JOINT RESEARCH CENTER FOR PANEL STUDIES
DISCUSSION PAPER SERIES

DP2011-004
February, 2012

Does Taxation Affect Marriage and Family Planning Decisions?

Kei Sakata*
Colin McKENZIE**

【Abstract】
This paper examines the effects of taxes on the timing of births and marriages in Japan using the "National Survey on Families." We estimate the average effect of the tax deduction for dependents on the timing of births using a new control group, namely, those mothers whose age at the time of their first birth is 35 or older. We also contribute to the literature by extending our examination of the impact of the deduction for dependents to second and third births. We also estimate the average effect of the spouse deduction on the timing of marriages. The evidence suggests that for their third child, young Japanese couples time conception to obtain the economic benefits associated with the tax deduction for dependents, but the size of this effect is rather small. There is no evidence to suggest that tax incentives affect the timing of marriages.

* Associate Professor, Faculty of Economics, Ritsumeikan University
** Professor, Faculty of Economics, Keio University

Joint Research Center for Panel Studies
Keio University

Does Taxation Affect Marriage and Family Planning Decisions?

Kei Sakata
Ritsumeikan University,
ksakata@ec.ritsumei.ac.jp
and
Colin. R. McKenzie
Keio University,
mckenzie@z8.keio.jp

ABSTRACT

This paper examines the effects of taxes on the timing of births and marriages in Japan using the "National Survey on Families." We estimate the average effect of the tax deduction for dependents on the timing of births using a new control group, namely, those mothers whose age at the time of their first birth is 35 or older. Moreover, we examine the potential learning effects of dependent deduction. We also contribute to the literature by extending our examination of the impact of the deduction for dependents to second and third births. We also estimate the average effect of the spouse deduction on the timing of marriages using women who have never worked before. The evidence suggests that for their third child, young Japanese couples time conception to obtain the economic benefits associated with the tax deduction for dependents, but the size of this effect is rather small. Unlike some previous studies for other countries, there is no evidence to suggest that tax incentives affect the timing of marriages.

Keywords: births, family planning, Japan, marriage, taxation, timing.
JEL Classification Codes: H24, J12, J13

1. INTRODUCTION

One key focus of economic analysis concerns how taxes and subsidies can affect and possibly distort human behavior. In Japan, the effect of the tax system on the labor supply decisions of women has been the subject of a deal of research (see, for example, Kohara, 2001). Many studies suggest that even though taxes and subsidies may not change actions, they can alter the timing of these actions. Some studies focus on capital gains realizations (Burman and Randolph, 1994), while others even go beyond conventional economics research and explore the impacts of taxes on the timing of births, deaths, and marriages.

The usual formulation of taxation legislation can mean that a difference of one day can lead to significant differences in the tax burden imposed on an individual. This difference of one day can lead to shifts in actual behavior by bringing actions forward or delaying actions, or by shifting how the timing is reported through changes in the timing of lodging documents.

There is research indicating that both the timing of deaths and births responds to taxation regimes. Kopczuk and Slemrod (2003) investigate whether the timing of death is responsive to taxation, and find that there is small 'death elasticity'. Dickert-Conlin and Chandra (1999) examine the impact of taxation in the U.S. on the timing of births, and find that due to tax incentives births are shifted from the first week of January to the last week of December.

Similarly, Kureishi and Wakabayashi (2008) demonstrate that tax incentives cause births to be shifted from January to December in Japan. They use information on 'shot-gun marriages' to control for whether parents time conception or not. Assuming that non-shotgun married parents were more likely to time conception, babies from non-shotgun marriage are more like to be born in December than in January compared to the babies of shot-gun marriages.

Gans and Leigh (2009) found that the introduction of a A$3000 "Baby Bonus" on 1 July 2004 in Australia caused births to be moved from June to July, so that parents could become eligible for the Baby Bonus (the Australian tax year runs from July to June next year). They also found another shift in the timing of the births in July 2006 when the Baby Bonus was increased by A$1000.

Can the timing of births and deaths really be controlled? Kopczuk and Selmrod (2003) could not rule out the possibility of 'ex-post doctoring of the reported date of death.' Dickert-Conlin and Chandra (1999) and Gans and Leigh (2009) suggest that caesarean section deliveries and the inducement of labor play an important role in manipulating

the timing of births. Furthermore, as evidence of the manipulation of births, Gans and Leigh (2009) indicate that babies born in July 2004 are statistically heavier due to the delay in delivery.

The findings of Kureishi and Wakabayashi (2008) are interesting given that caesarean section deliveries are less prevalent in Japan, and that more than 90% of deliveries are full-term. They still find there is evidence of an impact of a tax incentive to give births in December without the manipulation of births at the time of delivery. Their findings suggest that tax incentives even affect the timing of conception. Table 1 shows the percentage of cesarean deliveries in Japan. Even though there is an upward trend in the use of the cesarean procedure in Japan, cesarean deliveries are still far less prevalent than in the U.S. In 2005, 17.4% of the deliveries in Japan were cesarean deliveries compared to more than 30% in the U.S. Furthermore, the manipulation of the registration of a birth is also less likely in Japan. In the past, it might have been possible to delay the registration of birth because many babies were born at home. However, as shown in Table 2, after the mid-1960s most babies are born at a hospital making it very difficult to manipulate the registration at birth as a hospital issues a birth certificate on the precise date of a birth. If the manipulation of deliveries and registrations can be discounted in Japan, the only plausible explanation for Kureishi and Wakabayashi's finding of changes in the timing of births is changes in the timing of conception.

[Table 1 around here]
[Table 2 around here]

Another stream of research relates to the effects of taxation on the timing of marriages. If the timing of births and deaths are in fact controllable and respond to taxes, we might expect that the timing of marriage would also be affected by tax incentives given that the timing of marriage should be easier to control compared to the timing of births and deaths. Sjoquist and Walker (1995) find empirical evidence that tax incentives in the United States cause a shift of the timing of marriage from the end of the year to the beginning of the next year. Gelardi (1996) finds that people changed the timing of their marriage in response to changes in the details of marital deductions in Canada, England and Wales. However, these studies on marriage timing are based highly aggregated time-series data, and do not directly examine individual behavior.

Alm and Whittington (1997) use data from the Panel Study of Income Dynamics (PSID) to investigate the relationship between income taxes and the timing of marriage in the United States. They find that the marriage penalty in the US is associated with the

timing of marriage, and that people delay their marriage due to the marriage penalty (For a survey on the marriage penalty, see Alm et al. (1999)). However, Alm and Whittington (1997) argue that the magnitude of this effect is small.

This paper will revisit the analyses of the effects of taxation on the timing of births and marriages using Japanese data obtained from the "National Survey on Families" (Kazoku ni tsuite no Zenkoku Chousa). This paper contributes to the existing literature in three ways. First, we directly examine whether Japanese couples time conception rather than manipulating deliveries by caesarean section using a new control group. Second, the use of this control group allows us to investigate whether the timing of second and third births are affected by the tax deduction for dependents. By comparing the effects for first, second and third births, we can investigate whether or not there are potential learning effects associated with this part of the tax system. Third, this is the first paper to compare the impact of tax savings for a husband associated with the spouse deduction and the tax savings for a wife's father associated with the dependent deduction on the timing of marriage.

First, our primary interest is the average effect of the tax policy on the timing of births for those parents who are affected by the tax. So, rather than estimating the average effects of the tax on the timing of births for all parents, we focus on those people who are likely to time their births. Kureishi and Wakabayashi (2008) have dealt with this point by focusing their analysis on the timing of first births for shotgun marriages and non-shotgun marriages. Their argument is that non-shotgun parents are more likely to time conception. One puzzling aspect of Kureishi and Wakabayashi's (2008) results is that they find a significant tax effect when they compare December and January births, but they do not find a significant tax effect when November-December births are compared with January-February births. We also compare December births with January births, but our additional focus is on a slightly wider time span, October-December births compared with January-March births. If the timing of conception is really the explanation for the timing differences that Kureishi and Wakabyashi (2008) report, then difficulties with timing conception exactly lead us to believe that this wider time frame is more appropriate for the analysis of this issue.

Here, we also propose a new and alternative control group, that is, those mothers whose age at the time of their first birth is 35 or more. According to Dunson et al. (2002), a woman's fertility starts to decline in her late 20s, and it substantially decreases by her late 30s. It is assumed that if the mother's age at the time of her child's birth is 35 or more, she cannot time her conception, whereas her younger counterparts are likely to be able to time conception. Since one of Kureishi and Wakabayashi's (2008) findings is

that in order to time births, Japanese time conception rather than manipulating deliveries by caesarean section, this control group may be more appropriate to examine the issue. This choice of the control group is also attractive in that we can secure enough observations for both the treatment and control groups.

Second, this paper sheds light on the effects of learning about the dependent deduction. It is possible that many young couples are not familiar with the tax system and may not be aware of the tax benefits for children until they have their first baby, but they may learn about benefits of the tax system after the first birth. In order to examine the potential for learning about the tax systems, we also analyse second and third births.

