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Missing Girls, Education, and the One Child Policy

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Delineating the Effects of Maternal Education on Son Preference Under the One Child Policy

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I. Introduction

Over the past three and a half decades, China has seen a surge in the ratio of male to female newborns. A biologically normal sex ratio at birth calls for around 105 or 106 boys for every 100 girls (Sen, 1990), and before 1985, Chinese parents gave birth to about 107 newborn boys for every 100 girls, a figure that falls within the normal range for sex ratio at birth. In the years following the enactment of the One Child Policy, which dictated that most Chinese couples only have one child or face steep fines and other legal penalties, this number has climbed dramatically. Between 2005 and 2010, China's sex ratio at birth averaged 117 boys for every 100 girls born– an alarmingly high figure. Economic incentives and cultural preferences favoring boys, coupled with the constraints on childbearing opportunities imposed by the One Child Policy have resulted in a startling reduction in the number of women in China today.

While the One Child Policy has had an undeniable negative impact on China's deficit of female babies, the significant reduction in the number of girls born in China since 1980 also owes a great deal to the widespread adoption of ultrasound technology in China, which has given prospective parents the tools necessary for determining the sex of an unborn child. Sex-selective abortion accounts for an overwhelming majority of China's excess males (Wei, Li, Hesketh, Liu, and Zhang, 2005), and increased access to the requisite technology has significantly widened the gap in the number of newborn boys and girls (Chen, Li, and Meng 2013).

Although the One Child Policy sounds as though it constitutes a highly rigid legal framework with regard to fertility, it is a much less dictatorial policy than its name suggests. In an effort to reduce high male birthrates and to appease groups who are especially resistant to fertility policy, China's national government, as well as provincial and municipal authorities, has instituted a number of exceptions to the One Child Policy, allowing certain parents to have additional children, though these efforts have met with little success. These exceptions most frequently apply to poor, rural families, who exhibit high rates of son preference relative to the rest of China's population. Often, rural families are allowed to have a second child provided that they have already had a daughter. Furthermore, financial disincentives for additional fertility create an environment where well-off families are more likely to be able to afford additional children. Since selecting for the sex of an unborn child may require bribery or expensive procedures such as sperm-sorting, wealthy families are better situated to engage in sex-selection. Thus, second children in China are even more disproportionately male than their older siblings, with 62% of births following a daughter being male in 2000 (Ebenstein, 2010: 92).

This paper examines the determinants of China's increasingly unbalanced sex ratio at birth with a special focus on maternal educational attainment. First, I provide a brief summary of the One Child Policy, focusing on some particulars of its implementation and justification. I then give a brief survey of economic and demographic literature relating to the effects and determinants of sex-selective behavior in developing countries, especially in China. A theoretical discussion of education and son preference follows, including an outline of a model of the effect of education on sex-selective behavior in India and a model of fertility decision making in the context of the One Child Policy. Since India and China are similar in both their levels of development and degrees of son preference, the first of these models offers useful perspective on the mechanics of son preference in developing countries in general. The second of these models focuses more on the decisions of individuals in the context of the One Child Policy, though it does not detail the effects of education on these decisions.

This paper attempts to reconcile the conclusions of these two models through empirical analysis, demonstrating a positive correlation between maternal education and son preference in Chinese families following the institution of the One Child Policy. In spite of the restrictive policy environment fostered by the One Child Policy, women have a great deal of agency in decisions regarding their own fertility, and educational attainment is one of the primary determinants of how these decisions are made. This indicates that the One Child Policy effected a shift in the factors influencing Chinese parents with regard to sex-selection, as education has become a significant predictor of son preference in Chinese individuals who have had children since 1980.

II. History of the One Child Policy

The Chinese Communist Party began its efforts to curb China's unchecked population growth in the 1960s. After famine claimed nearly 30 million lives between 1959 and 1961, the fertility rate in China climbed to alarmingly high levels during the following decade. While the national government made no explicit restrictions on the number of children couples could have, it initiated a campaign to promote birth control in an effort to lower national fertility. This ended with the dawn of the Cultural Revolution in 1966, and the government ceased to manage fertility rates until 1970.

Chinese fertility policy in the 1970s took a similar tack to the short-lived attempts of the 1960s, though in a more coordinated fashion. Instead of dictating how many children couples could have, the government strongly encouraged parents to have no more than two children. In fact, reductions in China's national fertility rate were more substantial in the 1970s than in any other decade, as the total fertility rate (TFR) fell from 5.8 to 2.2 (Liang, Lee: 2006: 14). Increased female participation in the labor force, and a number of acute shortages of food and other essentials had undeniably significant impacts on the fertility rate during this period. Nonetheless, as the 1980s began, China's government took an even stronger stance against population growth.

