1964-69, and in 1970-73. The number of observations for the analyses is shown in Table A3.

Education

The educational levels of women are based on their highest educational attainments that they reported at the entry of the survey. This can be regarded as their complete education, considering the woman's age when she joined the survey and the fact that it is rarely to be observed in Japan that women go back to full-time education once they left schools/colleges/universities. For those still being in education without work experience at the time of the question, the level of education is set at the one they will ultimately achieve. In other words, this variable is treated as a fixed variable rather than time-variant variable and assumed that each woman has an anticipation of their complete level of education in their younger days.

The educational levels are classified into four as follows: 1) Junior high school graduation (in total, nine years of schooling) or less than high schools. This category also includes vocational schools, which do not require high school graduation at admission. 2) High school graduation (in total, twelve years). 3) Junior college or technical college graduation (in total, thirteen to fifteen years, typically fourteen years). 4) University graduation (in total, sixteen years) or graduate schools.

Occupational certificate

The variable for the possession (or not) of an occupational certificate is constructed based on the information that each woman reported at the entry of the JPSC. I include all types of occupational certificates and licenses that make it possible for their owner to work as a specialist in the related job. Frequently observed cases are those of teachers, day care providers, nurses or health care workers, nutritionists or dieticians, beauticians or barbers, computer specialists, dental hygienists, and pharmacists[11]. It is

11 At the entry of the JPSC, the respondents are asked whether they hold the following certificates or licenses (figures within parentheses indicate the number of the holders of the corresponding certificate among the 1991 women in my sample). In the following, certificates or licenses are ordered according to the number of holders: teacher (162), day care provider (115), nurse or health care worker (92), nutritionist or dietician (77), beautician or barber (47), computer specialist (26), dental hygienist (19), pharmacist (13), laboratory worker (12), social worker, caretaker (11), driver's license for taxies and/or buses (7), denture maker (3), architect (2), medical doctor, dentist (1), advisor of consumer products (1), and interior decorator (1). The following certificates or licenses are also listed, but no persons were in

to be noted that most of these certificates or licenses are obtained during the time that women are in full-time education.

4.2. Postponement of motherhood and educational levels

Figure 4 depicts the Kaplan-Meier estimates of the waiting time to motherhood from age 15 according to educational attainments. The figure presents the results for three birth cohorts, separately in panels (a), (b) and (c). The curves show the proportion of women who have not yet become a mother (vertical axis) at different ages (horizontal axis) [12]. As can be inferred from these graphs, higher-educated women enter motherhood later than lower-educated women for all cohorts. That is, the curves for better-educated women are located in the upper part of the graphs compared to those for less educated women. For instance, among the oldest cohort (women born in 1959-63), the median age of women at first childbirth is 25 years for high school or junior high school graduates, whereas it is 27 year for junior college graduates and 29 years for university graduates. The difference in the four survivor functions is statistically significant in each of the three cohorts (see Table A4). The graphs also clearly illustrate the postponement of having children for the same educational group when moving from the older cohort to the more recent ones. This does not hold for women with the lowest level of educational attainments[13].

(Figure 4 around here)

Panels (a) and (b) show that not so many women become a mother after age 35, since the curves flatten out and become virtually parallel to the horizontal axis. If the line is completely horizontal, it means that the proportion of childless women remains constant as women age. Thus, this parallel section of the curves can be seen as an

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these categories: lawyer, drafter of legal documents, professional who fills out bureaucratic forms, insurance agent, (business or product) analyst, certified public accountant, and tax accountant. The JPSC also asked women whether they passed the English language exams (140) or held the certificate for bookkeeping (274). However, these certificates are not considered as being truly 'occupational certificates' in the analyses in this paper, because the minimum skill level to obtain these certificates is not sufficiently high to perform work as a specialist. Phrased differently, these certificates do, in practice, not open career perspectives in higher-level jobs. Likewise, holding other certificates (321) is not included into the category of 'occupational certificates'.

12 For the 1959-63 cohort, results pertain to the age group 15-42. For the 1964-69 cohort, this is the age group 15-37 and for the youngest cohort of 1970-73 it represents the age group 15-32.

13 It should be noted, however, that the number of observations is fairly small in the latter group of women as indicated in Table A3.

estimate of the proportion of ultimately childless women. Panel (a) depicts that the proportion of ultimately childless women in the 1959-63 cohort is around 20% for university graduates, whereas it is at only 10% for the other educational groups. This proportion (at age 37) has also considerably increased for the 1964-69 cohort in panel (b), particularly among women with higher education. Approximately 40% of university graduates and a quarter of junior college graduates have no children at age 37 in this cohort. Although it is obviously too early to discuss ultimate childlessness for the youngest cohort in panel (c), the postponement trend has become more prominent in this cohort. The proportion of women who remain childless at age 32 has increased significantly compared to the older cohorts for not only higher-educated women, but also for lower-educated ones. However, higher-educated women remain more likely to be childless than lower-educated women.

4.3 Postponement of motherhood and occupational certificates

Does holding an occupational certificate make any difference in the timing of first birth? Figure 5 presents Kaplan-Meier estimates according to whether women have an occupational certificate or not. The three panels for the aforementioned three cohorts relate to women with more than high school education (post-secondary education)[14].

