below 1.3 million yen per year but are given the full benefits of the health and long-term care insurance system and can also receive the first tier of a public pension without having paid any premiums on their own. Moreover, private as well as public firms often provide spouse allowances to wage and salaried workers, and this allowance is often given only to workers whose spouse earns an amount below the income tax or social security thresholds. Even though Takahashi (2010) and Bessho and Hayashi (2014) have suggested that a policy change should not increase the hours worked by married females by a large amount, this system has resulted in widespread adjustments of the hours worked by housewives that about one in five hourly part-time workers with school children are bunching at the threshold.

Prime Minister Abe announced in 2013, and again in 2014, that he will change the income tax system and abolish the tax-related spouse deduction, which has implicitly supported the typical family model of a male breadwinner and a female home-maker. Following his lead, large enterprises, such as Toyota, started discussions in 2014 and announced in July 2015 that, after a transition period, the firm's family allowance will be linked to the number of children and that the spouse allowance will be abolished. The National Personnel Authority also announced that it would abolish or reduce the dependent spouse allowance for national public servants.

In the end, however, Prime Minister Abe did not abolish the spouse income deduction of 0.38 million yen, which was formerly linked to spousal incomes of below 1.03 million yen. Instead, in late 2016, he announced that he will *increase* the deduction to link to spouse incomes of 1.50 million yen from January 2018. The effect of this policy is not straightforward as there is still a 1.30 million yen social security tax threshold. Moreover, from October 2016, those hourly part-time workers working at firms with more than 500 employees who work more than 20 hours a week and whose monthly income is over 88,000 yen, or 1.06 million yen a year were mandated by law to join the employee's social security tax program, or *Kosei* pension program, and have social security tax be levied on them. This was planned in 2012 by the Reform of National Pension Law.

3.4   Policies to increase women leaders

Policies to increase the number of women leaders are a core priority of the Abe Cabinet. When he took over office in 2013, Abe announced that he hoped listed firms would appoint at least one woman to their boards. To promote women in management, from April 2015, all listed firms were required to disclose the number of their female board members. In August 2015, the Diet passed the Act Concerning Promotion of Women's Career Activities (*Josei Katsuyaku Suisin Hou),* which was to come into effect in April 2016. This law nudges enterprises to take actions to promote women through voluntary action plans. The law particularly demands that all firms with more than 300 employees analyze the status of women within their firms and then make action plans to increase women's active participation. These plans should be accredited by the local MHLW office.[7] Firms with good performance will be recognized by the government recognition in the form of marks (*Eruboshi*) that they can put on their products.[8] In March 2016, the government announced that those firms earning such recognition will be given preference points in public procurements.

Although this policy is an important policy goal, because the new law was enacted from 2016 and our *LFS* data is only available up to 2015, we cannot examine the effect of this policy. It can be said that progress has been slow. As early as 2003, the government has adopted the target of increasing the share of women leaders to at least 30% by 2020 (the "202030 target"), but progress has been poor. The government still has '202030 target', but the various targets adopted in December 2015 were in general lower, for example, women middle managers at private enterprise, *kacho*, to be 15% by 2020.

4. Estimation strategy and data

4.1 Estimation strategy

The approach adopted in the present paper is not to try and identify the effects of individual policies implemented by the Abe Administration that were discussed in Section 3 but rather to treat the individual policies as a package called Abe's Womanomics of 2013–2015 and use the DD method to identify the causal effects of the package on married women's labor market variables. In addition, the impact of changes in the supply of childcare on married women's labor market variables is also explicitly investigated at the same time.

To investigate the policy impacts on the labor supply of women, the following stylized model is assumed:

$$
\begin{aligned}
Y1_i = {} & a_1 + b_1 \text{Youngest Child}_i + c_1 D_{pi} + d_1 (\text{years of policy } 2013-2015)_i \\
& + e_1 \text{Youngest Child}_i \times D_{pi} + f_1 \text{Youngest Child}_i \times (\text{years of policy } 2013-2015)_i \\
& + g_1 H_{1i} + u_{1i}
\end{aligned}
\tag{1}
$$

where $Y1_i$ is a 0–1 labor supply dummy variable. In one case (*Employment*), it takes the value of 1 if the person is working and 0 if the person is not working. In the second case (*permanent-contract regular employment*), the 0–1 dummy variable takes the value of 1 if the person is in *permanent-contract regular employment* and 0 otherwise. The three key explanatory variables are: *Youngest Child*$_i$, which is a 0–1 dummy variable relating to the age of the youngest child in the family; D_{pi}, which is the prefectural index for accredited day care provision where the subscript p stands for the prefecture where the person lives; and (years of policy 2013–2015), which is a 0–1 dummy variable taking the value of 1 for the years 2013–2015 and 0 otherwise. H_{1i} is the vector of covariates, such as educational attainment, age and age squared, the number of children in the household, whether there is a grandmother present in the household, the spouse's income, regional dummies, year dummies for 2002–2011, the growth rate of childcare facilities in the relevant prefecture, and the job openings to job seekers ratio. The last two variables are included to take account of active increases in the provision of childcare places that was noted in Section 3.1 and changes in demand, respectively. The disturbance term u_{1i} is assumed to be $u_{1i} \sim \text{NIID}(0, \sigma_1^2)$.

The coefficient c_1 can be interpreted as a measure of the effect of increasing the supply of day care on married women without young children. c_1 may not be zero because the availability of day care may affect labor supply of women who have either not yet had a child but intend to do so in the future or who have children older than 10 years. $c_1 + e_1$ represents the effect of a one-unit increase in day care supply on mothers with young children.[9] The coefficient d_1 can be interpreted as measuring how Abe's Womanomics policies have affected the labor supply outcomes of married women relative to the period before Abenomics, ignoring the effect of day care provision, and $d_1 + f_1$ measures the impact of that for mothers with young children.

The combined effect of Abe's policy on the maternal choice to be in "gainful employment" can be regarded as being measured by $d_1 + f_1$, plus $(c_1 + e_1) \times$ (the actual increase in childcare provision during the period).

We will also estimate the determinants of hours worked per week using the DD method to investigate the impact of Abenomics on *permanent-contract regular employees* for both males and females. As most *permanent-contract regular employees* are expected to work full time and must have some kind of childcare arrangement, the DD effect of the policy period for work hours has been mainly focused on. Even though most husbands do not take leave at childbirth, if the "Womanomics" policy allows more fathers to reduce their work hours, then the policy should be regarded as being successful in giving fathers more time with children. The stylized model for hours worked is assumed to be as follows:

$$
\begin{aligned}
\text{weekly work hours}_i ={}& a_2 + b_2(\text{years of policy 2013 to 2015})_i + c_2 \text{Youngest Child}_i \\
& + d_2 \text{Married}_i + e_2 \text{Married}_i{}^*(\text{years of policy 2013 to 2015})_i \\
& + f_2 \text{Youngest Child}_i{}^*(\text{years of policy 2013 to 2015})_i \\
& + g_2(\text{Year 2010}-2012)_i{}^*\text{Youngest Child}_i + h_2 H_{2i} + u_{2i},
\end{aligned}
\tag{2}
$$

where weekly work hours is the number of hours worked per work for those people in employment, and it is unobserved for those people who are not in employment; marriage is a 0–1 dummy variable, taking the value 1 if the respondent is married and 0 otherwise, H_{2i} is a vector of covariates, such as age and age squared, the number of children in the household, the spouse's income (=0 if unmarried), regional dummies, year dummies for 2002–2011, monthly dummies, the predicted log wage, and the job openings to job seekers ratio. As the hours worked equation will be estimated jointly with individuals' selection to work, the disturbance term u_{2i} is assumed to have the properties $u_{2i} \sim \text{NIID}(0, 1)$ and Corr $(u_{1i} u_{2i}) = \rho_1$, and the predicted log wage rate is computed for each respondent using the estimates of the wage equation in Table S4 in the online supplementary material, where the selection to work as *permanent-contract regular employee* has been controlled for. The specification of Equation (2) enables us to see if hours worked were reduced by Abenomics and whether the effect was stronger for people who are married or have young infants in their family. That is, if e_2 and f_2 are negative, then Abe's policies were successful in reducing the long work hours of *permanent-contract regular employees.* (Year 2010-2012) was added to account for short-hour option mandate for workers with child below age 3 starting from 2010.