The One Child Policy may be the most ambitious example of demographic engineering in human history. Its official implementation in January of 1981[1] marks yet another turning point in the composition and growth of China's population. Much of the theoretic justification for these measures stems from the resurgence of Malthusianism in the late 1960's and early 1970's. Works such as *Limits to Growth* (Meadows et al.: 1972) offered numeric justifications for their dire predictions about the consequences of unchecked population growth in the developing world (Hartmann: 1995). As China turned its sights toward Zhou Enlai's "Four Modernizations"[2] in the late 1970's (at that point under the leadership of Deng Xiaoping), China's high rate of population growth loomed as a major obstacle to its economic prosperity.

Justifications for the One Child Policy applied this "Malthusian orthodoxy" of early 1970's control theory and applied it in broad, sweeping strokes. While politicians touted a number of numeric projections used to illustrate the severity of China's population problems as unassailably correct, reliable demographic statistics were simply unavailable in China at that time (Greenhalgh, 2003). In the absence of alternate research or projections, the One Child Policy appeared to be the only way to avert certain disaster.

Regardless of the reasoning behind it, the One Child Policy has brought about further reductions in the rate of population growth in China. Incidentally, its implementation coincides with one of the most remarkable periods of economic growth in any country in recorded history. The natural growth rate of China's population has fallen considerably in the period since 1980,

[1] The first official documents authorizing the state to dictate fertility policy date to January 4, 1981, when they were drafted by China's State Planning Commission (Vogel, 2011). However, the policy was first proposed in 1979 (Lee, Chang: 2006).

[2] That is, agriculture, industry, national defense, and science and technology.

averaging a 2.7% annual reduction, while GDP growth has averaged 9.94% (UNData) in each year over the same period.

While the One Child Policy may have had a substantial effect in the form of reductions in the rate of population growth in China, it has also carried with it a number of much more insidious demographic side effects. The rate of population growth in China has slowed a great deal since the introduction of the One Child Policy, but the ratio of boys to girls born over that same period has increased consistently and dramatically. The sex ratio at birth in China begins to climb from a relatively normal level of 107 boys for every 100 girls born between 1980 and 1985 to a truly concerning level of 117 boys for every 100 girls born between 2005 and 2010 (UNData). By the year 2000, around 9 million baby girls were "missing" due to abnormally high rates of male births in the years since 1980 (Ebenstein, 2010). This trend continued into the new millennium unabated, as China's sex ratio at birth has hovered around 120 boys for every 100 girls for the past decade and a half.

The necessity of the One Child Policy has also come under greater scrutiny in recent years. Rapid economic growth in China since 1978 has also had an undeniable effect on birth rates, as rising national income and higher rates of female participation in the labor force have increased the opportunity cost of having a child for many parents. In fact, many countries that have followed a similar developmental path to that of China have experienced similar reductions in the rate of fertility in the years since 1980 (Wang, Cai: 2010).

While its name might indicate rigid uniformity in the fertility of Chinese families, the One Child Policy admits a number of exceptions. For instance, couples who give birth to disabled children or whose first child dies in infancy are often allowed to have a second child. Moreover, families who live in especially poor, rural areas or who are engaged in labor-intensive occupations (such as certain forms of agriculture) are often allowed to have additional children as well. An exhaustive list of exceptions to the One Child Policy can be found in Gu et al. (2007).

The most widely invoked exception to the One Child Policy allows families with one daughter to have a second child. This amendment to the Policy was introduced in many provinces during the mid-1980s in an effort to combat China's rising sex ratio at birth and to quell rural resistance to the new policy. However, many parents who are subject to this exception have opted to engage in sex-selective behavior for their second child, resulting in an extremely high sex ratio at birth among second-born children in China (Ebenstein: 2010).

While the One Child Policy owes its inception to the national government, mechanisms of enforcement and exceptions vary considerably across polities and time. Implementation of the policy has been a largely decentralized affair. Mechanisms of enforcement range from forced sterilizations and abortions to financial penalties such as fines or wage cuts. During the 1990s, financial penalization became the primary means of dissuading parents from having further children, although reports of state-mandated abortion also continue to come out of China.

III. Literature Review and Data

There is a small but substantial body of demographic and economic literature dedicated to examining the causes of China's unbalanced sex ratio at birth. A number of cultural and economic forces shape fertility decisions in China, and their effects may be difficult to examine separately (Lipatov, 2008; Ebenstein 2011). Indeed, rates of sex-selection appear to be lower in areas where female income is relatively high (Qian, 2008). The One-Child policy has also resulted in higher rates of sex-selective abortion and lower survival rates for female infants (Arnold and Zhaoxiang, 1986; Zhu, Lu, and Hesketh, 2009), especially among second- or third-born children (Johansson and Nygren, 1991). In fact, the One-Child policy could account for more than half of China's excess male births from 1991-2005 (Li, Yi, Zhang: 2011), though ultrasound technology has undoubtedly also played a large role in China's rising sex ratio at birth. Nonetheless, increasingly severe enforcement measures during the 1990's may have caused parents to refrain from reporting female births (Hull, 1990), a fact that introduces a sample selection problem to regressions on more recent census data (Goodkind, 2011).