(Figure 5 around here)

These graphs reveal that holders of occupational certificates have children earlier than those without for each of the three cohorts. The difference in the two survivor functions is statistically significant in the first two cohorts[15] (see Table A4). Overall, the conclusion that emerges from the figure is in line with the theoretical discussion presented in Section 3. In other words, the career-planning argument, i.e. postponement of motherhood when the career cost is larger, suggests that occupational certificates facilitate or encourage earlier motherhood.

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14 I have also pursued estimations for women with high school education or less. However, the test statistics never reject the equality of the two survivor functions, namely the ones for women that possess an occupational certificate and the ones for those without such certificates. This is most likely due to the fact that the number of women with occupational certificates is small among lower-educated women (see Table A3). Moreover, one could on the basis of the theoretical considerations that were presented in Section 3 presume that a positive association between occupational certificates and fertility should be more relevant among higher-educated women in view of the higher opportunity costs of interrupted careers.

15 The statistically insignificant result in the youngest cohort may be due to the short observation period in this cohort. However, in order to be able to meaningfully examine this, it will be necessary to repeat this exercise in the future when additional waves for the data have become available (see also above).

5. Econometric Analyses on Timing of Motherhood and Occupational Certificates

The previous section presented Kaplan-Meier estimates that were consistent with the hypothesis that having an occupational certificate results in earlier motherhood. This section therefore will examine whether this finding remains valid when controlling for other factors that might affect timing of motherhood. Among such control variables, cohorts and education levels of women of course can be expected to be highly important as we have seen in the previous section. Thus, the influence of these variables on postponement of motherhood is also of interest in this section.

According to human capital theory (Becker, 1964; Mincer, 1974), higher education implies larger accumulation of human capital and thus higher earnings power for women. Section 3 of this paper follows this theoretical insight. However, the role of education in timing of motherhood seems to be more complex (see Gustafsson and Kenjoh, 2008 for a literature review). One important aspect is that high-educated women, per definition, stay longer at school and if being in education is incompatible with having children because of lack of adequate income to pay for childcare and other costs, or because the student lifestyle does not fit with family responsibilities, women are more likely to enter motherhood later in life (Gustafsson, Kenjoh, and Wetzels, 2002). Blossfeld and Huinink (1991) study the timing of the first birth by separating the effect of being in school by means of a time varying explanatory variable in addition to the level of education. Blossfeld and Huinink (1991) emphasise that women's extended participation in schooling delays their transition to marriage and motherhood. I will also examine explicitly take account of this point in the below econometric analysis.

I estimate a piecewise constant exponential model for the timing of having the first child (see Yamaguchi, 1991, Greene, 2003 for more detail on duration analyses). As women's age increases, the proportion of women who have already had a first birth increases and the proportion still eligible decreases. Therefore, in demographic fertility research, we are interested in the probability of giving birth to a first child conditional on not yet having had a first child. This fits the concept of the hazard rate and the

piecewise constant exponential model allows us to have different hazard rates according to age categories[16].

The estimation results for the piecewise constant hazard model on the duration from women's age fifteen until first birth[17] are presented in Table 1. For convenience of interpretation, the table presents the hazard ratios, which are the exponential form of the coefficient estimates and which indicate the effects of a one-unit change in the corresponding variable. The means of the explanatory variables are shown in Table A5.

In the table, four estimations are reported. I analyse the interrelation between occupational certificates and timing of first motherhood in line with the aforementioned career-planning motive. However, one could argue that the explanatory variables for educational attainment and the occupational certificate convey the same information and hence could be collinear. Considering this point, I estimate the model for three samples, namely all women (columns a and b), low- educated women (column b) and high-educated women (column c). The category of high-educated women includes women who have more than high school education, namely post-secondary education and the group of low-educated women comprises those with high school degrees or less.

The results in column (a) belong to the sample of all women. They clearly illustrate that hazard rates differ according to age categories. In fact, the hazard rate of giving birth to the first child increases according to age, peaks in the age category 28-31 and then decreases. It also shows that the hazard rate is lower for the younger cohorts compared to the reference category of women born in 1959-63. The hazards of the 1964-69 cohort and the 1970-73 cohort are 76% and 58%, respectively of the hazard of the 1959-63 cohort, holding other things constant.

(Table 1 around here)

16 I have also estimated Cox proportional hazard model, which is a semi-parametric method for analysing the effects of covariates on the hazard rate. Estimation results were very similar to the results presented in Table 1.

17 An alternative way to estimate the timing of first birth is to focus on the interval between marriage and giving birth to the first child (for example, Fukuda, 1999, 2005; Nagase, 1999). Indeed, the average interval between marriage and first birth in Japan increased from 1.55 years in 1975 to 2.06 years in 2004. Measuring the interval between marriage and first birth, implicitly assumes that a couple starts considering the timing of having children only after they get married. It would be more reasonable to assume that marriage and childbearing are the outcomes of a joint decision process in Japan as suggested by Ermisch and Ogawa (1994) and Morgan, Rindfuss and Parnell (1984), considering the facts that the interval between marriage and first birth is still rather short and that many women are pregnant at marriage, a percentage that has increased from 12.6% in 1980 to 26.7% in 2004 (Japan's Ministry of Health, Labour and Welfare, 2006).