The hours worked Equation in (2) is estimated together with a work choice equation similar to (1) by maximum likelihood estimation to account for the impact of sample selection. We will see the policy effect on work hours of *permanent-contract regular employees.*

In the third part of our analysis, we examine the effect of Abenomics on hours worked by all workers (including nonstandard employees) by estimating the following stylized hours of work equation:

$$weekly\ work\ hours_i = a_2 + b_2 (years\ of\ policy\ 2013\ to\ 2015)_i + c_2\ Youngest\ Child_i$$

$$+ d_2 Married_i + e_2 Married_i * (years\ of\ policy\ 2013\ to\ 2015)_i$$

$$+ f_2 Youngest\ \ Child_i * (years\ of\ policy\ 2013\ to\ 2015)_i$$

$$+ g_2 (Year\ 2010 - 2012)_i * Youngest\ Child_i + h_2 H_{2i} + j_3 (nonstandard\ \ employment)_i$$

$$+ k_3 Married * (nonstandard\ employment_i) + l_3 (nonstandard\ employment)_i$$

$$* (years\ of\ policy\ 2013\ to\ 2015)_i + m_3 Married_i * (nonstandard\ employment)_i$$

$$* (years\ of\ policy\ 2013\ to\ 2015)_i + u_{2i} \tag{3}$$

where nonstandard employment is a 0–1 dummy variable taking the value 1 if the person is in nonstandard employment and 0 otherwise. Similar dummies are defined for *permanent-contract regular employees* and company executives, so self-employed and family workers are the base group. In order to determine whether or not Abe's advocacy of changing the income tax and related systems that provide support for dependent housewives have any effect on the hours worked by married part-time women, Equation (3) adopts the *difference in difference in difference* (DDD) method. If the coefficient m_3 is positive and significant, Abe's policy can be interpreted as having had the desired effect of increasing the hours worked by part-time married woman.

The final part of our analysis is to investigate the policy impact on hourly wages using the following log wage equation estimated jointly with work decision:

$$lnwage_i = a_3 + b_3 (years\ of\ policy\ 2013\ to\ 2015)_i$$

$$+ c_3 (nonstandard\ employment)_i + d_3 H_{3i} + u_{3i}, \tag{4}$$

where lnwage is the log of the hourly wage rate; H_{3i} contains control variables relating to educational attainment, tenure and tenure squared, external experience and external experience squared, and dummies for firm size; and the disturbance term u_{3i} is assumed to have the properties $u_{3i} \sim NIID(0, 1)$ and Corr $(u_{1i}\ \ u_{3i}) = \rho_2$.

4.2   Data

The analysis here uses 156 repeated monthly cross-sections of microdata from the Statistics Office's (Japan) *Labor Force Survey (LFS)* over the period 2002–2015. The *LFS* is a nationally representative survey conducted every month that covers about 40,000 households and about 100,000 individuals over the age of 15.[10] To be accurate, it is a rotating panel with respect to the residences, which are surveyed a total of four times in two successive years, two consecutive months in the first year and the same two consecutive months in the second year. From January 2002, the survey began to collect data on the fourth and last visit to households using a longer questionnaire, which asked not only about labor force status but also about educational attainment, tenure, and annual income in the previous year for all relevant individuals in the household; data from this longer questionnaire are used, which gives data on about 10,000 households or 18,000–22,000 individuals every month.

D_{pi}, the prefectural index for accredited day care provision, is measured as the number of places of accredited day care facilities for 2-year-olds in the prefecture where the person lives divided by the number of 2-year-olds in the prefecture estimated from the Census. Data on the availability of childcare are taken from the MHLW's *Survey of Social Welfare Institutions* (*Shakai Shisetu tou Chosa*), which surveys all accredited day care institutions and provides information on the number of children who use accredited day care facilities by the age of the child in October every year. This prefectural-level panel dataset of day care provision is standardized by the number of 2-year-old children in each prefecture, estimated from Census data, and is merged with the microdata in the *LFS*. Figure 4 shows the movement of the supply of day care places for 2-year-olds during our sample period 2002–2015.

Accredited day care facilities cover a good proportion of the facilities for childcare.[11] Our measurement approach departs from Asai *et al.* (2015) or Unayama (2011), who use the number of accredited day care places for 0–6-year-old divided by
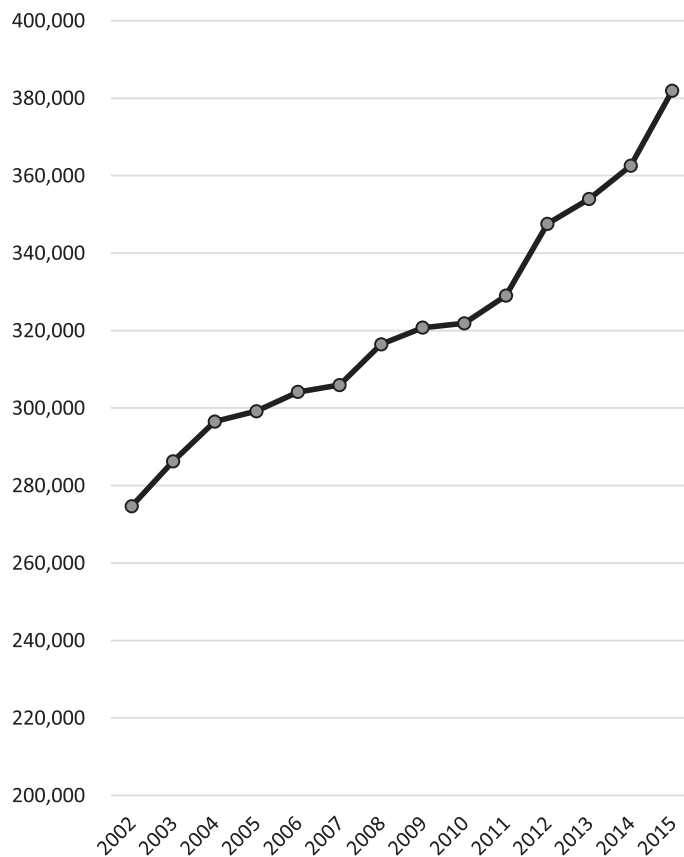

Figure 4 Supply of registered day care places for children aged 2 years.
Source: Computed from data obtained from the MLHW's *Survey of Social Welfare Institutions*.

the number of children in that age for the relevant prefecture. The present paper uses an index based on 2-year-olds for two reasons. For one thing, for children aged 3-6 years, kindergartens function as a substitute for accredited day care, and this has become increasingly more so as more kindergartens offer the option of an after-school care program. The number of kindergartens offering after-school childcare was 29.2% in 1997, 70.6% in 2006, and 81.4% 2012 according to the MEXT's *Survey on Child Education* (*Yoji Kyoiku Jittai Chosa*). There are large regional variations in the use of kindergarten in that ignoring kindergarten as a care facility will cause strong regional bias if we consider childcare provision for children aged 0–6 years.[12]

The second reason is the importance of infant childcare for paid employment. In her municipality-based analysis using data for 1997, Nagase (2003b) finds that the demand for infant childcare was statistically higher when a larger fraction of mothers were wage earners as compared with family workers. The provision of day care for infants after mothers take protected childcare leave is more important for the return of mothers to paid employment with their pre-birth employer compared with family workers. Since the return to *permanent-contract regular employment* in middle age after a period of joblessness in Japan has been found to be difficult (Nagase, 2011), childcare provision is all the more important.