Third, the potential effect of taxation on the timing of marriage is still a rather understudied area, especially when it comes to the analysis of individual decision making using microdata. As far as we know, this study is the very first study on the timing of marriage in Japan. If as Kureishi and Wakabyashi (2008) report Japanese couples try to control the timing of births to obtain the benefits of the dependent deduction, then they should try to control the timing of their marriages to obtain the benefit of the spouse allowance as well since it is much easier to control the timing of marriage compared to the timing of births. This study concentrates on those couples who are most likely affected by the spouse allowance by focusing on couples where the wife has never worked before. Although it is less common in recent years, in Japan a proportion of women do not enter the labor market after completing their education. Until they get married, these women live with their parents and help out with domestic duties at home. These women are called as '*Kaji-Tetsudai*' in Japanese, which means a helper with domestic duties. Obviously, this group of women with no work experience did not have any labour income at the time of their marriage, and, therefore, the couple must have passed the income test imposed to gain the full spouse deduction.

A great deal of attention has been paid to the relationship between the spouse deduction and female labor supply in Japan. As the spouse deduction is income-tested, there is evidence that married women adjust their labor supply so that they can avoid becoming liable for taxation, and their husbands can be eligible for the spouse deductions (for example, Abe and Ohtake (1995), Higuchi (1995), and Kohara (2001)). The existing empirical evidence suggests that in Japan married women's behavior in the labour market responds to the existence of the spouse deduction. However, there is no study that examines how the spouse deduction might have impacted on the decision of when to marry.

In the United States, due to income splitting, there is a huge range of variation in the impact of marriage on the tax liabilities of couples, so that there can be a marriage tax or

a subsidy depending on timing and the income levels of the individuals concerned. On the other hand, the Japanese spouse deduction is a straight forward pure marriage subsidy. Thus, it should be easier to estimate the average effect of the marriage subsidy on the timing of marriage.

This paper is unique in that it examines the potential effects of tax savings/losses related to a marriage from both the husband's and the wife's father's point of view. Thus, this paper also contributes to the literature on the timing of marriage in relation to intra-family decision making. Intra-family transfers have been studied widely. Altonji et al. (1992) used data from the Panel Study of Income Dynamics (PSID) to test the standard altruism model. Horioka (2002) and Yamada (2006) examine the intra-family interaction in terms of bequest motives. However, intra-family transfers via tax savings have not been examined. Here, we examine whether any incentive effects in the timing of marriage arise in the shift of a non-working female from being a dependent of her father for tax purposes to being a dependent of her spouse. If a non-working female delays her marriage from the end of one year to the beginning of the next year, then there is an implicit transfer from her married household to her parents' household via the tax system through the combined effect of the tax deduction for adult dependents that can be claimed by a parent and the tax deduction for spouses that can be claimed by a husband.

Our empirical results suggest that for their third births, there is some evidence that Japanese couples time conception to gain the dependent deduction. However, the magnitude of the effect is very small. In contrast, there is no evidence to suggest that the spouse deduction affects when couples marry. Couples do not delay their marriage to allow the wife's father to claim the dependent deduction for his daughter.

Section 2 provides an outline of the Japanese personal income tax. Section 3 discusses the empirical models used to estimate the effects of tax deductions on the timing of births and marriages, while section 4 details the definitions of the variables used in the analysis and the data sources. Estimation results are reported in section 5, and section 6 contains a conclusion.

2. JAPANESE INCOME TAX

Under the Japanese Income Tax Law, individual income earners are subject to income tax. An individual's income tax is computed on the basis of his/her annual taxable income in a tax year defined as January to December. Couples are not able to file jointly in Japan. There are basically two steps to compute an individual's income tax. First,

eligible deductions and allowances are subtracted from the individual's annual income to obtain an individual's taxable income. These deductions include deductions for dependents and for a spouse. Second, progressive income tax rates are then applied to this taxable income to determine an individual's required tax payments. Table 3 summarizes how the dependent allowance for young dependents and adult dependents, the spouse deduction, and marginal tax rates have changed in Japan between 1964 and 2003.

[Table 3 around here]

The deduction for dependents can be made if a taxpayer has children or other relatives who depend on the taxpayer for their livelihood and the dependent's taxable income is below a specified level, for example 380,000 yen or less in 2003. If this is the case, in 2003 the taxpayer could claim a 380,000 yen deduction for each dependent. As a new born baby obviously has no income, the taxpayer can claim the deduction for a newly born baby. The monetary value of the deduction to a taxpayer will depend on his or her marginal tax rate, the higher the tax rate the higher the value of the deduction to the taxpayer.

The discussion of the spouse allowance will assume that the taxpayer claiming the spouse deduction is the husband, since this is the case for the vast majority of Japanese households. The income test for the spouse deduction is a little more complicated than the deduction for a new born baby. The amount of the spouse deduction varies according to the wife's income. For example, in the 2003 tax year, if the wife's total income was below 700,000 yen, her husband was eligible for the full spouse deduction. If the wife's total income exceeded the 700,000 yen threshold, the deduction was gradually reduced and became 0 when the wife's total income exceeded 1.41 million yen. Again the monetary value of the spouse deduction to the taxpayer depends on his marginal tax rate.

It is important to stress that the eligibility for the dependent deduction and the spouse deduction is determined by the status of a household on the final day of the relevant tax year, namely, December 31. For example, if a baby is born on December 31, the couple can claim the full dependent deduction for this new born baby for the tax year ending on the baby's birthday, whereas if the baby is born on January 1, the couple is only eligible for the dependent deduction for the tax year starting on the baby's birthday. Thus, there may be a tax incentive to have a baby by the end of the year rather than to have a baby early in the next year.

Similarly if a couple gets married on December 31 and the wife's income is below the relevant threshold for that tax year, the husband can claim the full deduction for his spouse for the tax year ending on that day. If the same couple gets married on January 1 of the next year and the wife's income is below the relevant threshold, the husband can claim the spouse allowance for that tax year. So, everything else being equal, couples have a tax incentive to marry by the end of calendar year rather than delaying their marriage into early the next year.

In relation to the dependent allowance, a key point to note for children born in January is that this tax regime does not just mean a shift of the deduction for one year for parents who have children born in January. Parents with December born babies can typically obtain one extra year of the deduction compared to parents with babies born in January. To be precise, parents with babies who are born in January, February or March are more likely to lose one year value of the dependent deduction compared to the parents of babies who are born in December in the previous year.

This is due to the Japanese education system and the smooth transition of new graduates to the labor market after completing high school or university. In Japan, the school and business calendars start on April 1 and finish on March 31 of the following year. This means that babies born between April and March in the following year all belong to the same grade at school, graduate together, and are hired together, so that parents will typically lose the dependent deduction for these children at the same time regardless of which month they were born in.

When high school graduates or university graduates complete their education in March, the majority of them immediately take up a job or go on to do further education. Figure 1 shows how high school graduates fare after their graduation. The employment rate for high school graduates has been declining. In contrast, the proportion of high school graduates going to university has been increasing. These two groups, high school students who start working or who go on to university, make up the majority of high school graduates. The remaining high school graduates go on to enroll in a technical college or become unemployed.

[Figure 1 around here]

Figure 2 shows the employment rate for new college graduates in Japan. The majority of the new graduates smoothly transit from university to the labor market. The rest of the university graduates either go on to enroll in a post-graduate course or become unemployed.

[Figure 2 around here]

As the Japanese business calendar year starts from 1 April, the vast majority of new graduates start their new jobs from 1 April. This means both babies born between April to December in year t and babies born between January and March in year t+1 typically lose their dependent status when they finish their education and start working in year t+18 (high school graduates who start work immediately after graduating) or year t+22 (university graduates who start work immediately after graduating). In other words, for babies born between January and March parents cannot regain an additional year of deduction in year t+22 which they lost in year t. This is summarized in Table 4.

[Table 4 around here]

Medical Expenses

Another potentially important and relevant tax incentive is the deduction for medical expenses. In the process of child bearing, a household incurs various medical costs that are not covered by the National Health Insurance system. According to the "Survey on Trends in Childbearing and Parenting 2003", a couple spends, on average, 387,000 Japanese yen on childbearing. These costs include the cost of regular checkups, delivery and admission to a hospital for a delivery (Recruit, 2003). In some circumstances, these costs can be claimed as deductibles.

The amount of the deduction for medical expenses is computed as follows. First, the total medical expenses of the taxpayer and his/her spouse and dependents between January 1 and December 31 are added up. The amount of insurance rebates for these expenses is then subtracted from the total medical expenses to give net medical expenses. Furthermore, the smaller amount of 100,000 yen or 5 % of total net income is subtracted from the net medical expenses (in the case of 2003 tax year). The remaining amount is the amount of the deduction for medical expenses.

As the deduction for medical expenses is computed on the basis of medical expenses between January 1 and December 31, there is a tax incentive to concentrate the household medical expenses in one year. If an average income couple split the medical expenses between two tax years, they cannot claim a full deduction for the first 100,000 yen subtracted from their medical expenses. Thus, rather than having a baby in the first quarter, it may be beneficial for parents to have their baby in the fourth quarter.