A time-variant variable of "being in education" is included into the estimations in order to separate the effect of participation in education from the level of education. It takes the value 1 before the woman completes education and takes the value 0 afterwards. The results show that a woman following full-time education faces only 7.5% of the hazard of women who have finished schooling. This negative effect is stronger than what has typically been found in the European countries studied in Gustafsson, Kenjoh and Wetzels (2002), suggesting that student mothers are less common in Japan and that a longer stay in education could reduce the likelihood of being a mother significantly. After controlling for "being in education" as well as for the other variables in the equation, the higher the education attainment of the woman is, the lower the hazard rate turns out to be. This result is in line with the conclusion drawn in Section 4 and confirms the findings by Ermisch and Ogawa (1994) that among modern Japanese women, education does affect the timing of motherhood.

Holding occupational certificates increases the hazard 19% compared to having no such certificates and thus, they significantly reduce the time until giving birth to the first child other things being equal. Phrased differently, the theoretical reasoning on the effect of such certificates on motherhood are validated within this econometric exercise. Moreover, the effect is significantly positive given the level of the various control variables and thus after taking account of education. The effect also clearly differs across educational groups as the effect is not significant for lower-educated women (column c) but is highly significant for the subset of higher-educated women (column d). Again, this is in line with the aforementioned theoretical prediction and the Kaplan-Meier estimates.

Women's place of residence may be related to a different cost of raising children and/or the preference of having children. The variable is measured at one year before the year of childbirth, considering the timing of the decision making of childbirth. Women in larger cities have lower hazard than those in rural areas[18]. The unemployment rate of the district in which the woman is a resident is included into the estimations in view of

18 It is assumed that the value before the JPSC started in 1993 is the same as that in 1993. In addition, in line with many Japanese studies on women's employment and fertility, a variable on whether a woman is living with parents (or in-laws) or not could be included. Since the JPSC also provides such information from 1993 onwards, it is technically possible to include this information assuming that the value before 1993 is the same as that in 1993. However, this treatment is not suitable for the analyses here. Living arrangements with parents would change considerably around marriage and childbirth and the effect of living with parents on fertility would be very different before and after these events.

controlling for the labour market situation[19]. Ten districts are classified, namely Hokkaido, Tohoku, minami-Kanto, kita-Kanto and Koushin, Hokuriku, Tokai, Kinki, Chubu, Shikoku, and Kyushu. The variable is measured at one year before the year of childbirth as is the case with the city-size dummies. Additionally, the number of the woman's own siblings is included to control for the preference of having children and it shows a positive effect of the hazard of giving first birth[20].

Column (b) extends the model by examining the interactive effects between the three birth cohorts and four educational categories on timing of motherhood for all women. The estimated hazard ratio shows the hazard of a combination of each cohort and level of education directly compared to the reference category of high school graduates in the 1959-63 cohort. We can see that for example the hazard ratio of a high school graduate in the 1964-69 cohort is similar to that of junior college graduates in the 1959-63 cohort. Estimations results for all other variables are virtually indistinguishable between the specifications reported in columns (a) and (b). Also, in view of the similar log pseudo-likelihood values, the Akaike's Information Criterion (AIC) clearly favours the specification in column (a).

The estimations are subsequently redone by explicitly discriminating between women with high and low educational levels[21]. In doing so, I account for the fact that high-educated women are more likely to have an occupational certificate (see Table A3). As mentioned earlier, the positive effect of the occupational certificate is stronger for high-educated women than was the case for all women, whereas the effect for low-educated women is statistically insignificant. In other words, the encouraging influence of the occupational certificate for having children earlier is more relevant for high-educated women than low-educated women. This result follows straightforwardly from the career-planning motive outlined earlier because higher-educated women obviously face higher career costs. Moreover, columns (c) and (d) confirm that higher-educated

19 The Labour Force Survey has provided the unemployment rate of 10 districts since 1983. For the time period earlier than 1983 and in the case that the residential place is unknown or abroad, the national average unemployment rate is used. Also, it is assumed that women's place of residence before 1993 is the same as that in 1993.

20 For the same reason, a categorical variable of own mother's work experience during the woman's childhood, which is examined in the employment choice equation in Table A2, were also included. However, these variables were never significant and therefore I have not included them in the estimation results presented here.

21 I have also estimated the modes with cohort and education interaction as in like column (b). Estimation results were very similar to those reported in column (c) and (d) such that I refrain from presenting them. The AIC strongly prefers the specifications in (c) and (d) over those in which the interaction terms are present.

women tend to have their first child later than lower-educated women as the peaks of hazard are located in different age categories. The effects of other factors are generally similar to the sample of all women.

