Does Son Preference Persist in the Context of Very Low Fertility? Trends in Fertility Intentions in South Korea

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April 18, 2014

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* This manuscript is prepared to be presented at the Population Association of America 2014 Annual Meeting, May 1-3, Boston, MA.

Abstract

South Korea was the first country to report an abnormally high sex ratio at birth (SRB). Although the SRB has recently declined, gender inequity is still pervasive in the country. This study attempts to reconcile the apparent contradiction between a decline in SRB and persistent gender inequity by looking into changing nature of fertility intentions. We employ data from the Korean National Fertility and Family Health Survey that span 1991-2012 to examine son preference embedded in fertility intentions and its change over time. Despite substantial decline in son preference, son preference remains significant in the context of very low fertility. The abnormally high sex ratio at births returned to near normal levels, but the intention to have another child differs by the sex composition of previous children. The findings of this study suggest that strong son preference, which used to be manifested as sex-selective abortion, have dissolved and transformed into a more nuanced way, such as unrecognized preference for sex composition. This study contributes to our understanding of son preference, especially in the context of very low fertility.

INTRODUCTION

Son preference represents the systematic valuation of male children over female children, generally deriving from gender systems that are male-dominated in both economic and social domains. The degree to which this general tendency to value sons over daughters is translated into fertility behavior varies with the demographic context. In high-fertility regimes, most families will on average have multiple sons, and there are limited technological means for controlling fertility. Thus, there is limited prenatal sex selection, and sex ratios at birth are typically normal. As fertility declines, however, smaller family sizes mean that more families will not have a son if the sex of children is left to chance. At the same time, the increased availability of contraception makes it possible to make decisions about family size based on the sex composition of living children. If people continue having children only until they have a son, the sex ratio at last birth (SRLB) will increase beyond normal levels. In more recent transitions, sex-selective abortion is also available, allowing families to decide whether to have a son or a daughter, and leading to the elevated sex ratios at birth (SRB) recently observed in some parts of East, South, and Central Asia (Chung and Das Gupta 2007; Das Gupta et al. 2003; Retherford and Roy 2003; Guilmoto 2009).

Both theoretical predictions and empirical analysis show that, in contexts where parents value sons over daughters, reproductive indicators of son preference such as SRB and SRLB tend to rise as birth rates decline from high toward replacement level. Projections for how reproductive behavior might reflect son preference as fertility falls below replacement level are less clear. In a recent analysis, Bongaarts (2013) suggested that preferences for sons would likely decline during later stages of fertility transition as a result of overall movement toward gender equality. However, the degree and expanse of change in gender systems varies substantially

across low and replacement fertility contexts. In fact, incomplete movement toward gender equality has been cited as an explanation for low birth rates in some lowest-low fertility contexts (Jun 2005; Kim 2005; McDonald 2000). It is not clear how fertility behaviors might evolve in situations where low birth rates coexist with persistent gender inequality.

In this paper, we use the example of South Korean fertility during the period 1991-2012 as a case study to examine this question. South Korea (hereafter just Korea) was an early and prominent example of countries reporting a highly skewed SRB (Park and Cho 1995). In the literature, Korea is often described as a successful case handling abnormally high SRB that experienced a return to more normal levels in recent years (Bongaarts 2013; Chung and Das Gupta 2007; Guilmoto 2008). At the same time as this decline in SRB, the total fertility rate in South Korea declined from already below-replacement levels to lowest-low levels. And, despite rapidly increasing education levels, Korean women continue to experience heavy demands from traditional kinship and marriage systems leading to interrupted employment careers and limited labor force participation. We use data from Korean fertility surveys to document desired sex ratios, expressed son preference, and fertility intentions according to sex composition of existing children over a twenty-year period. Results are mixed, with different indicators exhibiting different trends, but the most direct measures of son preference show continued strong values for sons over daughters.

SON PREFERENCE, SEX RATIOS AT BIRTH, AND FERTILITY INTENTIONS

The literature on sex preference predominantly concentrates on developing countries, especially countries in East and South Asia. Strong son preference in Asian countries, such as China, India, and South Korea, is mostly evidenced by unbalanced high sex ratios at birth (SRB). As Coale (1973) suggested three prerequisites for demographic transition, Guilmoto (2009) identified three

conditions that are necessary for abnormally high SRBs: a preference for sons that is strong enough to motivate sex selection, low fertility that generates “fertility squeeze”, and access to sex-selection technology. In places where fertility declines fast, the desire for small families can conflict with particular preferences for the sex composition of children, or “fertility squeeze.” However, even where the demand to limit fertility is there, unbalanced SRBs are not possible unless sex-selective screening technology enables families to carry out their desire to have sons rather than daughters (Duthé et al. 2012).

Strong son preference is broadly attributable to cultural and economic contexts. Although the exact nature of gender systems varies across countries where son preference is observed, in general kinship systems that include patriarchy significantly contribute to the persistence of son preference. Most countries with son preference in Asia commonly have a patriarchal tradition based on agriculture. The family line and family resources including land are transmitted predominantly through male descendants, who also have responsibility for filial duties, such as elderly support and the rituals for ancestor worship. In such societies, women do not have power and are marginalized, resulting in strong discrimination against women. In addition, having sons provides an economic advantage over having daughters in these countries. Sons contribute more to economic production and provide old age support in an agricultural society whereas daughters do not have many things to offer and may even become an economic burden due to the high cost of marriage, including dowry.

Son preference is not limited to a few countries in Asia but also observed in other contexts. However, the ways of implementing son preference is different at different stages of the fertility transition. Bongaarts (2013) outlines a long-term pattern of son preference across the fertility transition; son preference gradually decline as the transition proceeds, but their

demographic outcomes vary with stages of the transition. In the pre- or early transition in which son preference is the highest, gender differences in infant and child mortality can be observed because son preference is implemented through postnatal practices discriminating against girls until contraceptive use is widely available. In the mid-transition in which son preference is stable or decline slightly, SRBs are normal or around normal until access to sex-selective abortion is available. As contraceptive use becomes available, however, couples stop childbearing when they reach their desired numbers of boys (sex-specific stopping behavior). As a result, the youngest child may be more likely to be a boy in this stage, leading to high SRLB. In late and end transition, son preference is in downward trends. But because contraception is readily available, people continue to exhibit sex-specific stopping behaviors. In countries where abortion is available, SRBs rise as fertility squeeze increases. Bongaarts's (2013) explanation provides a useful tool to understand the relationship between son preference and demographic outcomes with different stages. However, he leaves unanswered the question of how and whether son preference and their implementation would change in the post transitional stage, probably due to the limited empirical evidence on son preference at this stage.