3. MODEL

The previous section discussed the key provisions of the Japanese income tax system. In this section, we discuss the models used to explain the timing of births (section 3.1), and the timing of marriages (section 3.2).

3.1 Timing of Births

We use the following difference-in-difference (DID) style model which is an extension of Dickert-Conlin and Chandra's (1999) model. Unlike Dickert-Conlin and Chandra's (1999) analysis which compares births in the last week of December and in the first week of January, here we estimate two types of equations. First, we compare December births with January births. Second, the focus is on fourth quarter births and first quarter births to ensure there are a sufficient number of observations for our analysis. The model for comparing births in December and January can be written as:

$$\begin{aligned} Dec\_birth_i^* &= \delta_{10} + \delta_{11} deduction_i + \delta_{12} childbearing29_i \\ &+ \delta_{13} deduction_i \times childbearing29_i + X_i\delta + \varepsilon_{1i} \end{aligned} \tag{1}$$

$$Dec\_birth_i = \begin{cases} 1 \text{ if } Dec\_birth_i^* > 0 \\ 0 \text{ otherwise} \end{cases}$$

where *Dec_birth* is a 0-1 dummy variable which takes the value one if parents have their first child in December, and zero if they have their first child in January (babies born in the other ten months are excluded from the analysis).

The variable *deduction* is the potential tax deduction for a new born baby, and *childbearing29* is a 0-1 dummy variable which takes the value unity if the mother's age at the time of the birth of the child is 29 or less, and zero if the mother's age at the time of the birth of the child is 35 or more. Dunson et al. (2002) suggest that women's fertility decreases substantially by their late 30s. It is assumed therefore that if the mother's age at the time of birth is 35 or more, they cannot time conception whereas younger counterparts are likely to be able to time conception. The idea in using *childbearing29* is to view mothers who gave birth at an age younger than 29 as a treatment group, and mothers who gave birth at the age of 35 or more as a control group. It is important to emphasise that we intentionally exclude women who had children when they were aged between 30 and 34 since the extent to which they could control

conception is ambiguous.

In equation (1), the coefficient δ_{11} can be interpreted as the average tax effect on the timing of births for elderly mothers. If elderly mothers do not respond to tax benefits, then δ_{11} should be zero. The coefficient δ_{13} is the differential average tax effect between mothers who gave birth at younger age and who are likely to be able to time conception and older mothers. For the reasons discussed earlier, it is expected that $\delta_{13}>0$. $\delta_{11}+\delta_{13}$ is the average effect on the timing of birth for mothers who gave birth at a younger age, and it is expected that $\delta_{11}+\delta_{13}>0$.

The vector X in equation (1) includes other explanatory variables: the mother's education in years (*mother_educ*), the father's education in years (*father_educ*), the father's income (*father_inc*), and an urban dummy. The mother's and father's levels of education are included as explanatory variables because it is assumed that a mother and/or father with a higher education level is likely to have a better knowledge and understanding of the tax system. Thus, we expect that increases in these variables will increase the probability of a December birth. The father's income is included to control for income effects and potential differences in preferences across different income groups. Finally, the urban dummy is included to control for cultural and geographical effects. This variable is also expected to control for the availability of obstetricians and gynecologists in the area where the respondent lives. It is assumed that the error term in (1) is normally distributed, so that the model can be estimated using the probit technique.

Timing conception may not be as easy as some claim, and the young couples may project conception in a wider time span. Thus, we also compare births in the fourth quarter to births in the first quarter using the following model:

$$\begin{aligned} Q4\_birth_i^* &= \delta_{20} + \delta_{21} deduction_i + \delta_{22} childbearing29_i \\ &+ \delta_{23} deduction_i \times childbearing29_i + X_i\delta + \varepsilon_{2i} \end{aligned} \qquad (2)$$

$$Q4\_birth_i = \begin{cases} 1 \text{ if } Q4\_birth_i^* > 0 \\ 0 \text{ otherwise} \end{cases}$$

where *Q4_birth* is a 0-1 dummy variable which takes the value one if parents have their first child in the fourth quarter, and zero if they have their first child in the first quarter (babies born in the second and third quarters are excluded from the analysis).

In their analysis of the effect of the dependent deduction on the timing of first births,

Kureishi and Wakabayashi (2008) divide marriages into three groups: shotgun-marriages, non-shotgun marriages, and marriages where it is not clear whether or not they are shotgun marriages. First births in shotgun marriages are used as the control group and first births in non-shotgun-marriages are used as the treatment group. Kureishi and Wakabayashi argue that shotgun-married parents cannot time conception as they did not plan to have the baby in the first place. On the other hand, parents in non-shot gun marriages are able to time conception as they can plan their baby in advance.

Using this treatment and control group Kureishi and Wakabayashi (2008) find a significant tax effect between December and January births, but not between November-December and January-February births. We believe that our choice of control and treatment groups has an advantage over their comparison of shotgun-married-parents and non-shotgun-married parents in that it enables us to examine not only first births which Kureishi and Wakabayashi (2008) investigate, but also subsequent births.

In order to investigate whether or not there is any learning effect associated with the dependent deduction, equations (1) and (2) are also estimated for second and third births separately. When second and third births are analysed, the variables *Dec_birth_1st* and *Dec_birth_2nd* are included additional variables in estimating equation (1). *Dec_birth_1st* (*Dec_birth_2nd*) is a 0-1 dummy variable taking the value one if the first birth (second birth) is in December, and zero if it is January. These dummy variables are included to control for the birth month effects of previous births.

3.2 Timing of Marriage

To examine the effects of taxes on the decision of when to marry, we use the following difference in difference type of model to compare December marriages to January marriages:

$$\begin{aligned} Dec\_marriage_i^* &= \delta_{30} + \delta_{31} s\_deduction_i + \delta_{32} never\_worked_i \\ &+ \delta_{33} s\_deduction_i \times never\_worked_i + X_i\delta + \varepsilon_{3i} \end{aligned} \tag{3}$$

$$Dec\_marriage_i = \begin{cases} 1 \text{if } Dec\_marriage_i^* > 0 \\ 0 \text{ otherwise} \end{cases}$$

where *Dec_marriage* is a 0-1 dummy variable which takes the value one if the couple

gets married in December, and zero if the couple gets married in January (marriages in the other ten months are excluded from the analysis). The variable *s_deduction* is the value of the potential tax deduction for a spouse. The variable *never_worked* is a 0-1 dummy variable taking the value unity if the wife has never worked and zero otherwise. That is, we introduce as a treatment group, couples whose wife has never worked before. As discussed in section 2, the eligibility and the amount of the spouse deduction varies according to the wife's income. If the wife is employed in a full-time position, she is more likely to exceed the income threshold for the spouse deduction. Furthermore, if she was employed in a part-time position, the amount of the deduction could vary. In equation (2-2), δ_{33} is the differential average tax effect between couples where the wife has no work experience and, therefore, no income at the time of the marriage, and couples where the wife has some work experience. Since wives with no work experience are more likely to time marriage than those couples whose wife has some work experience, it is expected that $\delta_{33}>0$. δ_{31} is the average tax effects on the timing of marriage for couples where the wife has some work experience, and we expect $\delta_{31}>0$. $\delta_{31}+\delta_{33}$ is the average effect on the timing of marriage for couples whose wife has no work experience, and it is expected that $\delta_{31}+\delta_{33}>0$. When $\delta_{32}=\delta_{33}=0$, this model becomes similar to Alm and Whittington's (1997) model which compares fourth quarter marriages to first quarter marriages. Again it is assumed that the error term in (3) is normally distributed, so that the model can be estimated using the probit technique.

The vector X includes the husband's education level (*husband_educ*), the wife's education level (wife_educ), the husband's income (husband_inc), and the urban dummy. As is the case for the timing of birth equation (1), an urban dummy is included to control for cultural and geographical effects..

Of course, a taxpayer is also eligible for the spouse deduction when his future spouses' earnings are below the relevant income threshold. To take this into account, we need to estimate the wife's income around the time of her marriage. However, it is difficult to estimate the wife's income around the time of her marriage with our data set as it only contains information on a respondent's (or spouse's) current income and employment status. Women in Japan often quit or change their jobs around the same time as major events in their life such as marriage and childbearing. According to our data set, at the time of the surveys many women are currently not in the labor force and/or are not in full-time employment.

Thus, we only consider the extreme case, namely, women who have never worked before. As we have discussed earlier, in Japanese these women are called *Kaji-Testudai*. Those who are most affected by the tax incentive are women who had no income at the

time they married. We can be sure that those women who have never worked before definitely had no labour income at the time of their marriage. In this case, their husbands can claim the full amount of the spouse deduction.

