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Article

Fertility behaviors in South Korea and their association with ultrasound prenatal sex screening

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ABSTRACT

Imbalances in the sex ratio at birth in Southeast and East Asia increased especially after the mid-1980s. We study how ultrasonic technology affected sex ratios at birth in South Korea, a country with a strong son preference. Between 1985 and 1995 fetal screenings and abortion services were widely available, though not available in the years before, and prohibited in the years after. Using the 1985, 1995, and 2005 Census microdata, we examine changes in sex ratios of newborns by birth year. We then study periodic effects on the fertility stopping rule, using the 2006 Korean Longitudinal Study of Aging, which provides birth years for all children. Between 1985 and 1995 there was a large increase in the fraction of boy babies at birth orders of three or more. Despite these fractions falling in the subsequent time period when fetal screening became illegal, they remained above plausible biological levels. Supporting earlier findings in the literature, the increase in sex ratios was especially large when prior sibling composition was entirely female. We also find that having only daughters significantly increases the probability of parents having another child, and this effect is greater for parents with any child born after 1985 than the parents with all children born before 1985. There exist significant period effects, suggesting that sex ratios at birth became imbalanced when ultrasound technology became available. The availability of ultrasound technology also influenced parents' fertility decisions, seen especially in parents with only daughters deciding to have another child. Our study provides new evidence for how the availability of ultrasound technology influenced sex ratios at birth and influenced fertility behaviors in Korea.

1. Introduction

Since Sen (1992) found evidence of “missing women” in India, discrimination against women, as evidenced by imbalanced sex ratios, was recognized as a critical issue. Imbalances in sex ratio at birth in Southeast and East Asia increased especially after the mid-1980s (Chung & Das Gupta, 2007; Das Gupta et al., 2003; Hesketh et al., 2011; Yi et al., 1993), drawing considerable research attention. Park and Cho (1995) reported that sex ratios are imbalanced at birth in Korea and noted that sex ratios are more imbalanced at higher birth orders. Chung and Gupta (2007) found that son preference is significantly associated with mother's education, and Kim and Song (2005) and Kim (2004) reported variations in son preference across different religions and regions, respectively. More recently, Chen, Li, and Meng (2013) explained that the increase in sex imbalance at birth in China resulted from local access to ultrasound examinations, and Lin, Liu, and Qian (2014) found evidence that sex imbalance at birth increased after the legalization of abortion in Taiwan when prenatal sex-detection technology was already available.

In this paper, we investigate the changes in sex ratios at birth in Korea between 1976 and 2005 and seek to determine how the changes in sex ratios at birth are associated with the introduction of ultrasound diagnostic technology for fetal sex screening and the subsequent illegalization of the fetal sex screening practice. We also examine the changes in fertility behavior, particularly the “stopping rule,” before and after the introduction of ultrasonic diagnostic technology for fetal sex screening. One way to adjust fertility with respect to the sex of one's children is to avoid further births once the desired gender composition of children is attained (Arnold, 1985). This practice has been described in the literature as the “stopping rule,” whereby parents of sons avoid additional births in greater proportions than do son-less parents (Guilmoto, 2009). For parents preferring sons, especially those with only daughters, the gender composition of existing children may greatly influence the utility parents find in having an additional child. We hypothesize this effect would be even stronger after the introduction of ultrasonic diagnostic technology.

We identify precise periods when fetal screening was widely accessible and then became illegal with substantial penalties in South

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Korea. Using the 1985, 1995, and 2005 South Korean Census micro data, we examine changes in sex of newborns by birth year. We then study periodic effects on the fertility stopping rule using the birth year of all children provided by the 2006 Korean Longitudinal Study of Aging.

The paper is divided into four sections. The next section explains the changing legal and policy landscape of ultrasonic diagnostic technology in Korea. Section 4 describes the data and our analytical approach, while Section 5 summarizes our main findings. The final section highlights our conclusions.

2. Background

Starting in 1961, the South Korean government adopted an explicit population policy, which has changed over time with the population's changing demographic structure. The legality of and attitude toward induced abortion changed several times, alongside the access and legality of fetal sex screening using ultrasound diagnostic technology. The following is a brief history of how access and legality have changed together with the government's population policies.¹

2.1. Abortion

Abortion was strictly prohibited in Korea during the Japanese colonial period (1910–1945) (Tedesco, 1996) and was outlawed under the Criminal Code when the newly formed Republic of Korea established its laws in 1948. During this period, the prohibition was strictly observed and few induced abortions were performed (Sung, 2012).