6. Conclusions

This paper has shown that, as is also true for many other industrialised countries, postponement of motherhood is also a prominent demographic characteristic for Japan. Analysing the JPSC 1993-2003, there is a large postponement trend from the 1959-63 birth cohort to women born in 1964-69 and 1970-73. The proportion of ultimate childlessness also has increased considerably across the cohorts, especially among highly educated women. Approximately 40% of university graduates and a quarter of junior college graduates still did not give birth to the first child by age 37 in the 1964-69 cohort. The paper has confirmed that higher-educated women have children significantly later than lower-educated women, other things being equal and "being in education" also contributes to delayed motherhood next to the level of education of women.

This paper examined the effect of career costs on the timing of first birth in Japan. Two motives for postponing motherhood can be distinguished, notably the consumption-smoothing motive and the career-planning motive. The paper has focused on the career-planning motive and thus linked delayed motherhood to the indirect costs, i.e. career costs, of children. The career interruption of the mother leads to two types of wage costs. First, there is the direct wage loss due to the fact that the mother stays out of the labour force. Second, there is the human capital foregone. Indeed, staying at home for taking care of the children means that her job-related human capital stops growing or even depreciates unlike what would have happened if she had continued working. This will obviously affect wage earnings during the rest of the career.

I have argued that holding an occupational certificate or a license that qualifies the holder to work as a specialist in her field reduces the wage drop at re-entrance into the labour market. This is because these certificates show that a larger proportion of their skills are so-called *general* skills that women can use also in a different firm after childbirth. The career cost of having children thus will be smaller, which would encourage women to have children earlier and even reduce ultimate childlessness. Using the JPSC 1993-2003, I have estimated hazard models of timing of first birth. The

estimation results show that possessing an occupational certificate increases the hazard rate, which is the conditional probability of having children given not to have had children by then, by nearly 30% for women with more than high school education.

The results in this paper have illustrated and confirmed the motherhood postponement effect of career costs. Policies that reduce the career costs of having children through supporting families to balance work and childrearing, such as parental leave schemes and subsidised day care, would entail positive effects on timing of motherhood and thus completed fertility, since later births would result in a smaller ultimate number of children given the present tendency to postpone first birth. This paper has indicated a further instrument for such policy definition. Possession of an occupational certificate seems to lower career costs by safeguarding and signalling the general skill level such that Japanese authorities could encourage women to obtain such licences via, for example, subsidies that decrease the cost of taking these additional qualifications.

References

Adsera, A., (2004) "The Changing Fertility Rates in Developed Countries. The Impact of Labor Market Institutions," *Journal of Population Economics* 17: 17-43.

Ahn, N. and Mira, P., (2002) "A Note on the Changing Relationship between Fertility and Female Employment Rates in Developed Countries," *Journal of Population Economics*, 15: 667-682.

Becker, G. S., (1964) *Human Capital*, New York: Columbia University Press.

Beets, G. N. C., (1998) "Onderwijs en de geboorte van het eerste kind in Europa: FFS gegevens (Education and birth of the first child in Europe: FFS data)," *Bevolking en Gezin*, 27(2): 99-121.

Blossfeld, H. P., and Huinink, J., (1991) "Human Capital Investments or Norms of Role Transition? How Women's Schooling and Career Affect the Process of Family Formation," *American Journal of Sociology*, 97(1): 143-168.

Bongaarts, J., (1999) "Fertility in the Developed world: Where Will It End?" *American Economic Review. Papers and Proceedings*, May: 256-260.

Bongaarts, J., and Feeney, G., (1998) "On the Quantum and Tempo of Fertility," *Population and Development Review*, 24(2): 271-291.

Brewster, K. L., and Rindfuss, R. R., (2000) "Fertility and Women's Employment in Industrialized Nations," *Annual Review of Sociology*, 26: 271-96.

Cigno, A., (1991) *Economics of the Family*, Oxford, the UK: Clarendon Press.

Cigno, A, and Ermisch, J., (1989) "A Micro-Economic Analysis of the Timing of Births," *European Economic Review*, 33: 737-760.

Council of Europe, (2006) *Recent Demographic Developments in Europe 2005*.

d'Addio, A. C., and d'Ercole, M. M., (2005) "Trends and Determinants of Fertility Rates in OECD Countries: The Role of Policies, *OECD Social, Employment and Migration Working Papers*, 27.

Engelhardt, H., Kögel, T., and Prskawertz, A., (2004) "Fertility and Female Employment Reconsidered: A Macro-level Time-series Analysis," *Population Studies*, 58: 109-120.

Ermisch, J., and Ogawa, N., (1994) "Age at Motherhood in Japan," *Journal of Population Economics*, 7: 393-420.

Fukuda, N., (1999) "Determinants of the Timing of First Birth in Japan (Nihon-ni okeru Dai-isshi Shussan Taimingu-no Kettei-in, in Japanese)," *Journal of Population*

Problems (Jinkou Mondai Kenkyu), 55(1): 1-20.

Fukuda, N., (2005) "Women's Education and Fertility Strategy in Japan: Spacing or Stopping?" (Josei Gakureki to Shussan Senryaku, in Japanese)," *Journal of Population Problems (Jinkou Mondai Kenkyu)*, 61(4): 3-21.

Greene, W. H., (2003) *Econometric Analysis*, New Jersey: Prentice Hall (Fifth edition, First edition 1990).