The advantage of using this method is that we can avoid having measurement errors associated with estimating the amount of the spouse deduction as husbands of women who have never worked can receive the full spouse deduction. Moreover, women who have never worked are also free from the effects of the bonuses paid to many Japanese workers in December. In Japan, many companies provide bonuses in summer (usually July) and winter (usually December). This may distort our estimation as there is an incentive for women to resign from their jobs when they marry after they have received their end of year bonus.

There are two potential criticisms of our use of the group of women who have never worked before as a treatment group. First, these women do not represent the population as a whole, and, secondly, they may involve strong cohort effects. We do not claim these women with no work experience represent the married female population as a whole, and it is fair to say that many women are not subject to the effects of the spouse deduction as their incomes are above the relevant income threshold. However, women with no work experience are an important group for investigating the impact of the spouse allowance. These are the households that would obtain the maximum benefit from the spouse allowance, so if these couples do not respond to the tax deduction, then we can reasonably conclude that the spouse deduction probably does not affect the timing of marriage at all.

About 9% of the women in our sample (1147 out of 12,248) have no work experience. As Table 6 indicates, after imposing our sample selection rules, 7% of the women in our sample (47 out of 667) have no work experience. It is also worth noting that 89% of these women are born before 1960, and 11% are born between 1960 and 1976. Thus, although younger cohorts are more likely to have some work experience, the culture of women not working in Japan has not totally faded out in recent years.

The timing of marriages may be affected by not only by the spouse deduction, but also by the dependent deduction claimed by the wife's father. Women who have never worked before have no income, and will usually be a dependent of their father for tax purposes. Thus, there is another tax incentive for these women, that is, to delay their marriage to January to remain the dependent of their father until the end of the year so that their father can claim the dependent deduction. In order to conduct a comprehensive analysis of the potential impact of the dependent deduction claimed by a father, we would need information on the wife's father's income around the time she married.

However, our data sets do not have any information concerning the wife's father's income. Instead, we use a proxy for the wife's father's income, namely, the interaction of the wife's father's age and his years of education. To ensure that the wife's father is still in the labour market at the time of the marriage, we confine the sample to cases where the age of the wife's father at the time of marriage is below 60. When information about the wife's father's is used and the sample is restricted to fathers aged under 60 at the time of their daughter's marriage, we cannot obtain enough observations for women who have no work experience when comparing December marriages and January marriages. Therefore, we compare fourth quarter marriages and first quarter marriages. The relevant equation can be written as follows:

$$\begin{aligned} Q4\_marriage_i^* &= \delta_{40} + \delta_{41} s\_deduction_i + \delta_{42} never\_worked_i \\ &+ \delta_{43} s\_deduction_i \times never\_worked_i + \delta_{45}\, father\_age\_educ_i \\ &+ \delta_{46}\, father\_age\_educ_i \times never\_worked_i + X_i\delta + \varepsilon_{4i} \end{aligned} \qquad (4)$$

$$Q4\_marriage_i = \begin{cases} 1 \text{ if } Q4\_marriage_i^* > 0 \\ 0 \text{ otherwise} \end{cases}$$

where *Q4_marriage* is a 0-1 dummy variable which takes the value one if the couple gets married in the fourth quarter, and zero if the couple gets married in the first quarter (second quarter and third quarter marriages are excluded from the analysis). The vector X contains the same set of explanatory variables as for equation (3). In this model, young couples face two conflicting choices: to marry in the fourth quarter so that the husband can claim the spouse deduction; or to delay their marriage until the first quarter so that the wife's father can claim the dependent deduction. We expect $\delta_{41} + \delta_{43} > 0$, and $\delta_{45} + \delta_{46} < 0$.

4. DATA

Our data are drawn from the 1998 and 2003 "National Survey on Families (NSF)" (Kazoku ni tsuiteno Zenkoku Chousa). These surveys were conducted by the National Family Committee of the Japanese Society of Family Sociology and the Social Science and the Social Science Japan Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo. The surveys were conducted in January 1999 and 2004, respectively. In the 1998 survey, 10,500

individuals who were aged between 28 and 77 as of December 1998 were surveyed with a response rate of 66.52% (6,985 responses). In the 2003 survey, 10,000 individuals who were aged between 28 and 77 as of December 2003 were surveyed, and the response rate was 63.02% (6,302 responses). In our analysis, the two surveys are pooled together.

Both surveys ask respondents about the year and month of their latest marriage. The 1998 survey asks about the year and month of the birthday for each child up to the fifth child, while the 2003 survey asks about the year and month of the birthday for each child up to the third child. We focus on the timing of the couple's first, second and third child.

There are two variables that need to be estimated for our analysis, the husband's income at the time of the relevant event, birth or marriage, and the value of the tax deduction. The nominal value of the dependent allowance to a couple depends on the marginal tax rate for the principal income earner. In order to compute the potential tax deduction for a new born baby, we need to know the husband's nominal after-tax income at the time of birth of each child. The NFS provides information only on a husband's current income and occupation, but does not provide information on the husband's income at the time of birth of each child. We therefore estimate the father's income using the method suggested by Kureishi and Wakabayashi (2008). That is, we first estimate an income equation for husbands using information on the husband's current income. Here the log of income is regressed on age, age squared, education dummies, firm-size and occupational dummies. The predicted value of the husband's income at the time of birth of each child is computed from this equation using the husband's age at the time of the birth of each child. To account for individual effects, we added a half of the residual. This estimated income is converted into nominal income at the time of the birth. It is important to note that the inclusion of the residual in estimating husband's income did not alter the later results.

In order to minimize measurement errors in estimating the income equation, husbands who are self-employed and/or aged 60 years or more are excluded from the analysis. The incomes of the self-employed people are heavily influenced by the business-cycle. Elderly workers are likely to have changed their job after their mandatory retirement. Both of these factors are likely to cause measurement errors if we included these individuals in estimating the income equation.

The process for estimating the husband's income at the time of marriage is essentially the same, but in this case, we compute the predicted value of the husband's income at the time of his marriage from the estimated income equation using the husband's age at

the time of his marriage.

The next step is to compute the value of the tax deduction to the taxpayer. It is assumed that the husband is the principal income earner around the time the couple is married and around the time each child is born. The National Tax Agency Annual Statistics (NTAAS) (Kokuzei-cho Toukei Nenpou-sho) provides information on the marginal tax rate for each income group, the number of brackets, and per-capita average amount of taxable income for each income group. To compute an individual's taxable income accurately, we need the information on other deductions and allowances such as medical expenses, insurance payments, and the number of elderly dependents, but the NSF does not contain such information. Hence, we convert the estimated father's income or husband's income into the per-capita average amounts of taxable income which are listed in the NTAAS. The average amount of the deduction for a dependent for this taxable income category can then be obtained from NTAAS. This nominal value of the relevant deduction is then multiplied by the marginal income tax rate according to the average per-capita amounts of taxable income. Finally, the deduction is converted to 2003 prices.

Our sample examining the timing of births is confined to respondents who satisfy the following five criteria. First, we focus on respondents who have at least one child. This criterion is self-explanatory as we focus on the deduction for a new born baby. Second, respondents who have been divorced or widowed are excluded. Divorcees or widows may have children from their previous marriage, but NFS does not contain the information on their previous marriage. If the respondent is female, there is no information on her previous husband, and, therefore, it is impossible to estimate that husband's income. Third, the sample is confined to respondents whose husbands have an income. This restriction is imposed to enable us to estimate the father's income. Fourth, to be consistent with Kureishi and Wakabayashi (2008), we excluded respondents whose babies were born before 1964. Finally, we exclude all observations which do not contain all the information required in estimation. For the analysis of the timing of marriages, in addition to the second, third and fifth criteria for the analysis of births, all marriages before 1964 are also excluded. Descriptive statistics are summarized in Table 5 for the samples used in the analysis of the timing of births, and in Table 6 for the samples used in the analysis of the timing of marriages. These tables are made corresponding to the sample selection.

[Table 5 around here]

[Table 6 around here]

5. RESULTS

5.1 Timing of Births

Figures 3-1, 3-2 and 3-3 show graphically the difference between the treatment and the control groups for first, second and third births, respectively, by month (denoted by diff). These figures are created without imposing any sample selection to show the overall trends in the original data. Although Figure 3-1 for the first child and Figure 3-2 for the second child do not suggest that the frequency of December births is higher than January births for the treatment group, Figure 3-3 for the third child shows that births tend to be concentrated towards the end of year.

[Figures 3-1, 3-2, 3-3 around here]

The results for estimating the difference in difference model in equation (1) for first, second and third births with the late childbearing group as the control group and younger mothers as the treatment group are presented in equations (7-1)- (7-6) in Table 7. All the results reported in Table 7 and the Tables that follow are the estimated marginal effects associated with each variable rather than the actual estimated coefficients for the probit model. In the equations for the first child (equations (7-1) & (7-2)) and the second child (equations (7-3) and (7-4)) reported in Table 7, the estimated marginal effects of *deduction* are positive, but not statistically significant. The magnitude of this marginal effect is also rather small, as a 1000 yen increase in the value of the dependent deduction increases the probability of a December birth by 0.002 per cent in equation (7-1) and (7-2) for the first child. As equations (7-3) and (7-4) indicate, the effects are negligible for the second child. Equations (7-5) and (7-6) even show a negative sign for the estimated coefficient of this variable. Similarly, the estimated coefficients of the interaction term between *deduction* and *childbearing29*, δ_{13}, are not statistically significant in any of the cases reported in Table 7. In some cases, the estimated coefficient has a negative sign which is consistent with our a priori expectations.