Data on the job openings to job seekers ratio are obtained monthly by prefecture at the prefectural labor office for job seekers, and the monthly prefectural data are matched with the employment data.

As the *LFS* only has data on the number of hours worked in a week and annual income for the previous year for 12 categories, the hourly wage rate is computed as the mid-point for the category for annual income divided by weekly work hour times 50 weeks.[13]

5. Econometric analysis of the effect of Womanomics

5.1 Married women's labor force participation and *permanent-contract regular employee* participation

Table 2 reports estimates of the marginal effects of the variables when Equation (1) is estimated for married women aged 25–54 years using a probit estimator, with standard errors adjusted to account for prefectural clustered data. The column labeled "Employment" shows the results when the employment decision, namely, being employed (1) and being out of employment (0), is analyzed. The column labeled "*Permanent-contract regular employee*" shows the result of the *permanent-contract regular employee* participation decision, where other forms of employment as well as those people out of employment are assigned a value of 0. We see that a husband's higher income and young children have strong negative effects on married women's employment; such effects are significant but smaller for the choice of *permanent-contract regular employee* participation, while having a higher education strongly increases the probability of a woman being in *permanent-contract regular employment*. The presence of a grandmother in the household has a strong positive impact on both forms of maternal labor participation.

Table 2 Labor participation of married females aged 25–54 years

	Employment	Permanent-contract regular employment
Educational attainment dummy		
14 years	0.0261***	0.0820***
	(4.3)	(14.4)
16 years	0.0618***	0.1864***
	(7.9)	(24.5)
Age	0.0209***	0.0060***
	(15.9)	(4.8)
Age squared	−0.0003***	−0.0001***
	(−16.9)	(−6.1)
Supply of day care		
Day care places to child ratio (age 2)	0.1639***	0.2035***
	(2.6)	(3.5)
Growth rate for childcare capacity (age 2)	0.6441***	0.5352***
	(4.0)	(3.4)
Youngest child 0–3 × day care places to child ratio (age 2)	0.4608***	0.0562
	(5.7)	(1.5)
Youngest child 4–6 × day care places to child ratio (age 2)	0.4639***	0.1209***
	(8.5)	(2.9)
Youngest child 7–9 × day care places to child ratio (age 2)	0.1801***	0.1461***
	(4.9)	(4.7)
Husband's last year income	−0.0002 ***	−0.0001 ***
	(−40.3)	(−21.1)
Age of youngest child		
Youngest child 0–3 dummy	−0.4890***	−0.0976***
	(−26.7)	(−9.8)
Youngest child 4–6 dummy	−0.3425***	−0.1119***
	(−18.6)	(−10.9)
Youngest child 7–9 dummy	−0.1570***	−0.1017***
	(−10.1)	(−10.7)
Youngest child 10–12 dummy	−0.0309***	−0.0480***
	(−4.1)	(−8.5)
Youngest child 13–14 dummy	0.0084	−0.0204***
	(1.5)	(−3.8)
Youngest child over 15'dummy	0.0222***	−0.0010
	(5.5)	(−0.2)
Years of policy	0.0141**	−0.0087*
	(6.3)	(−1.9)
Years of policy × youngest child 0–3	0.0256***	0.0465***
	(2.7)	(6.4)

Table 2 *continued*

	Employment	Permanent-contract regular employment
Years of policy × youngest child 4–6	0.0031	0.0166**
	(0.4)	(2.1)
Years of policy × youngest child 7–9	0.0188***	−0.0062
	(2.9)	(−1.0)
Years of policy × youngest child 10–12	0.0070	−0.0057
	(1.0)	(−0.8)
Years of policy × youngest child 13–14	0.0030	−0.0099
	(0.4)	(−1.4)
Years of policy × youngest child over 15	0.0101 **	−0.0054
	(2.0)	(−1.1)
Number of children in the family	0.0362***	−0.0047***
	(14.2)	(−4.5)
Grandmother in the household	0.1185***	0.1032***
	(19.6)	(20.6)
Job opening to job seeker ratio	−0.0133	−0.0094
	(−1.2)	(−0.8)
PsuedoR^2	0.0786	0.0474
Psuedo log likelihood	−307,755	−264,227.0
Sample size	516,840	

Note: This table reports the marginal effects and t-values for the coefficient for each control variable when the underlying model is estimated by the Probit method. In addition to the variables reported in the table, the model also includes regional dummies, year dummies for 2002–2011 (with 2012 as the base year), and monthly dummies. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Numbers in ( ) indicates t-values.

There are contrasting effects of an increase in the number of children in the family; while an increase in the number of children pushes stay-at-home mothers to engage in gainful employment, the increase in the number of children pull mothers out of *permanent-contract regular employee* positions.

Let us now examine the effect of childcare supply. We see that both a higher growth rate of spaces for 2-year-old children and a higher ratio of day care facilities for 2-year-olds to children significantly increase employment, and also *permanent-contract regular employee* participation of married women in general. The effect on mothers *with* infants aged 0–3 years is the combined sum of this effect on married women in general and the cross effects of that of mothers with young children. The latter effect is also positive and significant for most cases. During 2013–2015, the 2-year-old childcare provision ratio at the national level rose by 2.5% points, and the annual growth was 3.9%. Using the estimated coefficients, during the 2013–2015 period, the employment of married women

without young children is estimated to have gone up by 2.9%, that of mothers with a youngest children aged 0–3 years by 4.1%, the *permanent-contract regular employee* participation of married women by 2.6%, and that of mothers with infants by 2.7% because of the increased provision of childcare. For a prefecture such as Tokyo where the childcare provision growth was exceptionally high, it is estimated that the employment of married women increased by nearly 6%, for mothers with infants by 8%, the increase in the *permanent-contract regular employee* participation of married women by more than 5%, and for mothers with infants by more than 5%.

In addition, the DD analysis shows that the years of Abe's policies increased married women's employment additionally by 1.4% compared to the base year of 2012 and the employment of mothers with a youngest child aged 0–3 additionally by 4.0%. It also increased the *permanent regular employment* of new mothers significantly, additionally by 3.8%, but reduced the *permanent regular employment* of married women without young children by 0.9% compared with the base year of 2012. After controlling for the changes in the provision of childcare, the labor attachment of mothers with young children increased substantially during this policy period

Therefore, both policies, the stronger growth in day care provision, and Abe's policies to ease the work–life balance (including increased childcare leave allowance during the period and policies focused on decreasing overtime work) worked to increase married females' *permanent-contract regular employee* participation and also the labor force participation.

