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# Testing Fisherian Adaptive Sex Ratio Hypothesis: A Famine-Based Natural Experimental Approach

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Fisher (1930) proposed the hypothesis that natural selection adjusts the sex ratio at birth such that in populations of skewed sex ratios, more infants of the minority sex will be born. Given the complexities of the human family and marriage system and the long lag between birth and sexual maturation, Fisher's original formulation of the argument does not directly lead to any testable empirical hypotheses among humans. Lummaa et al. (1998) adapted the Fisherian sex allocation hypothesis and focused on the relationship between sex ratio at birth and the sex ratio of the population of local adults of reproductive age. Their empirical test of the hypothesis, which was based on Finnish historical demographic records, led to mixed results. Helle et al. (2008), in contrast, focused on the relationship between sex ratios at birth between consecutive birth cohorts because, as they argued, these previously born infants, as opposed to the current adults, are most likely to be in the same marriage pool as the newly born infants.

This study proposes a different way to operationalize and test the Fisherian adaptive sex ratio hypothesis. Drawing upon the sociological and psychological literature on early socialization and particularly Belsky et al. (1991)'s work on the relationship between early childhood experience and lifetime reproductive strategy (i.e., the timing of sexual maturation, the onset of sexual activity, promiscuity, and the number of desired children), it is reasonable to assume that early childhood may be the critical period to form a heuristic sense of gender composition as part of the early socialization process. In modern societies, the most important form of early socialization takes place in kindergarten, preschool, elementary school, high school, and college. If an individual has been consistently exposed to a gender-imbalanced school environment, such a personal experience is likely to be the single strongest cue for the population gender composition. Furthermore, school enrollment is cohort-based. Thus, the school experience, which cannot be directly tested with most of the existing population data, can be translated into the cohort experience, which can be directly tested with existing population data. More specifically: (1) offspring sex ratio at

birth is inversely related to the sex ratio of the parental cohort; and (2) the longer people stay at school, the stronger the abovementioned relationship becomes.

The key methodological challenge in testing the above hypotheses is identifying an abrupt change in sex ratio at birth (of the parental cohort) that is exogenous in nature. The change must be abrupt to present sufficient variations to capture, and the change must be exogenous to ensure that valid causal conclusions can be drawn from the statistical results.

Song (2012) identified such an abrupt and exogenous change in sex ratio at birth between 1960 and 1965, presumably caused by the 1959-1961 Great Leap Forward Famine and its aftermath. Such changes will be used to identify the causal effect of parental cohort sex ratio on offspring sex ratio at birth in the proposed study. To be more specific, two different sources of the famine-induced variations in sex ratio at birth will be used for the identification purposes, including (1) temporal variations, and (2) regional variations. Mother's birth cohort will be used to represent the temporal variation in the famine impact and, following Song (2011), a county-level index of famine-induced changes in sex ratio at birth will be constructed and used to capture the regional variations. A difference-in-difference analysis that includes both the temporal and regional variations will then be conducted to test the relationship between parental and offspring sex ratio at birth.

The 1982 one-per-thousand fertility survey data will be used to construct the county-level measure of the famine-induced changes in sex ratio at birth. The constructed measure will then be merged into the 2001 fertility survey for the difference-in-difference analysis.

# References

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