[Table 7 around here]

As discussed earlier, one primary interest is determine whether $\delta_{11}+\delta_{13}>0$. In other words, whether the sum of the coefficients of *deduction* and *deduction*childbearing29* are positive and statistically significant. The marginal impacts of these two variables are

individually not statistically significant in all equations in Table 7. Hence, we conduct an asymptotic t-test of the null hypothesis $\delta_{11}+\delta_{13}=0$ against the alternative hypothesis $\delta_{11}+\delta_{13}>0$ for the models reported in Table 7. In all cases, these t-tests could not reject the null hypothesis.

None of the equations estimated in equation (1) provides any evidence that the tax deduction for dependents has a statistically significant impact on the timing of births. This may reflect the fact that conception may not be easily achieved within such a short time span. Thus, we extend our analysis to compare births in the fourth quarter to births in the first quarter using equation (2).

The results of estimating equation (2) are summarised in Table 8. The estimated results for the first child, equations (8-1) and (8-2), and the second child, equations (8-3) and (8-4), do not provide any evidence that the tax deduction for dependents has a statistically significant effect. The tests of the null hypopthesis $\delta_{21}+\delta_{23}=0$ cannot reject this hypothesis. However, the coefficients of the interest in equations (8-5) and (8-6) are statistically significant for the third child. Although the estimated marginal effect of *deduction* is negative and significant, the coefficients of the cross-term between *deduction* and *childbearing29*, δ_{23}, are positive and statistically significant in equations (8-5) and (8-6) for the third child. The positive effect δ_{23} dominates the negative effects of δ_{21} and we can conclude the overall treatment effect is positive. This result highlights the possibilities of learning about the effects of the deduction and the longer time span of projecting conception.

[Table 8 around here]

5.2 Timing of Marriage

Figure 3-4 depicts the difference between women who have some work experience and women who have no work experience in relation to the month of their marriage (denoted diff). The trends of these two groups are quite similar, but there is a slight positive difference in December marriages compared with January marriages. Table 9 reports the results of estimating various versions of equations (3) and (4) for the timing of marriages. Models (9-1) and (9-2) report the results of a difference in difference model using couples where the wife has never worked as the treatment group. In equation (9-1) and (9-2), the marginal effect of the spouse deduction is found to have a positive, but statistically insignificant effect. The estimated coefficients of the cross term in equation (3), δ_{33}, are not significant in equations (9-1) and (9-2). As discussed earlier, one primary interest is whether $\delta_{31}+\delta_{33}>0$. We also conduct an asymptotic

t-test for the null hypothesis $\delta_{31}+\delta_{33}=0$ against the alternative hypothesis $\delta_{31}+\delta_{33}>0$ in models (9-1) and (9-2) in Table 9. For both models, the null hypothesis cannot be rejected. That is, the spouse deduction does not affect the timing of marriage.

.

[Figure 3-4 around here]

[Table 9 around here]

Adult Child Deduction Claimed by the Wife's Father

In the previous subsection, we examined the effects of the spouse deduction on the timing of marriage. A straight forward explanation for the insignificance of the tax variables is that Japanese couples do not choose the timing of their marriage based on tax incentives. However, there may be another channel that leads taxation to have an effect on the timing of marriage, that is, the dependent deduction claimed by the wife's father. Those women with no work experience are more likely to have been claimed as a dependent for tax purposes by their father at the time they were married. Table 3 details the nominal value of the dependent deduction for an adult dependent. According to Table 3, until 1974 the spouse deduction is generally larger than the dependent deductions. From 1975 until 1986, the two deductions then have the same value. From 1987, the spouse deduction is again set at a higher value than the dependent deduction.

More importantly, in the past, the Japanese tax system was much more progressive and the maximum marginal tax rates were much higher. So, if a woman married by the end of December, her father may lose a tax saving associated with the dependent deduction that is possibly larger in value than the tax saving accruing to the husband from being able to claim the spouse deduction.

Neither NSF 1998 nor NSF 2003 contains information on the respondents' (or their spouse's) father's current income. Even if we did have such information, many fathers are likely to be already retired and so it would be impossible to estimate their income at the time of their daughter's marriage.

Thus, we use an interaction term of the respondent's father's age and the respondents' father's education level as a proxy variable for their income at the time of their daughter's marriage. Our expectation is that the higher the father's age and the higher the father's education level, the higher his income, the higher his marginal tax rate is, and so the higher the value of the dependent allowance to him. Thus, we expect a negative sign for the coefficient associated with the father's education level.

We have estimated the probability of fourth quarter marriage using equation (4). *father_age_educ*, is a proxy for wife's father's marginal tax rate. Equations (9-3) and

(9-4) in Table 9 summarize the estimated results for the impacts of the spouse deduction and the deduction of dependent for the on fourth quarter marriages. There is no statistically significant variable in any of these models. For the estimates of equation (4), we also test individually the null hypotheses $\delta_{41}+\delta_{43}=0$, and $\delta_{45}+\delta_{46}=0$, but we cannot reject these null hypotheses. Therefore, it can be concluded that there is no evidence to suggest that the timing of marriages is motivated by the tax incentives of the spouse deduction. These results also rule out the possibility that women with no work delay their marriage from the fourth quarter to the first quarter of the following year so that their father can claim a dependent deduction for them.

.

6. CONCLUSION

This paper has examined the effects of taxes on the timing of births and the timing of marriages using Japanese micro data. Our study is unique in three ways. We estimate the average effect of the income tax system on the timing of births for those parents who are affected by the dependent deduction. We propose a new control group, that is, those mothers whose age at the time of their first birth is 35 or older. It is assumed that these mothers cannot time their conception, whereas younger counterparts are likely to be able to time conception. Moreover, we examined whether there are learning effects associated with the tax system by reexamining the hypothesis for second and third births. Finally, this study is unique in that we compare the impacts of tax savings associated with the spouse deduction and the dependent deduction on the timing of marriages. Like the analysis of the timing of births, we estimate the average effect of the income tax system on the timing of marriages for those women who are most likely to be affected by the tax policy, namely, women who have never worked before.

In our estimated results, we could not detect any effects of tax incentives for the first and second child. However, there is some evidence to suggest that Japanese couples time conception to gain the dependent deduction in the case of third child. It is evident that for the third child, couples are more likely to give birth in the fourth quarter than the first quarter. This result may stem from the fact that we allowed the possibility of longer time span for planning the conception, and learning about the dependent deduction occurs. However, in any case, the estimated size of the impact for third births is very small.

Moreover, there is no evidence to suggest that the deduction for spouses affects the decision of when to marry. The effects of gaining the spouse deduction for the husband are negligible. We also examined that another tax incentive that couples delay their

marriage so that the wife's father can claim the dependent deduction. We again rule out such possibility.

Acknowledgements

The first author wishes to acknowledge the financial assistance provided by the Japan Society for the Promotion of Science Grant in Aid for Scientific Research No. 22730239 for a project on the "The Analysis of Single Children living with Their Parents". The second author wishes to acknowledge the financial assistance provided by a Global Center of Excellence (GCOE) Award made to the Graduate School of Economics and the Graduate School of Business and Commerce at Keio University for Raising Market Quality- Integrated Design of Market Infrastructure. Both authors wish to thank Wataru Kureishi, Terukazu Suruga, Ryuichi Tanaka, Midori Wakabayashi, the participants of a Microeconometric Workshop at Melbourne University, and the participants of the Family Economics Workshop at Keio University for their helpful comments and suggestions. Earlier versions of the paper were presented at the Autumn 2010 Meeting of the Japan Economic Association held at Kwansai Gakuin University in September 2010, and the Twelfth International Convention of the East Asia Economic Association (EAEA12) held at Ewha Women's University, Seoul in October 2010. Both authors also wish to acknowledge the kind permission of the National Family Committee of the Japanese Society of Family Sociology and the Social Science and the Social Science Japan Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo in making available the data in the "National Survey on Families (NSF)" (Kazoku ni tsuite no Zenkoku Chousa) for use in the analysis in this paper.

REFERENCES

Abe Y. and Ohtake F. (1995), Zeisei shakai hosho seido to pa-to taimu rodosha no rodo kyokyu kodo (Taxation, social security and the labor supply of part-time workers), *Kikan Shakia Hosho Kenkyu*, 31, 120-134 (in Japanese).

Alm J. and Whittington L.A. (1997), Income Taxes and the Timing of Marital Decisions, *Journal of Public Economics*, 64(2), 219-240.