Our finding of the significant effects of day care contrasts with the recent study of Asai *et al.* (2015) who challenged many earlier studies on the effect of childcare on maternal labor supply by stating that their prefectural fixed effects model suggested that childcare provision was only a substitute for the informal care provided by grandparents and that it did not increase maternal employment in three-generation households, even though the effect was significant in nuclear households. Asai *et al.* use prefectural Census data aggregated by family type that spans the period 1990–2010. The rapid changes in maternal labor structure as well as family structure during this 20-year period requires mention. For one thing, the number of three-generation households has shrunk drastically. According to MHWL's *Comprehensive Survey of Living Conditions*, the percentage of three-generation households among households (excluding single households) was 17% in 1992, 14% in 2001, and 9% in 2013. This includes three-generation households with grown-up children who have no need for day care. In our data, the percentage of married women with children in the age range 25–54 years living with the household head's mother or mother-in-law was already as low as 9% in 2002 and 4% in 2015, showing a further shrinking of three-generation households for the younger generation. The reduction in the proportion of three-generation households is also related to changes in industry structure. The Statistics Office's *Employment Status Survey* of 1992 shows that as many as one-third of married females worked as family workers or were self-employed when more husbands worked as self-employed, while three-generation households were more prominent in such families. In our data, for married women in the age range of 25–54 years, such informal

workers already comprised only 14% in 2002, and this decreased to 6% in 2015. Therefore, the analysis pertaining to three-generation households is of small significance for the analysis of maternal labor in the 2000s. However, one might say that during the period 1995–2005, the provision of infant care in rural prefectures increased not only because it was a nationally advocated policy but also because many day care centers in the rural prefectures were faced with losing customers due to the drain of young workers to metropolitan areas. Therefore, the results of Asai *et al.* (2015) can be interpreted as meaning that the increase of infant care in rural areas with three-generation households was more supply-led than demand-led. Our results showed the importance of provision of infant care for maternal employment in present-day Japan.

Overall, during Abe's administration, maternal employment increased as a result of the increase in child-care provision and Abe's other initiatives. At the same time, I should mention that the participation of married women in *permanent-contract regular employment* has been on a long declining trend, even though Abe's policies and the increased provision of childcare encouraged those women *already* in *permanent-contract regular employment* to continue to work after they took childcare leave.

5.2 Changes in hours worked for males and females

The results of estimating an hours worked equation together with an equation to take account of the sample selection to work as *permanent-contract regular employment* are shown in Table 3. As Abe's policy related to hours worked was not confined to mothers with infants but directed to all workers, including males and single workers, the hours worked equation was estimated for both males and females, where both samples included married and unmarried individuals. Those who are on leave are also included in the sample.

Permanent-contract regular employees are known for their long working hours. However, when one's youngest child was less than 3 years old, we see, in the left columns of Table 3, that maternal work hours were reduced by 6.0 hours and, additionally, by as much as 6.1 hours during the policy period. This reduction is even larger than the 3.5-hour decline in the hours worked by mothers of infants when the short hour option mandate regulation was passed in 2009 and enacted from 2010, as can be seen from the significant and negative estimated coefficient on the interaction term between infants and the years 2010–2012 in Table 3. The reduction in hours worked by *permanent-contract female regular employees* with children was substantial during the Abe administration due to the increase in leave taking and the increased use of the shorter hour work option. Additionally, we find that during the policy period, the weekly hours worked by married females fell statistically significantly by 0.8 hours, and for unmarried and married males, they fell significantly by 1.6 and 0.3 hours, respectively, compared with the base year of 2012.

Now, let us examine the effect on fathers, as given in the right columns of Table 3. The hours worked by fathers are often found to become longer when a baby is born; presumably, this is to support the family as more women tend to stay at home. However, during the years of the Abe policies, the hours worked by fathers with young

Table 3 Weekly hours worked for females and males aged 25–54 years in *permanent-contract employment*

	Female		Male	
	Coefficient	t-value	Coefficient	t-value
Work hour equation for *permanent contract regular employees*				
Age	0.018	0.49	0.633	24.9***
Age squared	0.001	2.71***	−0.009	−29.2***
Years of policy	0.109	0.70	−1.632	−13.0***
Years of policy × married	−0.769	−4.90***	1.327	11.0***
Married dummy	2.936	32.5***	4.507	70.7***
Years of policy × youngest child 0–3	−6.110	−16.3***	−0.727	−4.44***
Years of policy × youngest child 4–6	−1.299	−3.81***	−0.598	−3.05***
Years of policy × youngest child 7–9	−0.375	−1.32	−0.215	−1.13
Years of policy × youngest child 10–12	0.489	1.74*	−0.068	−0.35
Years of policy × youngest child 13–14	0.937	2.79***	0.603	2.65**
Years of policy × youngest child over 15	0.067	0.52	0.416	3.79***
Youngest child 0–3 dummy	−5.974	−26.2***	1.558	14.9***
Youngest child 4–6 dummy	0.332	1.63	1.512	13.0***
Youngest child 7–9 dummy	0.178	0.88	1.248	10.7***
Youngest child 10–12 dummy	−0.160	−0.83	1.157	9.88***
Youngest child 13–14 dummy	−0.946	−4.62***	0.750	5.76***
Youngest child over 15 dummy	−1.144	−10.3***	−0.170	−2.26***
Number of children in the family	0.629	11.2***	−0.264	−7.81***
Spouse's last year income (0 if not married)	0.000	2.77***	−0.002	−18.4***
Job-opening job-seeker ratio	−0.029	−0.19	0.873	8.88***
Predicted log wage	1.463	17.9***	−3.106	−47.6***
Year 2010–2012*youngest child 0–3	−3.476	−12.5***	−0.278	−2.25***
Selection equation to *permanent contract regular employees*				
Age	−0.013	−6.25***	0.034	16.7***
Age squared	0.000	−0.20	−0.001	−25.3***
Married dummy	−0.465	−95.4***	0.511	106.4***
Years of policy × married	0.063	7.25***	0.167	18.8***
Day care places to child ratio (age 2)	0.283	11.3***	−0.283	−10.1***
Growth rate of child care capacity (age 2)	1.085	12.4***	0.313	3.30***
Child 0–3 × day care places to child ratio (age 2)	0.852	17.6***	0.111	2.30**
Child 4–6 × day care Places to child Ratio (Age 2)	0.730	13.4***	0.187	3.04***
Child 7–9 × Day care places to child ratio (age 2)	0.709	13.0***	0.117	1.97*
Spouse's last year income (0 if not married)	0.000	−29.5***	0.000	−19.8***

Table 3 *continued*

	Female		Male	
	Coefficient	t-value	Coefficient	t-value
Youngest child 0–3 dummy	−0.069	−7.67***	−0.070	−7.97***
Youngest child 4–6 dummy	−0.500	−28.9***	0.184	11.0***
Youngest child 7–9 dummy	−0.528	−27.1***	0.136	6.51***
Youngest child 10–12 dummy	−0.441	−21.9***	0.139	6.62***
Youngest child 13–14 dummy	−0.134	−13.8***	0.165	17.2***
Youngest child over 15 dummy	−0.032	−3.02***	0.152	14.4***
Years of policy	0.068	11.3***	0.054	9.22***
Years of policy × youngest child 0–3	0.154	10.3***	−0.066	−4.52***
Years of policy × youngest child 4–6	0.058	3.21***	−0.054	−2.95***
Number of children in the family	−0.024	−8.24***	−0.054	−18.8***
Grandmother in the household	0.186	29.3***	−0.037	−5.84***
Job-opening job-seeker ratio	0.013	1.56	−0.016	−1.96**
Estimated ρ_1	−0.83		0.72	
Estimated σ	15.83		14.14	
log pseudo-likelihood	−1E+06		−2E+06	
Number of observations	733,118		702,653	
Number of uncensored observations	218,102		493,729	

Note: This table reports the estimates of Equations (1) and (2) jointly using the maximum likelihood method. Other controls, 11 regional dummies, year dummies, and month dummies. Work hour regression with selection correction, seishain age 25–54. ***significant at 1% level, ** significant at 5% level, * significant at 10% level.

children were also reduced, albeit by a small amount of 0.6–0.7 hours when the youngest child was younger than the age of 6, showing a significant effect of the policy years.