However, a more permissive attitude toward induced abortion began to develop during the Korean War (1950–1953) when many women experienced unwanted pregnancies including those resulting from sexual violence (Kwon, 1993). This permissive attitude continued after the war, as the idea of limiting family size increased in popularity into the 1990s (Choe & Park, 2005; Tedesco, 1996). According to the 1991 National Fertility and Family Health Survey, ever-married women aged 15 to 49 supported induced abortions if the mother's health is in danger (93%), if the pregnancy was the result of sexual violence (98%), and if the mother is unmarried (87%). The same survey also found that 32% supported induced abortion if the sex of the fetus is not what the parents desired.

The Korean government adopted an explicit population control policy in 1961 as a component of the first Five-Year Economic Development Plan. The government promoted small families to increase per capita income and to alleviate poverty. The government launched a fertility planning campaign with slogans such as, "Unplanned parenthood traps you in poverty" and "Have fewer children and achieve prosperity" (Stephen, 2012). This campaign was well received by the general public during these early years of economic development, and the family planning program was successful in its first decade, as observed in the total fertility rate; the average number of children born to a woman over her lifetime sharply dropped from 6 in the early 1960s to 4.5 in 1970 (KOSIS, 2014).

As a direct means of avoiding unwanted births, particularly after contraceptive failure, induced abortion gradually increased in Korea, especially among urban women (Choe & Park, 2005; Stephen, 2012). By 1970, abortion had become a common practice with more than 40% of women reporting having had an induced abortion to terminate unwanted pregnancies, and this rate rose to over 50% by the 1980s (Chun and Das Gupta, 2009). Abortions were easy to obtain in clinics throughout the country, and the operations performed were safe, cheap, and completed without social resistance despite the illegality of the procedure (Tedesco, 1999).

¹ Much of the content on legal history of abortion law is drawn from Sung (2012), and the content on family planning policies is drawn from Choe and Park (2005).

Abortion remains common in South Korea. Although the annual number of abortions is difficult to ascertain as no national data are available, Ahn et al. (2011) estimated that 342,433 induced abortions are performed annually at a rate of 29 abortions per 1000 women aged 15 to 44, while 440,000 childbirths are reported. There seems to still be a discrepancy between the widespread practice of abortion and Korean law.

2.2. Ultrasound diagnostic technology

The obstetric use of ultrasound technology was first introduced in Korea in 1980. In 1985, ultrasonic diagnostic equipment was domestically produced (Jeong, 2000) and became widely available and affordable for fetal sex screening. In 1984, ultrasound screening cost about \$75 US dollars, while chorionic biopsy cost almost nine times more, and amniocentesis cost five times more than ultrasound (Park & Cho, 1995).

Ultrasonics spread widely and were even performed at private clinics. In 1987, fetal screening was legally authorized for the detection of genetic problems and for the monitoring of fetal growth only, but was prohibited for the purpose of prenatal sex screening. However, there were no substantive penalties associated with such use. The Korean fertility rate fell sharply until 1987 and continued to decline until 2005, attaining the world's lowest fertility rate of 1.076.

With the continuing rapid decline in fertility, the government amended regulations on medical care to prohibit prenatal sex screening by sharply increasing the penalty for performing prenatal sex determination procedures in 1994. Before this amendment, laws prohibiting fetal sex screening were not enforced, and the penalty for violation was minimal (Kim, 1999). After this amendment, Chapter 2 of the Medical Practices Act states that a medical provider must not personally examine or assist another in examining a pregnant woman for the purpose of determining the sex of the fetus, and upon determining sex of the fetus through examination, must not reveal such information to the pregnant woman, to her family member, or to any other persons (Kim, 1999). Upon violation of this law, a physician could face up to three years imprisonment and a fine of up to US \$25,000, as well as the revocation of one's medical license. In March of 1996, the first administrative punishment for violation of the Medical Practices Act took place when a doctor received a one month suspension for conducting ultrasound tests for sex determination. In October of 1996, a doctor was first arrested and charged with informing pregnant women of the sex of their unborn children.

The suspension of medical licenses for eight doctors who performed sex determination tests on fetuses was widely publicized in the media. The Korean Medical Association launched a self-reform campaign to stop fetal sex screening in 1995 (Tedesco, 1996). The government also adopted a new population policy goal in 1996 to achieve replacement-level fertility (Stephen, 2012). However, this population policy was not very effective, with the total fertility rate still remaining at 1.18 in 2013.

Despite the illegality of fetal sex screening, ultrasonic diagnostic technology is widely used to detect genetic problems and presumably in the determination of the sex of the fetus. While it is difficult to obtain direct evidence of the illegal practice, indirect evidence for fetal sex screening is the unnatural imbalance of the sex ratio at birth.

3. Analytic approach

3.1. Data

To study changes in the sex ratio at birth over time, we use data on children born from 1976 to 2005 drawn from one-percent of the Korean census micro files for 1985, 1995, and 2005. Census micro data are the largest representative data with information about population characteristics, including sex, age, education, marital status, and religion of

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