Gustafsson, S., (2001) "Optimal Age at Motherhood: Theoretical and Empirical Considerations on Postponement of Maternity in Europe," *Journal of Population Economics*, 14 (2): 225-247.

Gustafsson, S., and Kalwij, A. (eds.), (2006) *Education and Postponement of Maternity: Economic Analyses for Industrialized Countries*, Dordrecht, the Netherlands: Springer.

Gustafsson, S., and Kenjoh, E., (2008) "The Timing of Maternity," In Del Boca, D., and Wetzels, C., *Social Policies, Labour Markets and Motherhood: A Comparative Analysis of European Countries*, Cambridge, the UK: Cambridge University Press, pp.182-224.

Gustafsson, S., Kenjoh, E. and Wetzels, C., (2002) "The Role of Education in Postponement of Maternity in Britain, Germany, the Netherlands and Sweden," In Ruspini, E. and Dale, A. (eds.), *The Gender Dimension of Social Change: The Contribution of Dynamic Research to the Study of Women's Life Courses*, Bristol, the UK: The Policy Press, pp.55-79.

Happel, S. K., Hill, J. K., and Low, S. A., (1984) "An Economic Analysis of the Timing of Childbirth," *Population Studies*, 38: 299-311.

Higuchi, Y., (1997) "The Effects of Income Tax and Social Security Policy: Married Women in the Japanese Labor Supply," *U.S.-Japan Women's Journal*, 13: 104-29.

Hiroshima, K. (2000) "Decomposition of the Recent Decline of the Total Fertility Rate: Doesn't Marital Fertility Rate Contribute? (Kin-nen-no Gokei Shusshou-ritsu Teika-no Youin-bunkai: Huuhu Shusshou-ritsu-ha Kiyo-site inaino-ka?, in Japanese)," *Demographic Studies (Jinkou-gaku Kenkyu)*, 26:1-19.

Hotz, V. J., Klerman J. A., and Willis, R.J., (1997) "The Economics of Fertility in Developed Countries," In Rozenzweig, M. R., and Stark, O. (eds.), *Handbook of Population and Family Economics*, volume 1A, Amsterdam, the Netherlands: Elsevier.

Japan's Cabinet Office, (2003) *White Paper on the National Lifestyle* (Kokumin

Seikatsu Hakusho), Tokyo.

The Japan Institute of Labour, (2003) *Data Book, International Comparison on Employment* (Deta Bukku Kokusai Roudou Hikaku, in Japanese), Tokyo.

Japan's Institute for Research on Household Economics, <http://www.kakeiken.or.jp/>.

Japan's Ministry of Education, Culture, Sports, Science and Technology of Japan, (previously, the Ministry of Education) (various years), *School Basic Survey*.

Japan's Ministry of Health, Labour and Welfare, (2006) *Live Births: Special Report on Vital Statistics*.

Japan's Ministry of Health, Labour and Welfare (previously, the Ministry of Health and Welfare) (various years), *Vital Statistics*.

Japan's Ministry of Health and Welfare (currently, the Ministry of Health, Labour and Welfare), (1998) *White Paper on Health and Welfare (Kosei Hakusho)*, Tokyo.

Japan's National Institute of Population and Social Security Research, (2003) *Child Related Policies in Japan*, Tokyo.

Kenjoh, E., (2004) *Balancing Work and Family Life in Japan and Four European Countries: Econometric Analyses on Mothers' Employment and Timing of Maternity*, Amsterdam, the Netherlands: Thela Thesis.

Kenjoh, E., (2005) "New Mother's Employment and Public Policy in the U.K., Germany, the Netherlands, Sweden and Japan," *Labour*, 19: 5-49.

Kiefer, N. M., (1988) "Economic Duration Data and Hazard Functions," *Journal of Economic Literature*, 26: 646-679.

Kohler, H. P., Billari, F. C., and Ortega, J. A., (2002) "The Emergence of Lowest-Low Fertility in Europe During the 1990s," *Population and Development Review*, 28(4): 641-680.

Kohler, H. P., Billari, F. C., and Ortega, J. A., (2004) "Low Fertility in Europe: Causes, Implication, and Policy Options," Harris, F.R.(ed.), *The Baby Bust: Who Will Do The Work? Who Will Pay Taxes?* Maryland: Rowman and Littlefield Publishers, Inc.

Kohler, H. P. and Philipov, D., (2001) "Tempo Effects in the Fertility Decline in Eastern Europe: Evidence from Bulgaria, The Czech Republic, Hungary, Poland and Russia," *European Journal of Population*, 17: 37-60.

Leibowitz, A., Klerman, J. A., and Waite, L. J., (1992) "Employment of New Mothers and Child Care Choice," *Journal of Human Resources*, 27(1): 112-133.

Lesthaege, R. and Willems, P., (2002) "Is Low Fertility a Temporary Phenomenon in the European Union?" *Population and Development Review*, 25(2): 211-228.

Mincer, J. (1974) *Schooling, Experience and Earnings*, New York: National Bureau of Economic Research.

Morgan, S.P., Rindfuss, R.R., and Parnell, A., (1984) "Modern Fertility Patterns: Contrasts between the United States and Japan," *Population and Development Review*, 10(1): 19-40.