Alm J., Dickert-Conlin S. and Whittington L.A. (1999), Policy Watch: The Marriage Penalty, *Journal of Economic Perspectives*, 13(3), 193-204.

Altonji, J.G., Hayashi, F. and Kotlikoff, L.J. (1992), Is the Extended Family Altruistically Linked? Direct Tests Using Micro Data, *American Economic Review*, 82, 1177-98.

Burman L.E. and Randolph W.C. (1994), Measuring Permanent Responses to Capital-Gains Tax Changes in Panel Data, *American Economic Review*, 84(4), 794-809.

Dickert-Conlin S. and Chandra A. (1999), Taxes and the Timing of Births, *Journal of Political Economy*, 107(1), 161-177.

Dunson D.B., Colombo B. and Baird D.D. (2002), Changes with Age in the Level and Duration of Fertility in the Menstrual Cycle, *Human Reproduction*, 17(5), 1399-1403.

Gans J.S. and Leigh A. (2009), Born on the First of July: An (Un)natural Experiment in Birth Timing, *Journal of Public Economics*, 93(1-2), 246-263.

Gelardi A.M.G. (1996), The Influence of Tax Law Changes on the Timing of Marriages: A Two-Country Analysis, *National Tax Journal*, 49(1), 17-30.

Higuchi Y. (1995), Sengyo shufu hogo seisaku no keizaiteki kiketsu (The economic consequences of policies to protect full-time housewives), in Hatta, T. and Yashiro N. (eds), *Jakusha Hogo Seisaku no Keizai Bunseki (An Economic Analysis of Policies to Protect the Weak)*, Nihon Keizai Shinbunsha,
185-219, Tokyo (in Japanese).

Horioka, C.Y. (2002), Are the Japanese Selfish, Altruistic or Dynastic?, *Japanese Economic Review*, 53(1), 26-54.

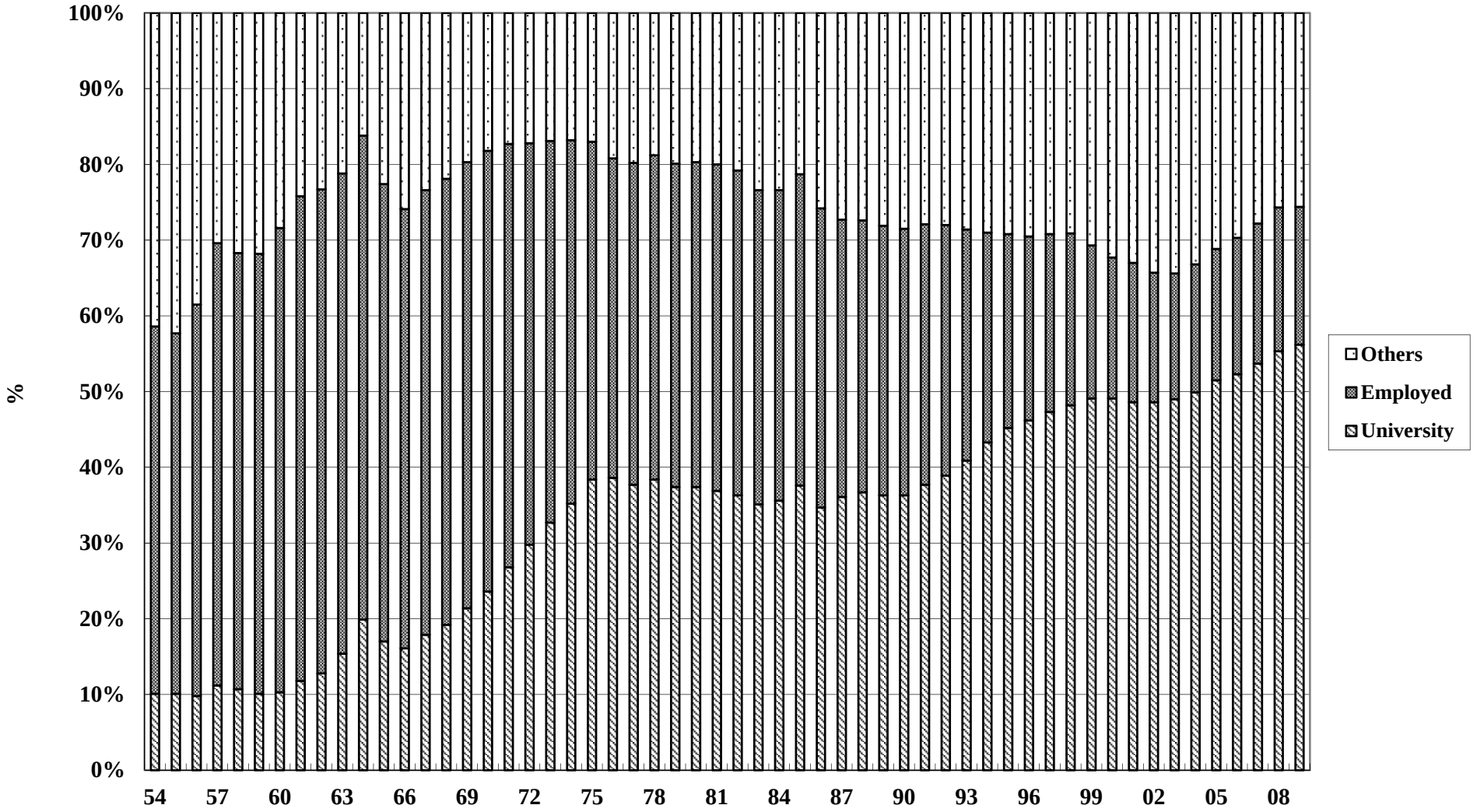
Kohara M. (2001), Sengyo shufu ha yufuku na katei no shocho ka? Tsuma no shugyo to shotoku fubyoudou ni zeisei ga ataeru eikyo (Is the full-time housewife a symbol of a wealthy family? The effect of taxes on the work choice of wives and income inequality), *Nihon Rodo Kenkyu Zasshi*, 493, 15-29 (in Japanese).

Kopczuk W. and Slemrod J. (2003), Dying to Save Taxes: Evidence from Estate-Tax Returns on the Death Elasticity, *Review of Economics and Statistics*, 85(2), 256-265.

Kureishi W. and Wakabayashi M. (2008), Taxing the Stork, *National Tax Journal*, 61(2), 167-187.

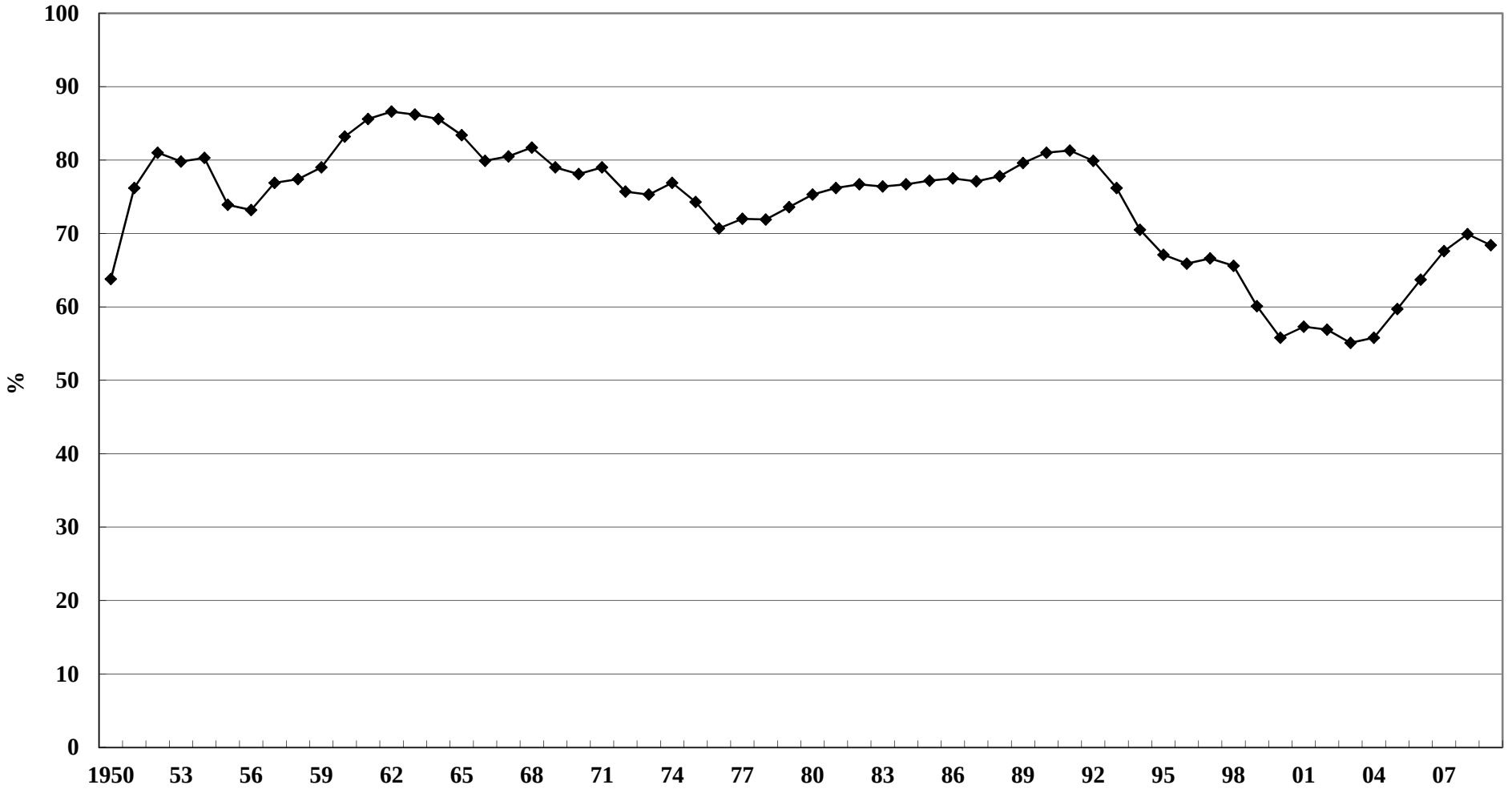
Recruit (2003), *Shussan Ikuji Torendo Chosa 2003 (Survey on Trends in Childbearing and Parenting 2003))*, Tokyo (in Japanese).
Sjoquist D.L. and Walker M.B. (1995), The Marriage Tax and the Rate and Timing of Marriage, *National Tax Journal*, 48(4), 547-557.
Yamada, K. (2006) Intra-Family Transfers in Japan: Intergenerational Co-residence, Distance, and Contact, *Applied Economics*, 38(16), 1839-1861.