Gender preferences in developed countries are usually hard to capture because they rarely are presented on the surface of conscious decisions people make. Thus, research usually tests for son preference in indirect ways, for example by examining whether the sex composition of previous children influences the transition to the next parity. In the United States, Pollard and Morgan (2002) did not find preference for either sons or daughters, but did identify a general preference for a balanced sex composition of children; parents with same-sex children are more likely to have a third child than those with a mixed sex composition of children (a boy and a girl). However, even these preferences for a balanced composition have gradually declined in

recent years, demonstrating a transition to true gender indifference. In countries where high gender equity is achieved, as in Scandinavian countries, Andersson and colleague (2006) found daughter preference for the third birth in Denmark, Norway, and Sweden and son preference in Finland, rather than gender indifference. Although it is still debatable whether change in gender systems leads to either gender indifference or different preferences in developed countries, these findings imply that changes in societal systems would also attenuate son preference in developing countries. A comparative study analyzing the effect of sex composition of previous children on fertility also demonstrated that son preference tends to be observed in gender inegalitarian societies (Mills and Begall 2010). In addition, research on this topic commonly reports that preferences for balanced-sex composition of children are universal across countries.

FERTILITY DECLINE AND SEX RATIO AT BIRTH IN KOREA

South Korea represents a distinctive case where strong patriarchal tradition coexists with modern values and individualism, including lowest-low fertility rates. As Korean society has undergone rapid industrialization and urbanization, people's attitudes and behaviors related to marriage and fertility began to change. The ways in which son preference was manifested in reproductive behavior also evolved. Figure 1, based on birth registration statistics from Statistics Korea, illustrates the joint trends in total fertility rate and sex ratio at birth through the late twentieth century.

<Figure 1 about here>

Korea experienced a rapid fertility decline in the late twentieth century. The total fertility rate in Korea remained at 6.0 or above until the early 1960s. When the Korean government launched the family planning program in 1962, and modern contraceptive methods were introduced, fertility rates began to decline rapidly. Rapid industrialization, urbanization, and a

strong policy drive for family planning changed family size norms and attitude toward children, accelerating fertility decline. As an outcome, modern contraceptive use became widespread across the country in the period of 1960-1970s. In this period, strong son preference was manifested in two different ways in Korea. First, higher female mortality among children (ages 1-5) and infants (age 1) was observed due to unequal care of male and female children (Cho, Arnold and Kwon 1982; Choe and Kim 1998; Choe 1987). Second, elevated sex ratios at the lastborn child (SRLBs) were reported (Park 1983). Although desired family size fell rapidly, most couples still wanted to have at least one or two sons. As a result, most women were reluctant to stop childbearing until they reached the desired number of sons. It is not clear whether there was any other form of behaviors implementing son preference in this period.

In the beginning of the 1980s, when total fertility rates reached replacement level[1], the sex ratio at births (SRB) began to depart from the normal level (Park and Cho 1995). The introduction of the determination of a fetus' sex through ultrasound resulted in an unexpected demographic outcome when it combined with son preference and the induced abortion that had been used implicitly and explicitly as a mean of family planning to prevent unwanted births. While fertility rates continued to fall in the 1990s, the SRB peaked in 1990 at 117 male births per 100 female births. Although SRB gradually declined through the 1990s, the level of SRB remained high until the late 2000s.

Induced abortion has been illegal in Korea since the 1950s. The Criminal Law in Korea has regarded induced abortion as criminal since 1953, and the most recent Mother and Child

[1] The period of 1980-1985 is considered as a turning point in Korean demography because total fertility rates reached below 2.0 in 1983. A few demographers in Korea also use the period as the threshold of the Second Demographic Transitions (e.g., Kim 2005). We agree with this periodization, but given our focus on son preference and its change with stages of fertility decline (Bongaarts 2013) we consider the period of 1980-2000 as a 'late transitional stage' and the period from 2001 to present as a "post transitional stage," respectively. The post transitional stage is the era of very low fertility and also part of the Second Demographic Transition.

Health Act (Article 15) established in 1973 allowed induced abortion only in exceptional cases (serious diseases, pregnancy after sexual assault, etc.) within 24 weeks. However, as a result of the strong push for family planning, there have been limited punishments for induced abortion, and laws on abortion have been effectively invalid. As the unbalanced SRB became a serious social issue in the late 1980s, more effective policies to prevent abortions were implemented and enforced in this period. The Korean government introduced the Prohibition of Ascertaining the Sex of Fetus (the Medical Law: Article 19 Section 2) in 1987, a law that prohibits medical personnel to ascertain the sex of a fetus and to notify it to a pregnant woman, her family, or others. This law was modified to prohibit determining the sex of a fetus within 32 weeks in 2009. The policy direction was clearly toward forcing medical personnel not to practice sex determination of fetus.

Since the early 2000s, the period in which the fertility rate in Korea entered 'lowest-low' levels, Korean total fertility rates have remained below 1.3 with minor variation (TFR of 1.19 in 2013). In this period, the Korean government launched a new population policy to boost fertility and to prepare for population aging (Lee 2009). These policies include improving gender inequity and providing support for balancing work and childrearing. During this period, as the abnormally high SRB continued to decline and reached approximately normal levels of 105.7 in 2012, the attention to son preference among policymakers also gradually faded away.

EVOLVING GENDER INEQUALITY IN KOREA

Pronounced son preference was culturally and historically inherent in Korean society from the beginning of fertility decline. In the traditional kinship system in Korea, only male descendants, especially the oldest son, can carry the succession of family name, inheriting properties, performing filial duties such as support for the elderly and the rituals of ancestor worship.

Because females are completely excluded from such duties and responsibilities, daughters cannot substitute for sons in the traditional system. The strong emphasis on men's role and authority makes people believe that bearing no son is considered as a sin to their ancestors. Gender inequality in the family was codified into law. For example, the family headship system (*hoju*) required all families to use the family name of the head and prioritized the order of succession to the oldest son over daughters and other female relatives based on patrilineal kinship ties (Kim and Kim 2004:7-26). Beliefs about the importance of sons also influenced understanding of marriage and family roles. According to a social survey conducted in 1971, half of married women of childbearing age agreed that a husband could take a second wife (concubine) if the first wife did not produce a son (Choe and Kim 1998: 201). As such, son preference has strongly been embedded in Korean society so that it was more likely an "institutionalized value" rather than individual preference, especially in the beginning of fertility decline (Kwon and Lee 1976: 5).