Nagase, N. (1999), "Work and Childbearing Choice of Married Women in Japan: the Effect of Labor Practices (Shousika-no Youin: Shugyou Kankyou-ka Kachikan-no Henka-ka, in Japanese)," *Journal of Population Problems (Jinkou Mondai Kenkyu)*, 55(2), June: 1-18.

OECD, (2001) *Employment Outlook*, Paris.

Sobotka, T., (2004a) "Is Lowest-Low Fertility in Europe Explained by the Postponement of Childbearing?" *Population and Development Review*, 30(2): 195–220.

Sobotka, T. (2004b) *Postponement of Childbearing and Low Fertility in Europe*, Amsterdam, the Netherlands: Dutch University Press.

United States' National Center for Health Statistics, http://www.cdc.gov/nchs/births.htm.

Walker, J. R., (1995) "The Effect of Public Policies on Recent Swedish Fertility Behavior," *Journal of Population Economics*, 8: 223-251.

Yamaguchi, K., (1991) *Event History Analysis*, Newbury CA: Sage.

Yamaguchi, K., (2006) "On the Change in Relationship between Total Fertility Rate and Women's Labor Force Participation Rate among the OECD Countries: Two Roles of Work-Family Balancing," Paper presented at the conference on *Fertility Decline, Women's Choices in the Life Course, and Balancing Work and Family Life: Japan, the USA, and other OECD Countries*, CGP-SSRC Seminar Series, University of Chicago, May 16–17.

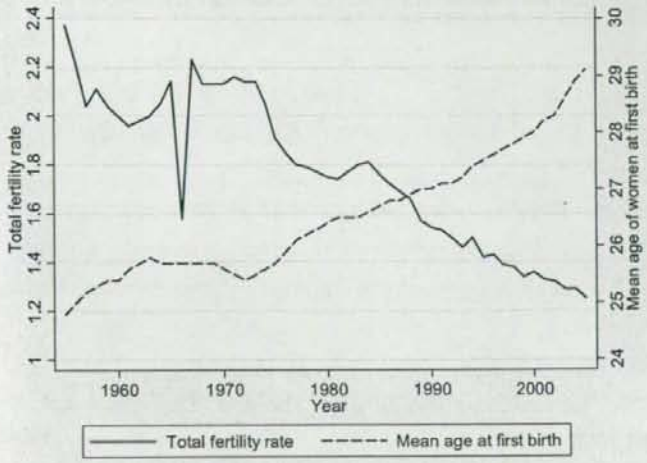

Figure 1. The total fertility rate and the mean age of women at first birth in 1955-2005.

Source: Japan's Ministry of Health, Labour and Welfare, *Vital Statistics*. Japan's Ministry of Health, Labour and Welfare (2006), *Live Births: Special Report on Vital Statistics*.

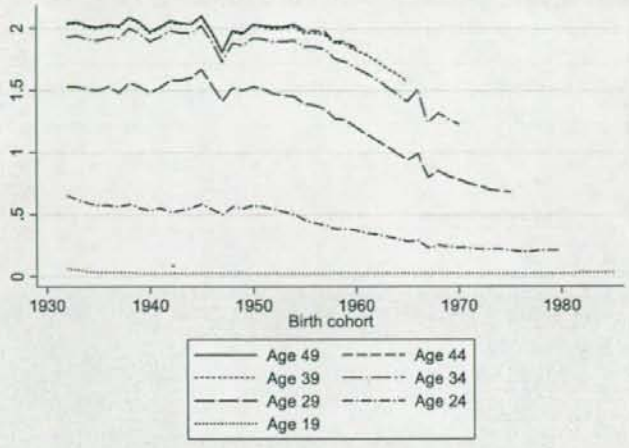

Figure 2. Cumulative live birth rates by age of mother, women born in 1932-85.

Source: Japan's Ministry of Health, Labour and Welfare (2006), *Live Births: Special Report on Vital Statistics.*

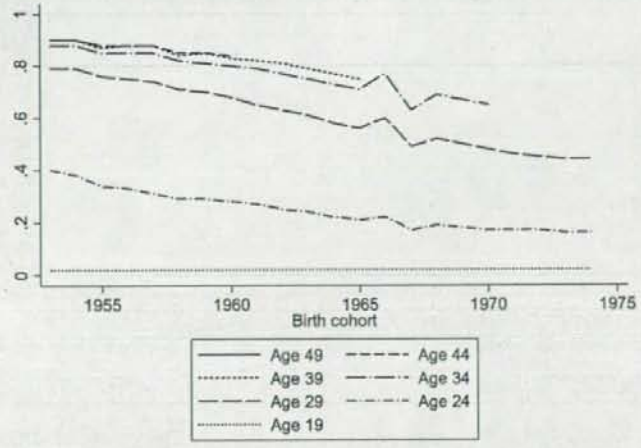

Figure 3. Cumulative live birth rates for first child by age of mother, women born in 1953-74.