Figure 1: The Career Path of High School Graduates

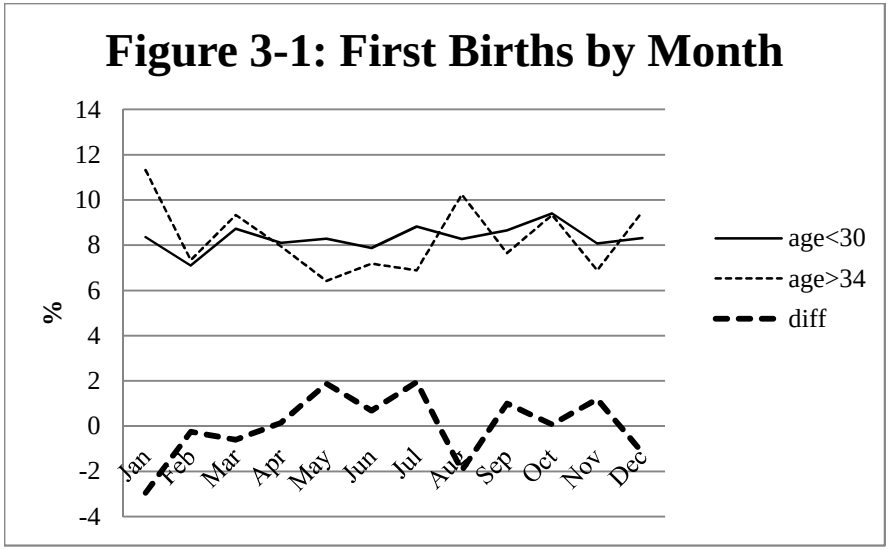


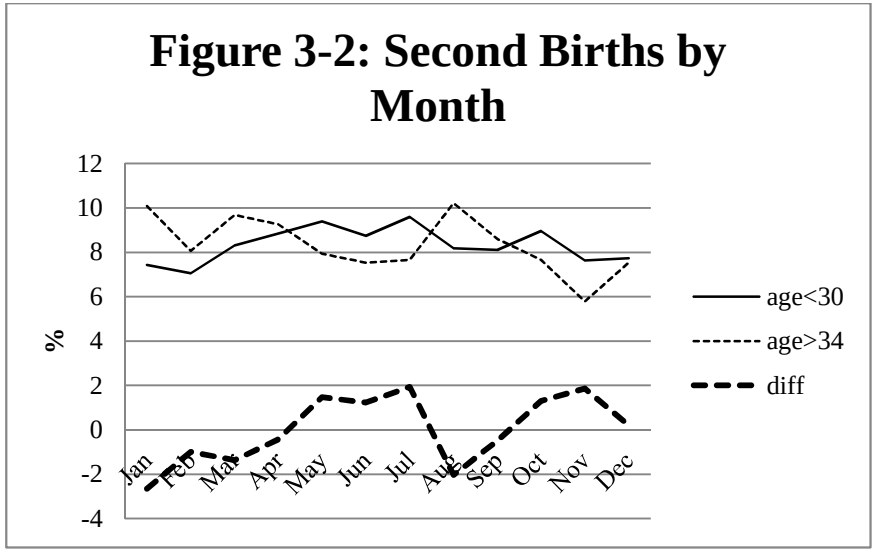
Source: Ministry of Education, Culture, Sports, Science & Technology (Japan), *Basic School Survey*.

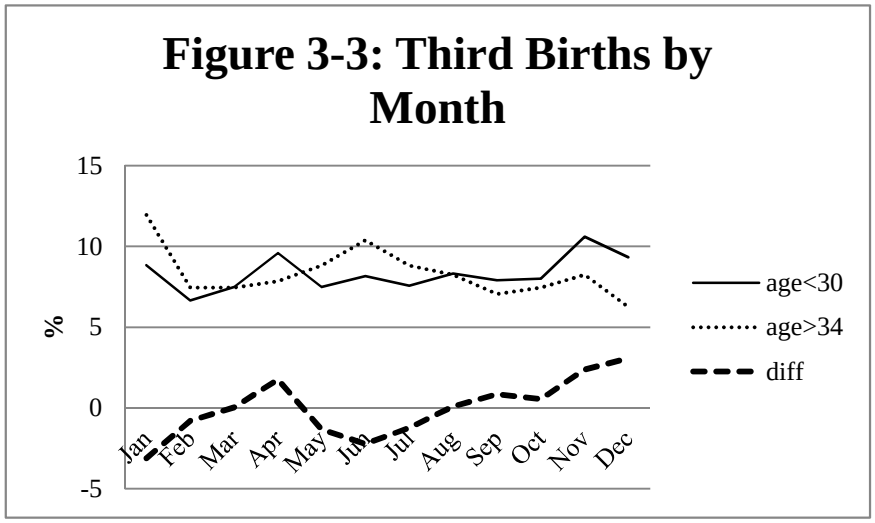
Figure 2: Employment Rate for New University Graduates

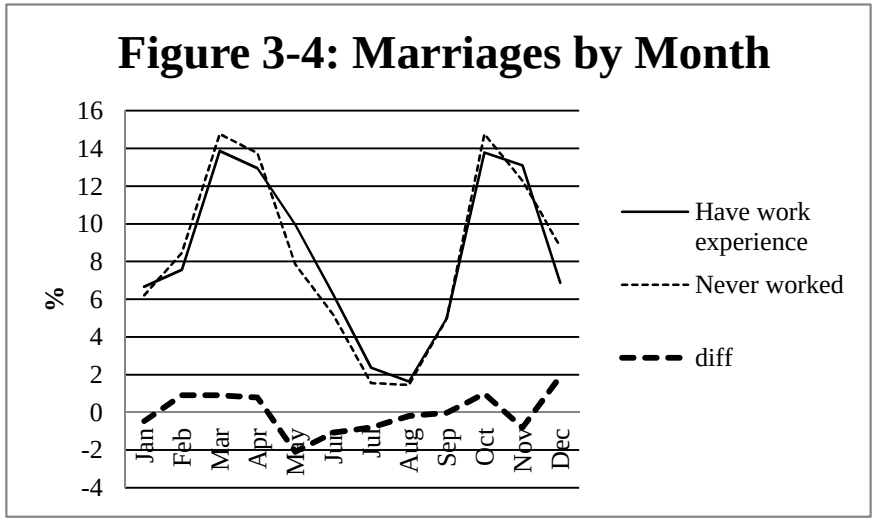


Source: Ministry of Education, Culture, Sports, Science & Technology (Japan), *Basic School Survey*.









Source: 1998 and 2003 “National Survey on Families (NSF)”

Table 1: Method of Child Delivery (C-section)
(%)

	JAPAN	US
1984	7.3	
1987	8.5	
1990	10.0	25.9
1993	11.8	22.3
1996	12.6	21.3
1999	14.7	22.1
2002	15.2	26.5
2005	17.4	30.5

Sources:
Ministry of Health, Labour and Welfare (Japan), *Survey of Medical Institutions.*
Center for Disease Control and Prevention (US), *National Center for Health Statistics* .

Table 2: Place of Child Delivery
(%)

	Hospital	Home
1950	4.6	95.4
1955	17.6	82.4
1960	50.1	49.9
1965	84.0	16.0
1970	96.1	3.9
1975	98.8	1.2
1980	99.5	0.5
1985	99.8	0.2
1990	99.9	0.1
1995	99.9	0.1
2000	99.8	0.2
2005	99.8	0.2

Source: Ministry of Health, Labour and Welfare (Japan), *Vital Statistics* .