Despite rapid socioeconomic development in the mid-twentieth century, women's social activities were still limited during this period. For instance, women's labor force participation rate remained 39.3% in 1970, which is just half of men's 77.9% (Statistics Korea 2013). In many cases, women who participated in economic activities were predominantly involved as unpaid family workers or temporary workers. For employed women, quitting their job before marriage and childbearing was considered as customary. By the late twentieth century, Korean society experienced the expansion of women's rights (at least in institutional aspects). College enrollment rate for women increased from 22.5% in 1980 to 65.4% in 2000, and eventually reached 74.3% in 2012, which is even higher than men of 68.6% (Statistics Korea 1998; 2013). In legal aspect, women's organizations and civil movement have emerged to revise the

patrinilineal family law which had reinforced traditional kinship system. Revising the law was also required due to emerging nontraditional families including single and divorced families based on demographic, economic, and social changes. Discriminatory aspects of family law have continuously been revised and amended since 1990.

Despite these improvements, women's gender roles still remain grounded in traditional norms. A wife predominantly takes the majority of house chores while a husband focuses on paid work outside. For instance, a recent survey reported that on average women with more than two preschool children spend 4 hours and 44 minutes for taking care of family per day while men spend only 1 hour and 7 minutes (Statistics Korea 2014). The traditional gender roles and people's perception also influence the entry to labor market. Korean women actively participate in the labor market in their 20s and early 30s, but leave for childbearing and childrearing (Park and Kim 2003). Then, they come back to labor market later after raising children However, due to the discontinuation of their career, they usually get temporary insecure jobs. As a result, women's labor force participation has stalled around 50% since the mid 1990s (Statistics Korea 2013).

DATA AND METHODS

Data

The data for this study come from the National Survey on Fertility, Family Health and Welfare 1991, 1994, 1997, 2000, 2003, 2006, 2009, and 2012. The National Survey on Fertility, Family Health and Welfare has been conducted by the Ministry of Health and Welfare in cooperation with the Korea Institute for Health and Social Affairs. The surveys have changed titles periodically, but are essentially a set of repeated cross-sectional surveys. Each survey is a nationally representative sample of both households and women of reproductive age when

weights are applied. The surveys use three-stage stratified sampling based on census enumeration districts, but the sampling procedure and target vary with survey year. The surveys are primarily conducted between June and August every three years. Sample size for each survey also varies, but is usually around 10,000 households and women living in the households. Despite variation in survey designs, samples, and questionnaires, the survey maintains the primary questionnaires on pregnancy and fertility over time, which enables us to analyze fertility intention and change over time. In particular, it also provides birth history and detailed fertility preferences, such as desired sex composition of children. To our knowledge, the survey is the best source to analyze fertility preferences and change in preferences in South Korea.

We restrict our sample to currently married women age 15–44 (42,567 cases) in our analysis. We include only women who are currently in marital unions because the questions on pregnancy and fertility are asked only to currently married women for some years; in places like South Korea, where nonmarital births are still rare, such survey design is not uncommon. (In some survey years, the fertility questions are also administered to previously married women; we restrict the sample to currently married women in all years to increase comparability.) After excluding 455 cases of women who are infertile (or living with an infertile husband) or missing on children ever born, our final analysis includes 42,112 cases. All cases are used for descriptive analysis. Because we conduct separate analyses by birth parity, the sample size for multivariate analyses varies (9,017 cases for women with a child and 23,605 cases for those with two children, respectively, after further excluding 51 and 108 missing on covariates). The surveys provide weight variables for households and individuals (women) separately, but for the 2009 survey only the weight variable for households is provided. According to their reports, individual weights are computed by adjusting individual (women's) response rates in sampling units, which

is unknown, to the household weights. Thus, the individual weight is not far from the household weight in each survey. As a result, we use individual weights for this study, but replace it with the household weight only for the 2009 survey. In addition, as the scale in the weights somewhat varies with survey year, we normalize the weights by dividing the weight by its mean so that sum of weights becomes the actual sample size for each survey.

Measures

Son preference We use multiple direct and indirect measures of son preference: the sex ratio at birth (SRB), the sex ratio at last birth (SRLB), the desired sex ratio at birth (DSRB), reported son preference, and fertility intentions as a function of sex composition of existing children. SRLB represents the indirect outcome of son preference implementation that has conducted in the past, primarily through fertility stopping behaviors, while DSRB and future fertility intentions reflect women's perception that may influence the link between son preference and fertility behaviors in the near future. SRB is derived from vital statistics created by Statistics Korea every year based on vital registration data. We compute SRLB and DSRB based on the analytic sample.

For SRLB, we compute the number of males per 100 females among respondent's last births. Except for 1991 and 1994 surveys, most surveys collect information on the first and last births of ever-married women who responded to the surveys. For the 1991 survey, the corresponding information is derived from women's pregnancy history. Consequently, SRLBs are available for most survey years, except for 1994.

The surveys also ask the desired number of children to ever married women. An additional question asks how many boys and girls they want, if the desired number of children is gender-specific. For DSRB, we take the total number of desired males per 100 desired females.

We also assume that those who report no gender preference want equal numbers of sons and daughters as in prior research (Bongaarts 2013), taking half as desired males and females respectively. SRB indicates the extent of son preference in reproductive behaviors particularly with regard to prenatal discrimination against female including sex-selective abortion.

We also use two individual-level measures of son preference, a direct question on son preference and a measure of whether the respondent wants another child. Each survey asks married women, "Is it necessary for you to have a son?" Possible responses include "must have a son", "would be better to have a son than none", "doesn't matter", and "don't know" We transformed responses to the question into three categories, "must have a son", "better to have a son", and "none." We include both "must have a son" and "better to have a son" as measures of son preference because we are interested in both stronger and weaker expressed preference for male children. We put "don't know" into "none" along with "doesn't matter" because the proportion is less than 1% of the analytic sample and no systematic pattern is observed. In some basic descriptive tables, we combine the two categories, "must have a son" and "better to have a son", but multivariate models treat them separately. This measure was used in a prior study describing the decline in son preference in Korea (Chung and Das Gupta 2007). It captures underlying feelings about the desire for sons, and has been shown to have independent effects on fertility, rather than meditating between individual characteristics and fertility, in some contexts (Larsen, Chung and Das Gupta 1998). However, reported son preference may underestimate actual feelings if people are reluctant to admit their bias. At the same time, reported son preference may overestimate the influence of feelings on behavior if people's feelings are not strong enough to act on or if sex-selective technology is not readily available.