Matsubara (2012) and Takeishi (2013) suggest that working short hours for a long period of time is not good for a woman's career prospect. Indeed, more firms are trying to get women back to working normal hours when their children grow older. Our results show that during the policy period, mothers of children over 10 years increased their work hours.

A higher job opening to job seeker ratio increases the hours worked by married males, but the effect was not significant for females. A higher job opening to job seeker ratio strengthens the position of workers, and the result seems to indicate that female *permanent-contract regular employees* prefer shorter work hours.

These effects were evident after controlling for sample selection to work as *permanent-contract regular employment,* as shown in the lower panel. When we examine the selection equation, mothers have a higher probability of leaving *permanent-contract*

regular employment, while fathers have a higher probability of staying in *permanent-contract regular employment* when their latest child is young. However, the interaction terms of the policy period with infants shows that fathers with small children were significantly less likely to stay in *permanent-contract regular employment* during the policy years, while the effect was significant in the opposite direction for females. This means that during the policy period, there was a small but significant effect in loosening the gender division of labor within households at childbirth, in that more women stayed in *permanent-contract regular employment,* while more fathers went out of such contracts.

Table 4 reports the results of estimating an hours worked equation for all workers (including nonstandard employee workers) based on Equation (3). The results with respect to the reduction in hours worked during the policy period are qualitatively similar to those reported in Table 3. If we look at the hours worked by parents with infants, we see that the hours worked by mothers with infants are 7.5 hours shorter, and, in addition, during the policy period, they are reduced by a further 2.2 hours. The policy effect on the hours worked by mothers with infants is much smaller compared with what is found for *permanent-contract regular employees* in Table 3, indicating that the reduction in hours worked for parents with infants was more notable for *permanent-contract regular employees.*

Table 4 also shows a significant effect of the Abe Cabinet's policy of encouraging married females to work more hours in nonstandard employment where dependent housewives with low incomes have enjoyed special protection. The regression results show that a person in nonstandard employment works about 6 hours less than someone in *permanent-contract regular employment*, and if they are married, they work an additional 4.7 hours less per week. The estimated coefficient on the DDD shows that, during the 2013–2015 period, the hours worked by married nonstandard employed females increased significantly, by about 0.9 hour per week. It is a small but statistically significant increase in their hours worked. Abe did not give out the concrete policy then, but he did ask firms to start discussions about abolishing firms' dependent wife allowances so that married wives could work longer hours. As we can easily expect, we see no such significant effects for males because most male work hours are not affected by the minimum income threshold for paying income tax.

The effect of the predicted wage on the hours worked is significantly positive for women but negative for men in both Tables 3 and 4. *Permanent-contract regular employees,* in general, work full time, and their average hours worked was 47.7 and 40.5 hours for men and women, respectively, compared to 47.3 and 34.3 hours for all male and female workers, respectively. For most men who already work more hours than the full-time standard, their labor supply might be backward bending as the wage increases.

5.3   A large gender wage gap remains

So far, we have seen some strong results on employment and work hours. However, there is still a long way to go to close the gender wage gap. Table 5 reports estimates of a wage equation using a sample of all workers where sample selection has been

Table 4 Weekly hours worked equation for female and male workers aged 25–54 years

	Female		Male	
	Coefficient	t-value	Coefficient	t-value
Work hour equation for all type of *employees*				
Age	−0.272	−11.7***	0.481	22.0***
Age squared	0.003	9.40***	−0.007	−24.5***
Type of employment (base self-employed and family workers)				
Permanent contract regular employees	4.023	37.4***	0.509	6.42***
Nonstandard employees	−2.236	−19.1***	−7.494	−62.6***
Company executive	1.941	10.3***	3.623	33.4***
Others	−5.480	−6.39***	−3.679	−3.56***
Years of policy	−0.476	−4.18***	−1.066	−9.49***
Years of policy × married	−0.859	−6.58***	0.444	4.08***
Married dummy	−1.001	−14.9***	3.155	45.6***
Nonstandard employee × years of policy	−0.077	−0.55	−0.430	−2.21**
Nonstandard employee × married	−4.738	−55.8***	2.333	15.8***
Nonstandard employee × married × years of policy	0.917	5.07***	−0.239	−0.75
Years of policy × youngest child 0–3	−2.196	−9.10***	−0.433	−2.97***
Years of policy × youngest child 4–6	0.328	1.69*	−0.500	−2.90***
Years of policy × youngest child 7–9	0.327	1.70*	−0.245	−1.36
Years of policy × youngest child 10–12	0.078	0.41	−0.265	−1.45
Years of policy × youngest child 13–14	−0.160	−0.72	0.312	1.46
Years of policy × youngest child over 15	−0.032	−0.32	0.309	3.01***
Youngest child 0–3 dummy	−7.500	−50.4***	0.603	6.57***

Table 4 *continued*

	Female		Male	
	Coefficient	t-value	Coefficient	t-value
Youngest child 4–6 dummy	-4.086	-34.3***	0.652	6.41***
Youngest child 7–9 dummy	-3.427	-29.4***	0.455	4.45***
Youngest child 10–12 dummy	-2.436	-21.4***	0.334	3.25***
Youngest child 13–14 dummy	-1.433	-11.7***	0.039	0.35
Youngest child over 15 dummy	-0.072	-1.01	-0.472	-7.28***
Number of children in the family	0.345	10.3***	0.065	2.27**
Spouse's last year income (0 if not married)	-0.003	-51.4***	-0.001	-5.59***
Job-opening job-seeker ratio	-0.332	-3.60***	0.959	11.3***
Predicted log wage	3.976	45.7***	-2.327	-36.9***
Year 2010–2012 × youngest child 0–3	-2.120	-10.5***	-0.218	-1.85*
Selection to employment equation				
Age	0.013	6.18***	0.041	14.2***
Age squared	0.000	-7.87***	-0.001	-17.3***
Married dummy	-0.328	-62.9***	0.968	126.2***
Years of policy × married	0.068	6.88***	0.057	4.03***
Day care places to child ratio (age 2)	0.273	8.39***	-0.106	-2.33**
Growth rate of child care capacity (age 2)	1.423	13.5***	0.743	4.74***
Child 0–3 × day care places to child ratio (age 2)	1.538	31.6***	0.092	0.87
Child 4–6 × day care places to child ratio (age 2)	1.566	24.8***	0.066	0.46
Child 7–9 × day care places to child ratio(age 2)	0.824	13.0***	-0.190	-1.35
Spouse's last year income (0 if not married)	0.000	-62.2***	0.000	10.8***

Table 4 *continued*

	Female		Male	
	Coefficient	t-value	Coefficient	t-value
Youngest child 0–3 dummy	−1.408	−84.8***	0.061	1.72*
Youngest child 4–6 dummy	−0.977	−47.3***	0.068	1.42***
Youngest child 7–9 dummy	−0.502	−23.5***	0.191	3.90***
Youngest child 10–12 dummy	−0.078	−8.36***	0.087	4.68***
Youngest child 13–14 dummy	0.033	3.22***	0.122	5.79***
Youngest child over 15 dummy	0.047	7.73***	−0.046	−4.91***
Years of policy	−0.001	−0.08	−0.032	−2.66***
Years of policy × youngest child 0–3	0.047	3.58***	0.005	0.16
Years of policy × youngest child 4–6	−0.014	−0.82	0.045	1.11
Number of children in the family	0.101	36.0***	0.037	7.34***
Grandmother in the household	0.326	38.1***	0.220	17.1***
Job-opening job-seeker ratio	0.001	0.09	0.076	6.01***
Estimated ρ_1	−0.126		0.195	
Estimated σ	12.41		13.14	
Log pseudo-likelihood	−2E+06		−3E+06	
Number of observations	724,411		696,260	
Censored observations	231,106		55,645	