Source: Japan's Ministry of Health, Labour and Welfare (2006), *Live Births: Special Report on Vital Statistics.*

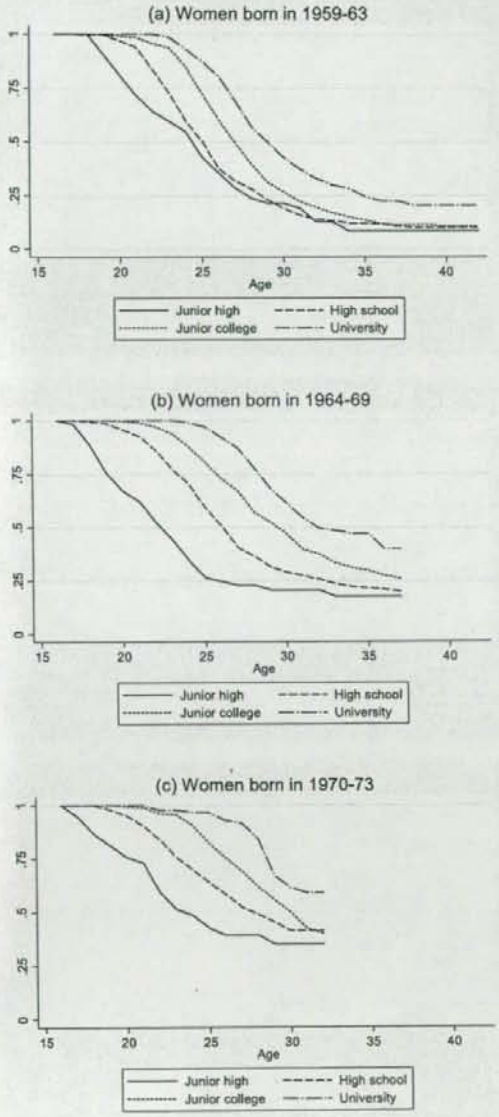

Figure 4. The Kaplan-Meier estimates of not giving first birth by educational attainments.

Source: Author's own computations based on the JPSC, 1993-2003, samples A and B.

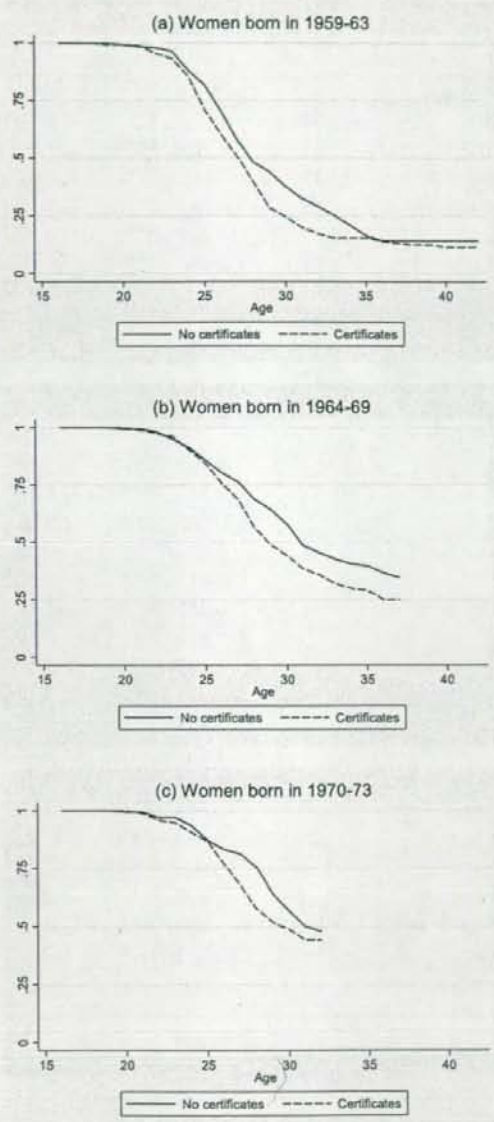

Figure 5. The Kaplan-Meier estimates of not giving first birth by possession of occupational certificates for women with more than high school education.

Source: Author's own computations based on the JPSC, 1993-2003, samples A and B.

Table 1. Estimation results on piecewise constant exponential models of the duration from age 15 to the birth of the first child.