We therefore also include a measure that is more closely linked to behavior, the desire to have another child. Fertility intentions do not perfectly predict actual fertility behaviors. However, fertility intentions are a strong predictor for fertility among other explanatory variables (Schoen et al. 1999) and have been used as a useful complement for fertility behaviors in prior studies (Hayford 2009; Quesnel-Vallée and Morgan 2003). In particular, fertility intentions serve as a link between underlying goals and values and eventual behavior. Our measure of fertility intentions for another child comes from the question "Do you want to have another child?" Possible responses include "yes", "no", and "under consideration." We recoded it into a dichotomous variable, whether or not a respondent wants to have another child (1=yes/under consideration, 0= no), so that we can estimate the likelihood of fertility intention. In exploratory analyses, we tested models dropping "under consideration" responses, combining these responses with the "no" rather than the "yes" category, and treating them as a separate response category. Results were substantively similar across all specifications.

In order to measure son preference, we predict fertility intentions as a function of the sex composition of previous children for women with one or two children. Because fertility rates in the time period we are studying are low, we do not examine women with more than two children. We incorporate sex composition of previous children into analytic models as a set of dummies, depending on the number of children. We grouped women with two children into three categories: mixed sex, two sons, and two daughters. For women with only one child, we distinguished between whether the first child is a son or a daughter. Due to data limitations, we do not consider the birth order of sons and daughters for women with two children. We set up the mixed sex composition group as the reference for women with two children and having a son for women with one child.

Covariates We also consider several covariates that may affect both son preference and fertility intention. Following prior research, we include residential area (metro, small city, and rural) in our model. We also include woman's education (less than junior high school completion, less than senior high school completion, and more than senior high school completion), employment status (housewife, white-collar, and blue-collar), and age distribution (five-year age groups). We account for change over time by including survey years.

Analytic strategy

We use survey data covering the period 1991-2012 in Korea to examine trends in several aspects of son preference in a context of decline in both the sex ratio at birth and the total fertility rate. Our analysis consists of two parts. First, we identify recent trends in son preference with several measures. We compare changes in SRLB and DSRB and contrast them with SRB between 1991 and 2012. We also provide descriptive tables that include reported son preference and fertility intentions by sex composition of previous children. The tables illustrate how those change over the last two decades. Then, we estimate the likelihood of parity-specific fertility intentions on the sex of previous children. We conduct binomial logistic regression models of fertility intentions for additional child. The models are separately estimated by birth parity; for women with one child and for women with two children, respectively. The primary coefficients of interest in these models are the coefficients for sex of previous children. We include interactions between these measures and a variable for survey year to test whether sex preference changes over time. Multivariate analyses also account for changes in women's roles, such as employment and educational attainment, as well as regional variation. These procedures examine whether factors these moderate the effect for the compositional effect of previous children on intention for another child.

RESULTS

Descriptive results

Figure 2 shows trends in the sex ratio at birth, sex ratio at last birth, and desired sex ratio at birth. As described above in the methods section, desired sex ratio at birth is calculated based on women's reported ideal number of sons and daughters, while the other two measures reflect actual fertility behavior. All three measures show declining preference for sons. As has been established in previous research, the SRB in Korea peaked in the early 1990s and declined steadily, reaching normal levels by the end of the study period in 2012. The SRLB also declined, but the decline did not begin until approximately ten years later, in the early 2000s; note that since the SRB reflects current behavior, while the SRLB reflects behavior over a longer period in the past, changes in the two measures will take place on different time scales. The decline was substantial, but the SRLB remained at elevated levels by the end of the study period. Taken together, trends in SRB and SRLB suggest that policy efforts to curb sex-selective abortion were successful, but that son preference still played an important role in contraceptive use and stopping behavior. The DSRB, in contrast, declined starting at the beginning of the period and fell below 100 around the year 2000, indicating a slight preference for daughters which continued to strengthen through the end of the study period.

This preference for daughters observed in the DSRB is not expressed in the SRB or SRLB yet because the DSRB measures current preference for children that may be realized in the near future while two other measures, especially SRLB, reflect previous behaviors that have occurred in the past. Since the DSRB reflects intentions, behaviors will lag behind these reported intentions. Depending on the age and parity composition of respondents in the sample, this lag may be substantial; behavior might even lag intentions by as much as a generation. Desired sex

composition of children may also be a more abstract measure than behavior or even intentions for another birth: mothers might want daughters for emotional or relational reasons, but have sons based on practical concerns.

<Figure 2 about here>

Reported son preference and fertility intentions also demonstrate declining but still important preference for sons. Table 1 presents reported son preference by parity and sex composition of existing children for women in each survey year. Overall, the proportion of ever-married women who reported either that it is necessary to have a son or that it is better to have a son fell from nearly 70% of the sample in 1991 to only 41% of the sample in 2012. Despite this rapid decline, the proportion of women reporting explicit son preference is still high. In most years excepting for 2012, the proportion of women indicating some level of preference for sons was higher among women with two children than among women with one child, suggesting either that son preference is associated with higher desired family size and higher fertility, or that son preference motivates women to have a second child in order to have a(nother) son, or both.

<Table 1 about here>

Consistent with declining fertility rates during this time period, the proportion of women who wanted another child fell between 1991 and 2012, as shown in Table 2. Among women aged 15-44, the proportion of those who wanted to have another child was 24.7% in 1991, but decreased to 17.9% in 2012. Overall, the downward trend in fertility intentions is also observed among women with one or two children despite some variation in recent years. Fertility intentions significantly decrease as parity increases. However, the most important result is that having no son is strongly associated with much higher fertility intentions than other composition among women with one or two children. For instance, in 1991 women who have no son and two

daughters expressed an intention for another child more than 10 times more often than do those with a son and a daughter (29.8% vs 2.6%). The substantial gap has decreased continuously in the last two decades and remained marginal in 2012. A similar pattern is also observed among women with one child; women with only a daughter (no son) expressed higher proportion of fertility intention for another child than those with only a son.

The slight rises of fertility intention in 2006 and 2012 against the long-term downward trend were in part attributable to the influence of Chinese zodiac on marriage and fertility. In 2006 when two first days of spring were in lunar calendar, there was a flurry to get married among Koreans due to its auspicious meaning to new couples.[2] When the year of Dragon returned in 2012—which is also auspicious for births—fertility rates in Korea actually increased as in other countries in East Asia. Although the influence of Chinese zodiac is important to understand temporal variation in fertility and marriage in East Asia, we do not discuss it in our study because it is not our primary concern and because it is also described in elsewhere (i.e., Lee and Paik 2006; Yip, Lee, Cheung 2002).