Note: This table reports the estimates of Equations (1) and (3) together using the maximum likelihood method. In addition to the variables reported in the table, the model also includes 11 regional dummies, year dummies for 2002–2011 (with 2012 as the base year), and monthly dummies. Work hour regression with selection correction, all workers age 25–54. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

corrected for. We see that there is a large effect of the type of employment on wages and also a strong impact of firm size on wages, which has been a feature that is frequently reported for the Japanese labor market. Compared with self-employed and family workers, the wage of females in *permanent-contract regular work* is 21% higher, and that in nonstandard work is 7% lower, after controlling for education, tenure, external experience, and firm size. For males as well, compared with self-employed and family workers, the wages of *permanent-contract regular workers* are about the same, while that of nonstandard employees are 31% lower. The large wage gap between *permanent-contract regular workers* and nonstandard employees may be an indication of the difficulty of gaining the former type of job compared to the latter.[14] The wage gap across firms of different sizes may also be an indication of the narrow port of entry to such firms. For these reasons, the increase of mothers staying in *permanent regular employment* is a welcoming change for long-term human capital accumulation. Table 5 also indicates that during the policy years, female wages increased by 3.6%, while male wages only increased by 1.7% compared with the base year of 2012, indicating some closing of the gender wage gap. However, we still see a large gender difference in employment structure. In 2015, for married women and for the age group of 25–54 years, 31% are out of the labor force, 38% are in nonstandard employment, 25% are in *permanent-contract regular employment*, and 7% are in other types. On the other hand, for married males in 2015 for the same age group, 79% are in *permanent-contract regular employment*, 16% are in other types, and less than 5% are in nonstandard employment. Our results demonstrated in Table 2 indicate that, in fact, *permanent regular employment* has declined even during the policy years for married women even though that of mothers have increased. Table 5 indicates that a large fraction of women earn low wages, and we see that the overall fraction of such nonstandard workers has increased rather than decreased.

6.   Concluding Remarks

The present paper analyzes whether or not Womanomics affected women's employment and their hours worked so that more women with families have better career prospects. As the wage gap and career prospects between *permanent-contract regular employee* and other forms of nonstandard employment is large, we not only look into employment and hours worked but also focus on whether or not Womanomics increased the proportion of women in *permanent-contract regular employee* position and decreased their hours worked in such employment.

We demonstrate that, during 2013–2015, the increase in the provision of infant care in urban areas was much faster than in the preceding years and that, from 2014, the childcare leave allowance was increased from 50% to 67% of monthly income for the first 6 months of the leave.

Our results indicate significant and strong positive effects of the policy to increase the proportion of mothers with infants staying in *permanent-contract regular employees* and also staying in employment. The strong growth in the provision of

Table 5 Log of hourly wages for male and female workers aged 25–54

	Female		Male	
	Coefficient	t-value	Coefficient	t-value
log wage equation				
Educational attainment dummy (base 12 years or less)				
14 years	0.151	84.0***	0.090	45.7***
16 years	0.316	121.5***	0.262	176.7***
Tenure	0.028	90.2***	0.040	161.8***
Tenure squared	−0.0003	−31.0***	−0.0004	−56.2***
External experience	0.001	3.08***	0.020	78.5***
External experience squared	0.000	6.15***	0.000	−30.0***
Years of policy	0.036	10.8***	0.017	6.00***
Type of employment (base self-employed and family workers)				
Permanent contract regular employees	0.210	35.3***	−0.021	−4.80***
Nonstandard employees	−0.086	−14.6***	−0.320	−65.0***
Company executive	0.388	41.3***	0.264	52.5***
Others	−0.005	−0.13	−0.124	−3.29***
Firm characteristics dummy (base less than 5)				
Firm size 5 and more	0.140	30.2***	0.151	39.4***
Firm size 10 and more	0.161	38.0***	0.201	58.1***
Firm size 30 and more	0.184	44.4***	0.255	75.0***
Firm size 100 and more	0.248	60.8***	0.358	107.0***
Firm size 500 and more	0.286	61.5***	0.445	117.7***
Firm size 1000 and more	0.305	73.9***	0.583	172.6***
Public sector employee	0.455	102.8***	0.611	173.8***

Note: Other controls, 11 regional dummies, year dummies, and month dummies. All workers wage regression age 25-54 (selection correction result not shown). ***significant at 1% level, ** significant at 5% level, * significant at 10% level.

accredited infant day care supported the change, and our DD analysis shows that even after taking account of changes in childcare provision, a large effect of Abe's policy remains for the 2013–2015 period. The effect of the increase in childcare provision was about the same in magnitude for the increase in the employment of mothers with young children, while the effect of the Abe administration on policy other than child-care supply was a little stronger in magnitude in increasing the proportion of mothers with infants who continue to stay in *permanent-contract regular employment.*

Our DD analysis for hours worked also show that Abe's policy was effective in reducing the hours worked of not only married female *permanent-contract regular employees* but also married male, single female, and single male employees of the same type as well. The hours worked by mothers, and also fathers, with infants was signifi-cantly shortened during the policy period (albeit to a much smaller degree for fathers), notably for *permanent-contract regular workers*, indicating an increased use of leave,

the use of short-hour option, and reduced overtime. These are signs that the work–life balance of *permanent-contract regular employees,* especially mothers and fathers with young children, have improved.

Our *DDD* analysis of hours worked also shows that, during the policy period, the hours worked by married females in nonstandard employment significantly increased, albeit by around 0.9 hours per week.

Now, can we say Abe's Womanomics was a success so far? Our analysis finds significant effects of Womanomics on maternal employment and hours worked. The increase of new mothers in *permanent-contract regular employment* not only increases the number of women with better career prospects but also sends a message to the younger generation that their future career should be different from those of their mothers.

However, our analysis also shows that the hourly wage gap between *permanent-contract regular employment* and nonstandard employment remains as large as 30% after controlling for education, tenure, external experience, firm size, and sample selection into employment. It must be that the difference in the hourly productivity of the two types of workers is smaller than the wage gap, because the ratio of nonstandard employment has continued to increase. During 2013–2015, the ratio of *permanent-contract regular employees* among paid employees was 94% for married males, no change from the level in 2003–2005, but it was as low as 40% for married females, which was lower than 43% a decade earlier. For unmarried males, the ratio was 78%, which was a substantial reduction from the 84% of a decade earlier, while for single females, it was 60%, down from 65% a decade earlier. In our probit analysis, we find a long-term increase in the employment of married women, but we find no such trend for *permanent-contract regular employment,* suggesting that the main increase in the employment of married women has come from increases in nonstandard employment.

For Womanomics to further work, a fundamental change needs to be made to Japanese labor practices so that the large wage gap between the two types of employment is reduced. This would mean giving new entrants and re-entrants to the labor market a better chance of developing their skills and forming careers. The Abe Administration has realized the importance of this policy. The buzz word of the Abe Administration from 2016 has been a "Revolution of the Way We Work (*Hatarakikata Kaikaku*)". One of the pillars of this policy is the government's attempt to seek to close the wage gap between *permanent-contract regular employment* and nonstandard employment by implementing "the same wage for same work" principle. The definition of the "same work" needs much scrutiny, however, and the phrase is difficult to define when the occupational labor market is underdeveloped, as it is in Japan, and the labor practice of long-term employees is very much structured, especially in large firms, while that for nonstandard employees are not. The gender wage gap within *permanent-contract regular employment* also remains large at firms as more males are explicitly or implicitly hired in fast-track courses, while more females are hired in slow-track courses at the start of their careers. This is almost equal to promising different training and wage profiles for the two genders and keeping low women in management. Such labor practice is again related to the "long-term employment practice" and the underdevelopment of the occupational labor market in Japan. In the past, and even today, the government has

provided tax and social security protection to dependent wives, which in effect has supported gender specialization within households. Although Abe has realized the need for change and realizes the negative effects of such protection on employment, in the end, however, in the face of political pressure, Abe did not eliminate the income tax and social security tax provisions favoring housewives. In late 2016, he rather promised to increase the spousal tax deduction from 2018. Although some spouses may offer to work longer hours by taking advantage of this policy, there is a suspicion that this policy may serve to depress the wage rate of nonstandard employment, which would harm those who need to earn their living from such employment. These workers would have to compete with housewives who can offer their labor for low earnings as the latter can reap the gains from the tax and social security system.