Table 3: Essential Elements of the Japanese Income Tax System

Year	Deduction for Young Dependents	Deduction for Adult Dependents	Deduction for a Spouse	Minimum Marginal Tax Rate	Maximum Marginal Tax Rate	Number of Tax Brackets
1964	38,800	50,000	108,800	8%	75%	15
1965	47,500	57,500	117,500	8%	75%	15
1966	57,500	60,000	127,500	8.50%	75%	15
1967	67,500	67,500	145,000	9%	75%	15
1968	77,500	77,500	157,500	9.50%	75%	15
1969	95,000	95,000	167,500	10%	75%	15
1970	115,000	115,000	177,500	10%	75%	19
1971	135,000	135,000	195,000	10%	75%	19
1972	140,000	140,000	200,000	10%	75%	19
1973	155,000	155,000	207,500	10%	75%	19
1974	220,000	220,000	232,500	10%	75%	19
1975–1976	260,000	260,000	260,000	10%	75%	19
1977–1982	290,000	290,000	290,000	10%	75%	19
1983	300,000	300,000	300,000	10%	75%	19
1984–1986	330,000	330,000	330,000	10.50%	70%	15
1987	330,000	330,000	492,500	10.50%	60%	12
1988	330,000	330,000	495,000	10%	60%	6
1989–1994	350,000	350,000	700,000	10%	50%	5
1995–1998	380,000	380,000	760,000	10%	50%	5
1999–2003	380,000	380,000	760,000	10%	37%	4

Notes: The reported values for each deduction are their nominal value in current yen. The spouse deduction is reported for the case where the spouse has no income. The reported value for young dependents is the value that would be appropriate for a new born infant.

Source: National Tax Agency, *National Tax Agency Annual Statistics (Kokuzeikyoku Nenpo)* , various issues.

Table 4: Eligibility for the Dependent Deduction

	Eligibility for deduction		
Babies born in	t	t+1 to t+21	t+22
April to December in year t	eligible	eligible	no deduction
January, February or March in year t+1	ineligible	eligible	no deduction

Note: Assumes that the child loses its dependence status 22 years after being born.

Table 5: Descriptive Statistics for Timing of Births

		December vs. January						Fourth Quarter vs First Quarter					
		First Child N=639		**Second Child N=467**		**Third Child N=143**		**First Child N=2000**		**Second Child N=1544**		**Third Child N=415**	
Variable	**Description**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Dec_birth	Dummy variable equal to 1 if the baby is born in December, 0 if the baby is born in January.	0.532	0.499	0.544	0.499	0.510	0.502						
Q4_birth	Dummy variable equal to 1 if the baby is born in October, November, or December, 0 if the baby is born in January, February or March.							0.537	0.499	0.526	0.499	0.542	0.499
deduction	Potential value of tax deduction for a new born baby in 1000 yen (2003 prices)	47.624	23.701	53.414	21.304	58.636	24.736	48.383	22.537	47.671	25.523	35.648	31.563
mother_age	Mother's age at the time of birth	52.5597	20.621	28.071	3.829	31.007	4.509	52.189	20.004	54.051	21.199	58.256	23.612
child_bearing29	Dummy variable equal to 1 if mother_age is 29 or less, 0 if mother_age is 34 or more.	0.922	0.269	0.865	0.342	0.636	0.483	0.940	0.238	0.897	0.304	0.651	0.477
mother_educ	Mother's years of education	12.573	1.782	12.381	1.824	12.692	1.688	12.574	1.797	12.398	1.772	12.525	1.885
father_educ	Father's years of education	12.997	2.343	12.837	2.406	13.301	2.388	13.062	2.396	12.824	2.350	13.118	2.461
father_inc	Father's income at the time of birth in 1000 yen (2003	701.056	555.885	725.341	616.788	745.170	598.608	707.796	551.091	724.563	558.870	722.252	570.814
urban	Dummy variable equal to 1 if the respondent lives in a large city, 0 othewise	0.546	0.498	0.550	0.498	0.559	0.498	0.543	0.498	0.519	0.500	0.520	0.500
Dec_birth_1st	Dummy variable equal to 1 if the first baby is born in December, 0 if the first baby is born in January.			0.094	0.292	0.119	0.325						
Dec_birth_2nd	Dummy variable equal to 1 if the second baby is born in December, 0 if the second baby is born in January.					0.042	0.201						

Table 6: Descriptive Statistics for the Timing of Marriages

		December vs. January (N=667)		Fourth Quarter vs. First Quarter (N=1032)	
Variable	**Description**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Dec_marriage	Dummy variable equal to 1 if the couple is married in December, 0 if the couple is married in January.	0.499	0.500		
Q4_marriage	Dummy variable equal to 1 if the couple is married in October, November, or December, 0 if the couple is married in January, February or March.			0.573	0.495
s_deduction	Potential value of tax deduction for spouse in 1000 yen (2003 prices)	48.777	18.958	48.908	17.253
never_worked	Dummy variable equal to 1 if the wife has never worked, 0 otherwise	0.070	0.256	0.034	0.181
husband_educ	Husband's years of education	13.243	2.366	13.546	2.239
wife_educ	Wife's years of education	12.747	1.881	13.021	1.663
husband_inc	Husband's income at the time of marriage in 1000 yen (2003 prices).	714.096	525.583	612.897	465.481
urban	Dummy variable equal to 1 if the respondent lives in a large city, 0 othewise	0.586	0.493	0.574	0.495
father_age_educ	(Wife's father's years of education)*(wife's father's age)			589.775	140.179

Table 7: Timing of Births: December vs. January

	First Child		Second Child		Third Child	
	(7-1)	**(7-2)**	**(7-3)**	**(7-4)**	**(7-5)**	**(7-6)**
deduction	0.002	0.002	0.000	0.000	-0.002	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
childbearing29	0.201	0.195	0.122	0.097	-0.009	0.0158
	(0.189)	(0.191)	(0.208)	(0.219)	(0.233)	(0.245)
deduction*childbearing29	-0.002	-0.002	0.002	0.002	0.006	0.005
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
mother_educ		0.0260*		-0.0139		0.0012
		(0.013)		(0.015)		(0.032)
father_educ		0.002		0.017		0.015
		(0.011)		(0.012)		(0.022)
father_inc		0.000		0.000*		0.000
		(0.000)		(0.000)		(0.000)
urban		0.004		-0.004		-0.133
		(0.041)		(0.048)		(0.091)
Dec_birth_1st				0.026		0.079
				(0.080)		(0.141)
Dec_birth_2nd						0.206
						(0.184)
Sample size	639	639	467	467	143	143

Estimates of the marginal effect are reported, and their robust standard errors are reported in parentheses.
*, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

All models include a constant.

Table 8: Timing of Births: Fourth Quarter vs. First Quarter

	First Child		Second Child		Third Child	
	(8-1)	**(8-2)**	**(8-3)**	**(8-4)**	**(8-5)**	**(8-6)**
deduction	0.001	0.001	0.001	0.001	-0.003*	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
childbearing29	0.157	0.161	0.151	0.155	-0.12	-0.171
	(0.129)	(0.130)	(0.119)	(0.120)	(0.136)	(0.139)
deduction*childbearing29	-0.001	-0.002	0.000	0.000	0.006***	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
mother_educ		0.023***		0.009		-0.022
		(0.008)		(0.009)		(0.017)
father_educ		0.002		0.004		0.020
		(0.006)		(0.007)		(0.014)
father_inc		0.000		-0.000*		0.000
		(0.000)		(0.000)		(0.000)
urban		-0.033		0.002		-0.115**
		(0.023)		(0.026)		(0.051)
Sample size	2000	2000	1544	1544	415	415

Estimates of the marginal effect are reported, and their robust standard errors are reported in parentheses.
*, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
All models include a constant.

Table 9: Timing of Marriages

Dependent Variable	**Dec_Marriage**		**Q4_marriage**	
	(9-1)	**(9-2)**	**(9-3)**	**(9-4)**
s_deduction	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
never_worked	0.258	0.223	-0.272	-0.280
	(0.172)	(0.182)	(0.465)	(0.461)
s_deduction*never_worked	-0.005	-0.004	-0.005	-0.005
	(0.004)	(0.004)	(0.006)	(0.006)
husband_educ		0.007		-0.002
		(0.011)		(0.008)
wife_educ		0.015		0.000
		(0.013)		(0.011)
husband_inc		-0.0001**		0.000
		(0.000)		(0.000)
urban		-0.007		-0.003
		(0.041)		(0.032)
father_age_educ			0.000	0.000
			(0.000)	(0.000)
father_age_educ*never_worked			0.001	0.001
			(0.001)	(0.001)
Sample size	667	667	1032	1032

Estimates of the marginal effect are reported, and their robust standard errors are reported in parentheses.

*, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

All models include a constant.