<Table 2 about here>

Multivariate results

In Table 3, we present coefficients from logistic regression models estimating the likelihood of wanting another child based on the sex of the existing child, reported son preference, survey year, and individual characteristics for women with one child. In Model 1, we only consider sex of a previous child, survey year, and the interaction between the two. In Model 2, we add reported son preference to the previous model. In the last model, we control for other

2 The following year (2007) was also the year of the Red Pig, which was interpreted as a golden pig among Koreans. Koreans tend to believe a baby born in the year would be prosperous and have good fortune, also resulting in a temporary increase in fertility rate.

covariates. The influence of son preference is represented by the coefficients for having a daughter. In Model 1, the coefficient is positive and statistically significant, indicating that women with a daughter are more likely to want another child than women with a son in 1991, the reference year. The daughter-by-year interaction terms represent variation in this effect over time. The coefficients are all negative, indicating that the difference in fertility intentions between women with daughters and women with sons declined over time; they are marginally significant starting in 2000 and become substantial since 2006, consistent with descriptive results. The total effect sizes of previous child's sex also clearly show a downward trend in son preference. Having a daughter was associated with 2.20 times ($e^{.788} = 2.20$) higher fertility intention than having a son in 1991, but gradually declined and reached 1.23 times ($e^{(.788-.662)} = 1.13$) higher than the other in 2009. The total effect size of having a daughter slightly increased in 2012 in which the year is not only auspicious for births but also favorable to a boy.

<Table 3 about here>

Reported son preference is also positively and significantly associated with the desire to have another child. In Model 2, both thinking "better to have a son" and "must have a son" show 1.86 times ($e^{.622} = 1.86$) and 2.36 times ($e^{.860} = 2.36$), respectively, higher fertility intention to have another child when the sex of previous child, survey year, and the interaction between the two are controlled. The difference between "better to have a son" and "must have a son" was also statistically significant at the level of 0.001. Interestingly, adding reported son preference into the model did not influence the previous result much, but rather increased the effect size of having a daughter from 0.788 to 0.872. It suggests that both the sex of previous child and reported son preference have independent effects on fertility intention for another child. In

exploratory models, we tested for interactions between sex composition of previous children and reported son preference; results showed both independent and interactive associations of these measures with fertility intentions.

In the last model, we included individual characteristics, such as residence area, women's education, employment status, and age, into Model 2. As expected, women's education and employment experiences, as well as urban residence, are associated with intentions to have another child. For both education and employment, higher socioeconomic status is associated with greater likelihood of intending another child. It is important to note that our analysis is parity-specific. Recent research on Korean fertility has documented that the parity progression to second or third births began to be selected by socioeconomic conditions, such as education, employment status, and region whereas the progression to first birth remains universal among married couples (D-S Kim 2007; J-S Kim 2007; Choi and Park 2009). These studies commonly point out that women with the lowest status, who had traditionally shown high fertility in the past, are more vulnerable to economic recession and insecurity having barriers for additional child. As a result, fertility gaps across social strata in Korea have shortened in recent years (D-S Kim 2007; Yoo forthcoming).

However, changes in individual characteristics do not account for the declines in son preference over time, as indicated by the fact that the daughter-by-year interaction terms remain large and statistically significant even controlling for individual characteristics. The coefficients for change over time in Model 1 and 2 are not substantially larger than those in Model 3. That is, declining son preference as expressed in fertility intentions seems to be a product of broad social change rather than a compositional effect driven by increases in women's education or employment between 1991 and 2012.

Table 4 shows the same multivariate models estimated for women with two children. Here, the reference category for sex composition of children is women with one son and one daughter; women with two daughters and women with two sons are compared with this reference. As in the models for women with one child, in Model 1 women with only daughters are more likely to want another child than women with one daughter and one son. The main effect term is large and positive: in 1991, the reference survey year, women with no sons were 16 times ($e^{2.773} = 16.01$) more likely to want a third child than those with balanced-sex children (a daughter and a son). The interaction terms with survey year are negative and statistically significant, indicating that this difference declines over time. The total effect of having two daughters on fertility intention has gradually declined and eventually reached 0.344 (2.773-2.429) in 2012, which is just 1.14 times ($e^{(2.773-2.429)} = 1.14$) higher fertility intention than the reference (the balanced-sex composition). Despite the considerable change in the total effect size, the result confirms that these women are significantly more likely than women with one son and one daughter to want a child in all years. The result is robust whether or not we include reported son preference and individual characteristics. In Model 2, reported son preference is strongly and positively associated with higher fertility intention for another child. When individual characteristics are added in Model 3, the coefficients for sex composition of previous children do not differ substantially from previous models in Table 4. Despite the remarkable decline in the effect of having two daughters (from odds ratio of 20.49 [$e^{(3.020-2.495)} = 1.69$] in 1991 to that of 1.69 [$e^{(3.020-2.495)} = 1.69$] in 2012, based on Model 3 in Table 4), son preference manifested in fertility intention remained substantial. Again, such change is not attributable to the compositional effect of individual characteristics including women's education, employment status, and residence area.

<Table 4 about here>

The main effect for women with two sons is relatively large and positive, but not statistically different from zero. The direction of this association suggests some evidence of a desire for a mixed-sex composition of children, in that women with no daughters are more likely to want another child than women with one son and one daughter. However, the interaction terms with year are negative, although again not reaching statistical significance. Thus, any suggestion of daughter preference in the early survey years is no longer present by the end of the period of observation, and rather, the total effect size including both main and interaction effects indicates in opposite direction in 2012. However, the fertility intention of women with two sons was significantly higher than women with the mixed-sex children when sex composition and survey year were considered in a separate model (not shown here). Consequently, daughter preference among women with two sons seems to be moderated by other conditions so that it is not easily captured in our models estimating fertility intention for additional child.

Reported son preference is also strongly and positively associated with wanting another child. Still, both reported son preference and the sex composition of children maintain independent associations with fertility intentions. The rest of covariates represent similar directions as in Table 3 although those effects sizes slightly declined in the model of Table 4.

Somewhat surprisingly, the main effect coefficients for survey year are also positive and statistically significant. For women with one son and one daughter, the reference category, the likelihood of wanting another child increased over the period 1991-2012 in the models in Table 4. That contradicts what we observed in the descriptive statistics earlier (Table 2). It is not clear why fertility intention for third child increased in this period when we controlled other covariates. One of the possible explanations is that the demographics of women with two

children could change considerably during the period. It may evidence that women with two children have highly been selected by certain conditions in recent years.