Looking at the longer term, many of the Womanomics policies, such as women in leadership, the increase in the number of childcare facilities, and changes in work culture in the work place to accommodate child-caring couples, started before Abe came into office in late 2012. The policies to change work culture started around 2003 and sped up in late 2008. There was a major reform of the childcare provision law in 2012 to include kindergartens and to give subsidies to kindergartens as childcare institutions. These policy changes provided the foundations for increasing the supply of childcare places/facilities during the Abe Cabinet during the period 2013–2015. Abe was good in sending a strong message to the business communities and to the national and local governments. Our analysis shows that Abe was successful in bringing about change in terms of work continuation of new mothers and a reduction in the hours worked by both new mothers and fathers as well as regularly employed married workers, yet major challenges remain in closing the gender wage gap and promoting women to managerial positions. It would also be interesting to investigate whether or not Abenomics had any impact on the probabilities of women getting married and having a first and a second child.

Notes

1 *Permanent-contract regular employees* refer to employees who are called *seishain* in Japanese, that is, workers who do not have a fixed-term contract. The *Labor Force Survey* uses the English term "regular employee" as the translation for *seishain*, and employees with all other forms of employment are called "non-regular employees". This latter group includes: part-time workers, *arbeit* (hereafter both referred to as hourly part-time employees), dispatched worker from temporary labor agencies, contract employees (*keiyaku shain*), and entrusted employees (*shokutaku*). However, the term "regular employee" does not really convey the long-term relationship presupposed for *seishain* workers. A substantial portion of part-time workers and fixed-contract employees can also be thought of as regular employees in the English sense of the word as most of them come to office daily and have a job tenure of over 1 year. The exact definitions in English of many terms in the *Labor Force Survey* are available at the following URL (accessed on 13 September 2017):
   http://www.stat.go.jp/english/data/roudou/pdf/definite.pdf
2 The survey was conducted with the support of the then Japanese Ministry of Health and Welfare and Yasushi Ohkusa.

3   The Strategic Meeting for Japan for Supporting Children and Family (*Kodomo to Kazoku wo Ouen suru Nihon Juten Senryaku Kaigi)* of December 2007 set the targets for 2012 and 2017 at 29% and 38%, respectively while the number was 20.3% in 2007. The percentage ratio of after-school child-care places for elementary school children in their first to third grades was 19.0% in 2007, with targets of 40% for 2012 and 60% for 2017, respectively.

4   For example, Tokyo's Minato Ward leaked information to a newspaper that the cost of childcare for 0-year-old babies was 7.2 million yen per year per one child!

5   Fathers were also allowed to take paternal leave during the first 8 weeks after the childbirth and the second child care leave sometime later.

6   From 2018, this will be extended from 6 months to 12 months if there is a lack of childcare places available.

7   Firms must collect and publish data from one of 14 options. The data include: data on the female ratio of employees, the gender gap in average tenure, the gender gap in applications to hirings ratio, the monthly amount of hours of overtime, and the gender gap for managers. Firms are asked to analyze the reasons for the gender gap, and their action plan should have a target and planned period. These plans must be made publicly available and be accredited with the local MHLW office. For example, the action plan can be in the form of increasing the number of male employees taking childcare leave or providing model plans for diverse career paths. The government recognition marks have three grades, and the recognition is based on the firm's present status.

8   To be recognized, the hiring ratio by gender and tenure by gender should be about the same for both genders; average work hours should be less than 45 hours, and the ratio of female managers should be more than the industrial average. The ratio of promotions to *kacho* managerial positions should be about the same for each gender, and the diversity of career paths is ascertained by the hiring of *seishain* from nonstandard employees.

9   The author thanks to Ayako Kondo for her extremely helpful conference comments concerning the model's specification, including her suggestion to include interaction terms between the child dummy and the day care provision index in the labor supply equation for married women.

10 Details of the sampling methods, estimation methods, and the sampling errors of the estimates used for the *Labor Force Survey* are available in English at the following URL (accessed on 13 September 2017): http://www.stat.go.jp/english/data/roudou/pdf/samplerr.pdf

11 There are non-accredited child care places in urban areas where childcare places are in severe shortage, but the number of such places is less than 5% of accredited places in the area. According to the MHLW 2011 fiscal year survey, 78,063 children of ages one and two attend non-accredited day care, while 2,155,749 attended accredited care as of April 2011. The percentage of non-accredited care to accredited care is 3.5%.

12 For example, in the Tokyo Metropolitan area in 1997, for children aged four, 60% attended kindergartens, while only around 30% attended accredited day care facilities. For the Tokai area, around 50% went to kindergartens, and 50% went to accredited day care facilities, while in the Hokuriku area, less than 40% went to kindergartens, while nearly 60% went to accredited day care facilities (see Figure 8–2 in Nagase, 2003b).

13 The question about annual income in the previous year offers respondents 12 possible answers: 0 yen; > 0 yen and less than 0.5 million yen; ≥0.5 yen and <0.99 million yen; ≥

1 million yen and <1.49 million yen; ≥ 1.50 million yen and <1.99 million yen; ≥2.00 million and <2.99 million yen; ≥ 3.00 million and <3.99 million yen; ≥ 4.00 million yen and <4.99 million yen; ≥ 5.00 million and <6.99 million yen; ≥ 7.00 million yen and <9.99 million yen; ≥ 10.00 million yen and <14.99 million yen; and 15.00 million yen or over. When there is an upper and lower bound, the mid-point in each category is used as the representative income. For the top income group, 17.00 million is used. Estimates of the wage rate are obtained by dividing the annual income by the number of work hours in the last week of the month multiplied by 50. The bottom and top percentiles of the wage data were not used in the analysis.

14 For example, for workers in the 40–54 years age group, the mean tenure of *permanent-contract regular workers* is 18.8 years for males and 15.1 years for females, while for non-standard workers (including part-time, arbeit, dispatched, and fixed-term contract workers) it is 5.4 and 5.8 years for males and females, respectively.

References

Abe Y. (2002). Does the ¥1.03 million tax exemption limit depress the hourly wage of part-time workers? *Japan Labor Bulletin*, **41** (9), 6–7.

Abe Y. (2010). Equal employment opportunity law and the gender wage gap in Japan: A cohort analysis. *Journal of Asian Economics*, **21** (2), 142–155.

Abe Y. (2011). Equal employment opportunity law and labor force behavior of women in Japan. *Journal of the Japanese and International Economies*, **25** (1), 39–55.

Abe Y. & Oishi A. (2009). The 1.03 million yen ceiling and earnings inequality among married women in Japan. *Economics Bulletin*, **29** (2), 1510–1519.

Akabayashi H. (2006). The labor supply of married women and spousal tax deductions in Japan—A structural estimation. *Review of Economics of the Household*, **4** (4), 349–378.

Asai Y. (2015). Parental leave reforms and the employment of new mothers: Quasi-experimental evidence from Japan. *Labour Economics*, **36**, 72–83.