	(a) All education			(b) All education		
	Hazard Ratio		z-value	Hazard Ratio		z-value
Age 16-19	0.037	***	-15.57	0.036	***	-15.52
Age 20-23	0.085	***	-20.88	0.083	***	-20.16
Age 24-27	0.202	***	-13.47	0.198	***	-13.04
Age 28-31	0.247	***	-10.55	0.242	***	-10.31
Age 32-35	0.148	***	-10.46	0.144	***	-10.37
Age 36-	0.083	***	-8.64	0.080	***	-8.68
Born in 1970-73	0.653	***	-5.04			
Born in 1964-69	0.768	***	-4.61			
In education	0.075	***	-9.30	0.075	***	-9.32
University	0.559	***	-6.17			
Junior college	0.754	***	-4.47			
Junior high school	1.367	**	2.50			
Born in 1970-73 * University				0.354	***	-5.40
Born in 1970-73 * Junior college				0.523	***	-5.26
Born in 1970-73 * High school				0.646	***	-3.50
Born in 1970-73 * Junior high				0.995		-0.02
Born in 1964-69 * University				0.412	***	-6.20
Born in 1964-69 * Junior college				0.551	***	-6.34
Born in 1964-69 * High school				0.812	**	-2.39
Born in 1964-69 * Junior high				1.353		1.48
Born in 1959-63 * University				0.635	***	-3.15
Born in 1959-63 * Junior college				0.821	**	-2.18
Born in 1959-63 * Junior high				1.052		0.27
Certificate	1.192	***	2.75	1.182	**	2.54
City size: large	0.680	***	-4.58	0.675	***	-4.67
City size: medium	0.872	*	-1.95	0.862	**	-2.14
Unemployment rate	0.926	**	-2.20	0.927	**	-2.15
No of own siblings	1.058	**	2.15	1.062	**	2.28
Wald χ^2	10,106.5	***		10,104.3	***	
Log pseudo-likelihood	-1,436.8			-1,432.2		
No of women	1,991			1,991		
No of births	1,371			1,371		
Time at risk	25,658			25,658		

*** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors are adjusted for clustering on women.

Source: Author's own computations based on the JPSC 1993-2003, samples A and B.

Table 1 (to be continued)

	(c) Low education			(d) High education		
	Hazard Ratio		z-value	Hazard Ratio		z-value
Age 16-19	0.042	***	-14.55	0.002	***	-6.00
Age 20-23	0.099	***	-15.59	0.031	***	-15.11
Age 24-27	0.211	***	-10.27	0.153	***	-10.08
Age 28-31	0.160	***	-9.95	0.265	***	-6.69
Age 32-35	0.099	***	-8.55	0.160	***	-7.16
Age 36-	0.048	***	-6.52	0.100	***	-5.97
Born in 1970-73	0.669	***	-3.60	0.657	***	-3.28
Born in 1964-69	0.853	**	-2.12	0.664	***	-4.81
In education	0.076	***	-6.18	0.222	***	-4.50
University				0.663	***	-4.42
Junior college				(base)		
Junior high school	1.382	***	2.83			
Certificate	0.954		-0.30	1.270	***	3.12
City size: large	0.733	***	-2.89	0.633	***	-3.44
City size: medium	0.914		-1.06	0.828		-1.63
Unemployment rate	0.916	*	-1.76	0.919	*	-1.68
No of own siblings	1.049	*	1.68	1.073		1.36
Wald χ^2	5,109.4	***		4,443.4	***	
Log pseudo-likelihood	-822.3			-561.3		
No of women	978			1,013		
No of births	734			637		
Time at risk	11,337			14,321		

*** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors are adjusted for clustering on women.

Source: Author's own computations based on the JPSC 1993-2003, samples A and B.

Table A1. The mean age of women at first birth and the total fertility rate in selected countries, 1980-2004.

	Mean age at first birth			Total fertility rate		
	1980	1990	2004	1980	1990	2004
Austria	...	25.0	27.0	1.65	1.46	1.42
Belgium	24.7#	26.4#	...	1.68	1.62	1.64[03]
Czech Republic	22.4	22.5	26.3	2.10	1.90	1.22
Denmark	24.6	26.4	28.4	1.55	1.67	1.78
Finland	...	26.5	27.8[03]	1.63	1.78	1.80
France	25.0#	27.0#	28.4#	1.95	1.78	1.91
Germany	25.0#	26.6#	29.0#	1.56	1.45	1.36
FRG before unification	25.5#	27.0#	28.0#[99]	1.45	1.45	1.38[00]
Former GDR	23.5#	24.6#	27.6#[99]	1.94	1.50	1.22[00]
Greece	24.1	25.5	28.0[03]	2.23	1.39	1.29
Hungary	22.4	23.1	26.3	1.91	1.87	1.28
Iceland	21.9	24.0	26.2	2.48	2.30	2.04
Ireland	25.5	26.6	28.5	3.24	2.11	1.93
Italy	25.0	26.9	28.7[97]	1.64	1.33	1.33
Netherlands	25.7	27.6	28.9	1.60	1.62	1.73
Norway	...	25.6	27.6	1.72	1.93	1.83
Poland	23.4	23.3	25.6	2.26	2.05	1.23
Portugal	24.0	24.9	27.1	2.25	1.57	1.40
Romania	22.5	22.7	24.2[03]	2.43	1.84	1.29
Spain	25.0	26.8	29.2[03]	2.20	1.36	1.32
Sweden	25.3	26.3	28.6	1.68	2.13	1.75
Switzerland	26.3#	27.6#	29.3#	1.55	1.58	1.42
United Kingdom	...	27.3#	29.5#[03]	1.89	1.83	1.63
Japan*	26.4	27.0	28.9	1.80	1.54	1.29
United States**	22.7	24.2	25.2	1.84	2.08	2.05

Source: Council of Europe (2006), *Recent Demographic Developments in Europe 2005*. *: Japan's Ministry of Health, Labour and Welfare, *Vital Statistics*. **: United States' National Center for Health Statistics, http://www.cdc.gov/nchs/births.htm.

#: Birth order within current marriage.