Discussion and conclusions

The goal of this study was to examine how son preference attitudes and behavior evolve in the context of low fertility. In Korea, where the SRB peaked at extremely high levels in the early 1990s, the level of SRB declined to around normal (105-107 males per 100 females) in the early 2000s. The Korean case is often presented as a success story for the decline of unbalanced SRB or the reduction of sex-selective abortions. We argue that returning to normal levels of SRB does not necessarily represent the dissolution of son preference, but may be followed by tempered son preference and changes in its manifestation from active behaviors (e.g. sex-selective abortions) to more abstract expressions such as (possibly unrecognized) intentions. We compared trends in both population-level (SRB, SRLB, DSRB) and individual-level (reported son preference, fertility intentions) measures of son preference and analyzed how the relationship between the intention to have another child and the sex composition of previous children has changed over time.

Consistent with reported trends in SRB in Korea, we find substantial evidence of declining son preference. SRLB and DSRB have declined along with SRB; women are less likely to report son preference when directly asked about the importance of having a son; and the association of the sex of existing children with intentions for future fertility has weakened over time. The DSRB has even dipped below 100, indicating the possible emergence of daughter preference. Despite these changes, son preference attitudes persist. Around 40% of women in the most recent survey reported that it was necessary or desirable to have at least one son, and intentions to have another child continued to vary depending on the sex composition of earlier

children, favorable towards sons. SRLB remained far above normal levels suggesting that a gender-based "stopping rule" is still being used even in the context of very low fertility. As a result, preferential attitudes still exist and appear to influence behavior despite the remarkable decline in the most severe effects of son preference.

Our study demonstrates that women with one child who is female are more likely to want to have a second child than women whose only child is male. Prior research in developed countries with below-replacement fertility and stable two-child norms has found no evidence for the implementation of gender preferences at this transition, arguing that decisions about childbearing at low parities are centered on whether or when to have a child rather than a certain sex composition of children (Andersson et al. 2006; Pollard and Morgan 2002). Even in Korea, (to our knowledge) son preference has rarely been seen at the first parity in empirical studies. Our finding contradicts those studies and confirms that son preference appear at the lowest parities and influence intentions for further children in Korea, which is consistent with an earlier study in Korea (Larsen, Chung, and Das Gupta 1998). Given the long duration of very low fertility levels in Korea, it may be that fertility decisions are increasingly conditional even at very low parity.

At parity two, women with two daughters display much higher fertility intentions than women with two sons. The higher fertility intentions among women with two daughters compared to those with two sons are consistent and robust over the observed period (1991-2012). Although the effect sizes of the sex composition have considerably declined for the period, the differences in fertility intentions between women with same-sex children remain substantial and at levels far higher than in other countries (cf. Duthé et al. 2012; Pollard and Morgan 2002).

Results for women with two children also suggest the possible emergence of a preference for a mixed sex composition. Relative to women with one boy and one girl, women with two sons are more likely to want another child although that was moderated by other factors, such as reported son preference and periodical change. Although the desire to have children of both sexes is common and widespread in developed countries, this desire has not been found by previous studies in Korea, especially those looking at small families (Arnold 1985; Larsen et al. 1998; Park 1983). The faint sign of balancing preference is important because it implies change in gender preferences for children in the near future. Unlike in the past, having only sons might not be enough to satisfy some couples in contemporary Korean society, even if son preference remains high. Recent studies reported the appearance of daughter preferences in Japan and Taiwan, where son preference was historically strong (Fuse 2013; Lin 2009). Similar trends have also been observed in Korea; people began to desire more girls than boys in 2012 (Kim et al. 2012). It is to be seen whether the emerging favor for daughters in this region would lead to any meaningful difference in demographic outcomes, and whether it would proceed to divergence in preference or convergence in gender indifference.

Our study also includes some limitations. First, our findings are limited to married women. However, this limitation has minimal effects given that childbearing mostly occurs in marital union in Korea; more than 97% of births were to married mothers in 2012. Second, our analysis is based on cross-sectional data and not longitudinal data. Thus, our findings are grounded on association rather than causal relationship, and we could not account for possible issues related to selectivity in examining attitudes and intentions among women who already had two children. Third, we use women's prospective intention to have another child. Although fertility intentions are closely related to actual fertility behaviors, the extent of which intentions

are connected to behaviors varies with diverse contexts. It is possible that intentions related to son preference are more or less likely to be carried out than non-gender specific intentions; we are not aware of existing research that tests for this possibility. Lastly, our analysis could not measure sex-selective abortion, which is a major mechanism for translating son preference into behavior.

Our study suggests that the strong son preference that caused unbalanced SRB in the 1990s has not disappeared, but instead has dissolved and transformed into a nuanced preference that does not appear on the surface in the post transitional stage. This analysis provides a unique opportunity to look at changes in son preference in the intersection between the end of the Demographic Transition and the beginning of Second Demographic Transition. Given the trajectories of shrinking son preference, it would be easy to predict that son preference would decline further, to levels so minor that they can be barely observed at the aggregate level. However, our findings suggest that son preference still exists in both attitudes and intentions. It remains to be seen if and how these values will be manifested in prenatal or postnatal preferential treatment. Prior research in developing countries (Chowdhury and Bairagi 1990; Guilmoto 2009; Park and Cho 1995) suggests that son preference may moderate the pace of fertility decline because couples tend to continue childbearing until they have the desired number of sons. In a post transitional stage with very low fertility, gender preferences for children, whether they are towards sons, daughters, or a certain combination, may contribute to moderating severe low fertility assuming sex-selective abortion is no longer a desirable option. The extent to which gender preferences increase fertility is unclear, but the possibility of this effect may have important implications for countries with very low fertility and strong historical preference for

sons like Korea and other East Asian countries as well as emerging low-fertility contexts such as Central Asia and the Caucasus.

We find that son preference remains significant in the context of very low fertility, but becomes more moderate and evolves to relate to different outcomes. The resolution of unbalanced SRB does not necessarily imply the dissolution of son preference, nor the emergence of gender indifference. Instead, weakened son preference sinks under the surface and transforms into unrecognized forms of behaviors. In many developing countries, son preference used to generate negative social practices, such as gender differentials in infant and child mortality, discrimination against daughters, and sex-selective abortion, at each stage of the demographic transition. It would be interesting to study whether son preference matters or generates other issues in post-transitional stages. Our study on the experience of Korea suggests policy implications for the growing group of countries with low fertility and high son preference.