Asai Y., Kambayashi R. & Yamaguchi S. (2015). Childcare availability, household structure, and maternal employment. *Journal of the Japanese and International Economies*, **28**, 172–192.

Bessho S.I. & Hayashi M. (2014). Intensive margins, extensive margins, and spousal allowances in the Japanese system of personal income taxes: A discrete choice analysis. *Journal of the Japanese and International Economies*, **34**, 162–178.

Eunmi M. & Brinton M. (2015). Workplace matters: The use of parental leave policy in Japan. *Work and Occupations*, **42** (3), 335–369.

Iwasawa M. (2004). Wife's work arrangement and reproductive behavior over 30 years (Tsuma no shugyo to shusshou kodo: 1970-2002 nen kekkon kohoto no nunseki). *Journal of Population Problem (Jinko Mondai Kenkyu)*, **60** (1), 50–69 (in Japanese).

Matsubara M. (2012). The impact of long-term use of the short working hour system on careers (Tanjikan seishain seido no chokiriyo ga kyaria ni oyobosu eikyo). *Nihon Rodo Kenkyu Zasshi (Japanese Journal of Labour Studies)*, **54** (10), 22–33 (in Japanese).

Mizuochi M. (2010). Husband's childcare and additional birth: A comparative analysis of five developed countries. *Journal of Population Studies (Jinkogaku kenkyu)*, **46**, 1–33 (in Japanese).

Muraki A. (2013). From Abenomics to womenomics: Working women and Japan's economic revival. Keynote Address by Vice Minister, Ministry of Health, Labor and Welfare, Japan, at the Brookings Institution on September 25th, 2013.

Nagase N. (1997a). Wage differentials and labor supply of married women in Japan: Part-time and informal sector work opportunities. *The Japanese Economic Review*, **48** (1), 29–42.

Nagase N. (1997b). Economic perspective on the analysis of childcare (Kodomo no yoiku no keizai bunseki: Kenkyu keifu to tenbo). *Toyo University Keizai Ronshu*, **22** (2), 69–96 (in Japanese).

Nagase N. (1999). Work and childbearing choice of married women in Japan: The effect of labor practices. (Shoshika no yoin: Shugyo kankyo ka kachikan no enka ka –Kikonsha no shugyo keitai sentaku to shussan jiki no sentaku). *Journal of Population Problems (Jinko Mondai Kenkyu)*, **55** (2), 1–18 (in Japanese).

Nagase N. (2002). Wife allowance and tax exemption behind the low wage of part-time workers. *Japan Labor Bulletin*, **41** (9), 8–9.

Nagase N. (2003a). Standard and non-standard work arrangements, pay difference, and choice of work by Japanese mothers. In: Houseman S. & Osawa M. (eds.), *Nonstandard Work in Developed Economies: Causes and Consequences*. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 267–300.

Nagase N. (2003b). Childcare policy for economic revival of urbanities. (Toshi saisei to hoiku seisaku). In: Yamazaki F. & Asada Y. (eds.), *Economic Analysis of Urban Revival (Toshi Saisei no Keizai Bunseki)*. Toyo keizai shinposha: Tokyo, 248–278 (in Japanese).

Nagase N. (2007). Were policies relating to the declining birth rate just on the table or really executed? (Shoshika ni kakawaru seisaku ha doredake jikko saretanoka). *finansharu rebu (Financial Review)*, **87**, 3–22 (in Japanese).

Nagase N. (2011). Structural change in unemployment by gender after 2000s using panel structure of *Labor Force Survey* (2000 nen iko no danjo no shitsugyo kozo no bunseki: Rodoryoku chosa no panel kozo wo mochiite kouzo henka wo bunseki suru). *Tokei to Nihon Keizai (Statistics and Japanese Economy)*, **1** (1), 91–111 (in Japanese).

Nagase N. (2014). The effect of a short-hour option mandate on first childbirth, birth intention and work continuation after childbirth: Evidence from Japan (Ikujitanjikan no gimukaga daiisshishussan to shugyokeizoku shussan iyoku ni ataeru eikyou : Hokaisei wo shizenjikken tosita jisshou bunseki). *Journal of Population Studies (Jinkogaku Kenkyu)*, **50** (1), 29–53 (in Japanese).

Nagase N. (2015). Childbirth and labor participation: The effect of Child Care Leave Law using natural experiments, evidence from Japan. Paper presented at a NBER Japan Project Meeting.

Nagase N. & Brinton M. (2017). Gender division of labor and second births: Labor market institutions and fertility in Japan. *Demographic Research*, **36** (11), 339–370.

Nagase N. & Moriizumi R. (2013). Female labor force participation following the first child birth; why small increase despite the protective law changes in Japan. *Journal of Social Sciences and Family Studies (Seikatsu Shakai kagaku Kenkyu)*, **20**, 19–36 (in Japanese).

Osawa M., Kim K.J. & Kingston J. (2012). Precarious work in Japan. *American Behavioral Scientist*, **57** (3), 339–334.

Sasajima Y. (2016). Howaito kara eguzenpushon no Nihon Kigyou heno Tekigo Kanosei (white collar exemption to be implemented to Japanese firms). *Nihon Rodo Kenkyu Zasshi (The Japanese Journal of Labour Studies)*, **58** (5), 101–106.

Shimizutani S. & Noguchi H. (2004). *An Economic Analysis of the Markets for old age Care and Child Care Services: Uncovering the Real State of Affairs Using Micro Data and Policy Proposals (Kaigo, Hoiku Sabisu Shijou no Keizai Bunseki—Mikuro Deta Ni Yoru Jittai Kaimei to Seisaku Teigen)*. Tokyo: Toyo Keizai shinposha (in Japanese).

Shu E. (2002). Measures to shorten working hours: Their current state and areas of concern. Waiting line for child care from view point of child care labor market (Hoikushi rodoshijo kara mita hoiku taikiji mondai). *Nihon Keizai Kenkyu*, **46**, 131–148 (in Japanese).

Takahashi S. (2010). An estimation of the work disincentive effects of the spousal deduction and the social security systems on the labor supply of Japanese married women. (Haigusha kojo oyobi shakai hosho seido ga nihon no kikon josei ni oyobosu roudou yokusei koka no sokutei). *Nihon Rodo Kenkyu Zasshi (Japanese Journal of Labour Studies)*, **52** (12), 28–43 (in Japanese).

Takeishi E. (2013). Measures to shorten working hours: Their current state and areas of concern. (Tanjikan kinmu seido no genjo to kadai). *Shogai Gakushu to Kyaria Desain*, **10**, 67–84 (in Japanese).

Teramura E. (2014). The effect of the workplace norm on female employment and work quit (Josei no ahugyo, rishoku kodo no jisshou bunseki: Shokuba no funiki ga ataeru eikyo no kensho). *Kyaria Dezain Kenkyu (Research on Career Design)*, **10**, 175–185.

Unayama T. (2011). Marriage and female labor participation: Evidence from Japanese prefectural cross-section data. (Kekkon, shussan to shugyo no ryoritsu kanousei to hoikujo no seibi). *Nihon Keizai Kenkyu*, **65**, 1–22 (in Japanese).

Supporting information

Additional supporting information may be found in the online version of this article at the publisher's website.

Table S1: Variable definition appendix.

Table S2: Wage equations used to compute the predicted log wage in Table 4.

Table S3: Wage equations used to compute the predicted log wage in Table 3.

Table S4: Descriptive statistics for the sample used in Table 2 (married females aged 25–54 years).

Table S5: Descriptive statistics for the sample used in Table 4 (male and female workers aged 22–54 years).

Table S6: Descriptive statistics for the sample used to compute the predicted log wage in Tables 3 and 4.