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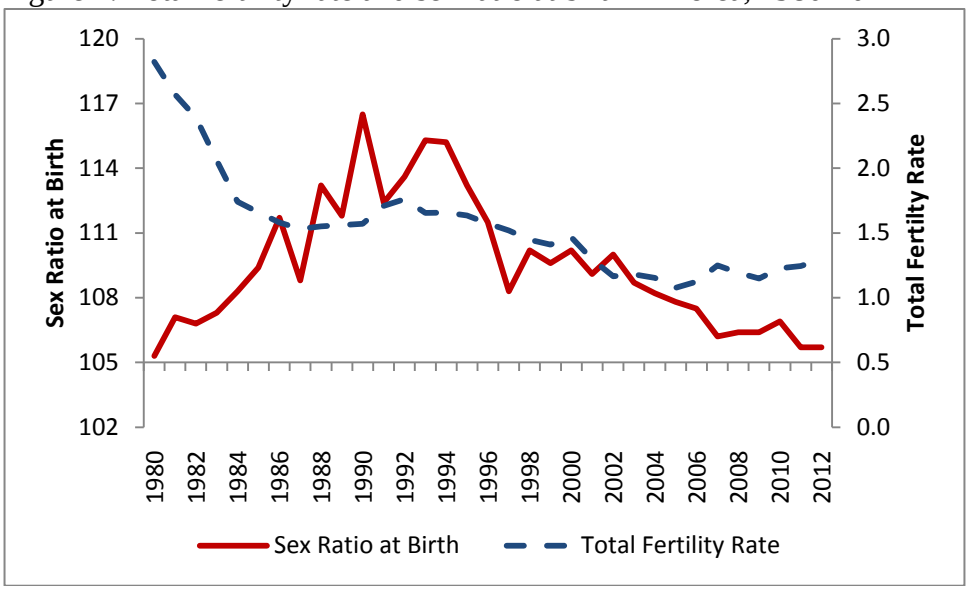
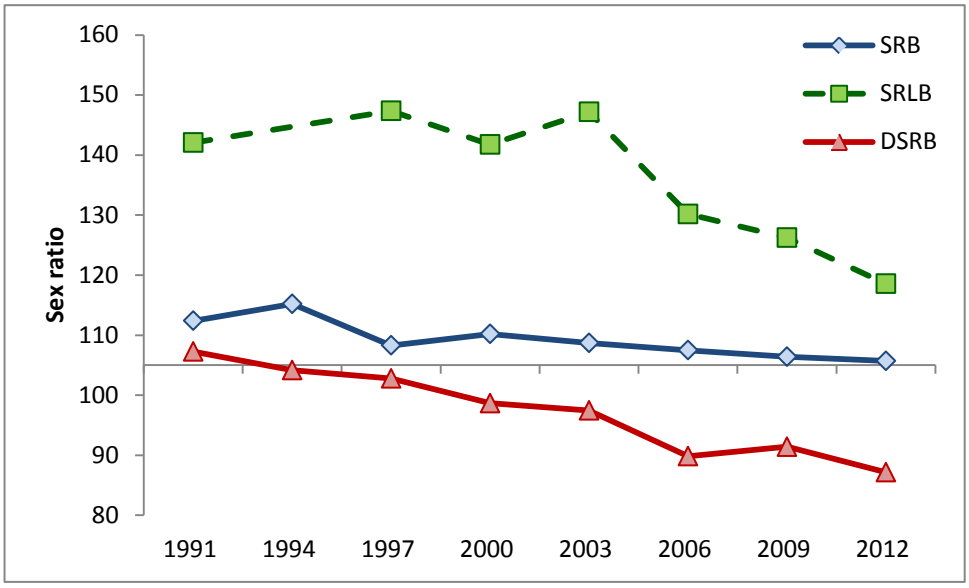
Figure 1: Total fertility rate and sex ratio at birth in Korea, 1980-2012



Source: Statistics Korea (2014)

Figure 2: Sex ratio at birth, sex ratio at last birth, and desired sex ratio at birth



Notes: authors' calculations based on analytic sample (see the text for details); SRLB is not available in 1994; the proportions of missing on SRLB and DSRB are 3.3% and 1.1%, respectively; both SRLB and DSRB were weighted; SRB is provided by Statistics Korea (2014).

Table 1: The proportion of son preference (must + better) by birth parity and sex composition

	Birth Parity									
	No children	One child			two children				Three and more	Total
	all	no son	a son	all	no son	a son	two sons	all	all	
1991	52.1	56.0	63.8	60.4	53.0	74.4	70.6	69.9	84.0	69.6
1994	45.3	51.0	49.0	49.9	49.7	66.8	63.7	63.0	76.8	60.6
1997	43.8	44.9	55.0	50.7	42.4	67.1	61.9	61.8	75.4	59.8
2000	42.6	42.2	54.7	49.4	46.4	68.5	63.7	63.4	73.0	59.5
2003	40.0	42.7	53.0	48.7	36.7	62.9	60.6	57.8	66.7	55.8
2006	41.5	36.6	49.6	43.8	36.9	55.2	51.4	50.9	59.2	49.3
2009	45.3	34.2	49.3	42.9	36.7	55.1	55.2	51.7	58.7	50.5
2012	37.4	26.1	46.1	36.2	26.8	45.1	45.4	41.6	51.4	41.0
Total	43.9	41.2	52.7	47.6	40.7	62.0	59.4	57.6	70.6	56.2

Notes: only women with two children or less; used normalized weight

Table 2: The proportion of fertility intention for another child by birth parity and sex composition

	Birth Parity									
	No children	One child			two children				Three and more	Total
	all	no son	a son	all	no son	a son	two sons	all	all	
1991	95.2	71.5	53.2	61.1	29.8	2.6	3.3	7.1	2.2	24.7
1994	92.0	74.1	60.3	66.2	29.5	4.7	7.8	9.9	3.4	28.9
1997	92.0	60.1	47.5	52.9	18.5	3.1	3.9	5.7	2.5	22.1
2000	88.4	54.8	43.0	48.1	12.6	2.6	3.3	4.5	1.5	21.3
2003	85.3	49.6	38.2	42.9	11.0	3.3	4.7	5.0	2.2	18.2
2006	88.6	49.0	41.4	44.8	12.3	4.1	4.9	5.7	3.2	22.0
2009	81.8	41.8	38.9	40.1	11.4	4.2	4.2	5.5	2.1	15.0
2012	86.0	44.6	36.5	40.5	5.6	4.0	3.2	4.1	1.2	17.9
Total	89.6	55.5	45.1	49.6	15.8	3.6	4.4	5.9	2.3	21.3

Notes: only women with two children or less; used normalized weight

Table 3: Logistic regression of intentions to have another child on sex of child and other covariates, women with one child

	Model 1			Model 2			Model 3		
	Est.	SE		Est.	SE		Est.	SE	
Intercept	0.130	0.074	†	-0.325	0.080	***	0.162	0.194	
Sex of first child (ref: a son)									
A daughter	0.788	0.120	***	0.872	0.122	***	0.757	0.133	***
Interaction w/ survey (ref: a son * 1991)									
A daughter * 1994	-0.139	0.176		-0.217	0.179		-0.059	0.199	
A daughter * 1997	-0.284	0.172	†	-0.274	0.174		-0.161	0.197	
A daughter * 2000	-0.319	0.169	†	-0.295	0.172	†	-0.335	0.194	†
A daughter * 2003	-0.339	0.176	†	-0.329	0.179	†	-0.409	0.201	*
A daughter * 2006	-0.463	0.169	**	-0.439	0.172	*	-0.352	0.194	†
A daughter * 2009	-0.662	0.169	***	-0.637	0.171	***	-0.498	0.182	**
A daughter * 2012	-0.449	0.164	**	-0.385	0.166	*	-0.378	0.189	*
Son Preference (ref: none)									
Better have a son				0.622	0.047	***	0.653	0.053	***
Must have a son				0.860	0.069	***	0.913	0.080	***
Residence (ref: metro)									
Small city							0.011	0.067	
Rural							0.252	0.081	**
Woman's edu: (ref: ≤ junior HS comp.)									
More than junior HS							-0.008	0.169	
Senior HS completion +							0.439	0.164	**
Woman's job: no job									
White-collar job							-0.108	0.066	
Blue-collar job							-0.536	0.065	***
Women's age (ref: <25)									
25-29							0.155	0.086	†
30-34							-0.645	0.090	***

	35-39							-2.087	0.105	***
	40-44							-3.456	0.151	***
Survey year (ref: 1991)										
	1994	0.292	0.108	**	0.417	0.110	***	0.265	0.138	†
	1997	-0.225	0.109	*	-0.163	0.110		-0.258	0.142	†
	2000	-0.408	0.108	***	-0.334	0.110	**	-0.294	0.143	*
	2003	-0.592	0.112	***	-0.513	0.114	***	-0.291	0.151	†
	2006	-0.477	0.109	***	-0.369	0.111	***	-0.262	0.151	†
	2009	-0.582	0.107	***	-0.466	0.109	***	-1.188	0.140	***
	2012	-0.685	0.109	***	-0.555	0.111	***	0.022	0.150	
-2LL		12599.250			12340.230			10162.720		
N (unweighted)		9017			9017			9017		

Notes: only among women with a child; used normalized weight; † p <.10; * p < .05; ** p < .01; *** p <.001.

Table 4: Logistic regression of intentions to have another child on sex of children and other covariates, women with two children

	Model 1			Model 2			Model 3		
	Est.	SE		Est.	SE		Est.	SE	
Intercept	-3.624	0.159	***	-4.585	0.172	***	-4.011	0.269	***
Sex combination of two children (ref: mixed-sex)									
Two sons	0.261	0.247		0.284	0.248		0.387	0.250	
Two daughters	2.773	0.190	***	3.115	0.193	***	3.020	0.199	***
Interaction w/ survey (ref: mixed-sex* 1991)									
Two sons * 1994	0.254	0.309		0.236	0.310		0.216	0.316	
Two sons * 1997	-0.021	0.333		-0.018	0.335		-0.100	0.339	
Two sons * 2000	-0.012	0.355		-0.016	0.356		-0.145	0.361	
Two sons * 2003	0.096	0.321		0.092	0.322		0.053	0.328	
Two sons * 2006	-0.057	0.320		-0.048	0.322		-0.199	0.328	
Two sons * 2009	-0.245	0.318		-0.279	0.319		-0.382	0.322	
Two sons * 2012	-0.501	0.361		-0.536	0.362		-0.628	0.369	†
Two daughters * 1994	-0.638	0.248	*	-0.719	0.251	**	-0.622	0.260	*
Two daughters * 1997	-0.796	0.264	**	-0.804	0.267	**	-0.679	0.276	*
Two daughters * 2000	-1.093	0.282	***	-1.167	0.285	***	-1.286	0.294	***
Two daughters * 2003	-1.487	0.269	***	-1.539	0.272	***	-1.607	0.281	***
Two daughters * 2006	-1.563	0.262	***	-1.677	0.265	***	-1.658	0.274	***
Two daughters * 2009	-1.685	0.255	***	-1.823	0.258	***	-1.734	0.263	***
Two daughters * 2012	-2.429	0.307	***	-2.541	0.31	***	-2.495	0.320	***
Son Preference (ref: none)									
Better have a son				0.900	0.070	***	0.921	0.072	***
Must have a son				1.345	0.083	***	1.428	0.086	***
Residence (ref: metro)									
Small city							0.065	0.082	
Rural							0.229	0.090	*
Woman's edu: (ref: ≤ junior HS comp.)									

More than junior HS							0.000	0.178	
Senior HS completion +							0.234	0.174	
Woman's job: no job									
White-collar job							-0.118	0.097	
Blue-collar job							-0.238	0.074	**
Women's age (ref: <25)									
25-29							0.104	0.131	
30-34							-0.443	0.142	**
35-39							-1.767	0.155	***
40-44							-2.807	0.195	***
Survey year (ref: 1991)									
1994	0.619	0.202	**	0.733	0.202	***	0.750	0.216	***
1997	0.167	0.212		0.276	0.213		0.431	0.229	†
2000	0.003	0.225		0.156	0.226		0.516	0.244	*
2003	0.260	0.207		0.471	0.209	*	0.841	0.231	***
2006	0.454	0.203	*	0.754	0.205	***	1.143	0.231	***
2009	0.488	0.197	*	0.800	0.200	***	0.058	0.232	
2012	0.457	0.211	*	0.853	0.214	***	1.538	0.241	***
-2LL	9679.959			9371.234			8498.904		
N (unweighted)	23605			23605			23605		

Notes: only among women with a child; used normalized weight; † p <.10; * p < .05; ** p < .01; *** p <.001.