China's high ratio of boys to girls has grave social implications and consequences. Countries with high numbers of males relative to females in their population as a whole may be more likely to experience high rates of violent and petty crime (Hudson and den Boer, 2004). Furthermore, the harsh, institutionalized nature of China's family planning policy compounds many of the issues that give rise to son preference in Chinese society. Such rigid, top-down enforcement of the One-Child policy may foster an environment where males dictate fertility decisions, increasing female vulnerability within the household and society (Chen, 2008). In addition to economic disincentives, Chinese officials have often enforced the One-Child policy with outrageously coercive methods, as well as forced sterilizations and late-term abortions (Hartmann, 1995).

In other Asian countries such as India, a few studies address the link between education and sex ratio at birth. Additional years of maternal education appear to improve survival rates for female children in India (Bourne and Walker, 1991). However, while further years of education are correlated with lower degrees of son preference in individuals, which translates into lower rates of sex-selection in more educated areas, the higher levels of economic opportunity that accompany greater educational attainment make technology for sex-selection such as ultrasound more readily available to prospective parents.[3] This suggests that areas with higher numbers of educated people may, paradoxically, have higher sex ratios at birth (Echavarri and Ezcurra, 2010). In fact, changes in female literacy do not necessarily presage improvements in the sex ratio at birth, and can even cause son preference to become more pronounced (Clark, 2000).

For the purposes of this paper, I have chosen to use individual-level data from the 2000 National Household Survey from China. The 2000 National Household Survey includes the most complete set of individual level data currently available from China. Individual level census data are also available from 1982 and 1990, but responses do not include a number of essential variables, including those correlated with income. Respondents in the 2000 census reported their highest level of educational attainment and whether or not they were literate, essential variables in my analysis. However, since these variables were self-reported, they may introduce some measurement error to any statistical analysis of the responses. Moreover, this census includes data on respondents' cost of living, a suitable proxy for income, as well as information on whether respondents live in urban, suburban, or rural areas.

I have also consulted data from the China Statistical Yearbook series, published annually by the Chinese National Bureau of Statistics. The Statistical Yearbooks contain more general statistics, including population growth and sex composition at the national and provincial levels. Unfortunately, the yearbooks contain no information about the birth population, diminishing their usefulness for the purposes of this paper.

Finally, I have consulted annual reports on the Chinese National Bureau of Statistics websites curated by government agencies, and data from the World Bank and the United Nations in my efforts to find some of the figures for China's sex ratio at birth since 1990. Given the

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[3] I follow Echavarri and Ezcurra by referring to this effect as "technological constraint change" hereafter.

sensitive nature of these statistics, I have had to gather these them from a variety of sources, since no authoritative set of figures was available.

IV. Models of Sex-selection

In order to form a working hypothesis about the effect of education on China's sex ratio at birth, I will first delineate a set of theoretical frameworks in which to conceptualize the effect of education on fertility decisions. My analysis of the mechanics of fertility decision-making draws heavily on two models of sex preference. One (Echavarri and Ezcurra, 2010) attempts to explain the relationship between individual educational attainment, the reproduction of cultural beliefs and values across generations, and sex-selective behavior. The other (Ebenstein, 2010) presents the relationship between the legal framework of the One Child Policy, with its many local variants, and the series of information sets presented to prospective parents in China.

Echavarri and Ezcurra (2010) present a general model of the effect of education on sex-selective behavior in India. While the demographic policy environments in India and China are not perfectly analogous, these two countries share a widespread cultural preference for sons, as well as economic factors that motivate biases in favor of male offspring. Since male earning power is relatively high in both China and India, parents may favor sons as a result of economic necessity or social security. This is especially true in China, where the state provides little social security, leaving children in charge of care for their aging parents. Echavarri and Ezcurra's model is defined as follows.

Consider a population where (for the sake of simplicity) each generation is composed of n individuals. Of these n individuals, $\rho^{-}n$ exhibit son preference, where $0 \leq \rho^{-} \leq 1$. Thus, some fraction of the population will, given access to the technology required for sex-selection, seek an abortion should they discover that they have conceived a female child. In the absence of any external influence (education, for instance) children in one generation acquire their parents' beliefs, and therefore, without such influence, individuals in one generation will display preferences identical to those of their parents in the previous generation.

Let $\sigma^{-}n$, where $0 \leq \sigma^{-} \leq 1$, represent the share of the population with access to the technology required to determine the sex of an unborn child and subsequently to seek an abortion. In spite of the prevalence of sex-selection in China and India, some people may not be able to afford the tests and procedures that are required for sex-selection, and while the number of counties where ultrasound technology is readily available has risen steadily over the past 30 years (Chen, Li, and Meng, 2013), government policy measures designed to combat sex-selection have increased the expense and difficulty associated with sex-selective abortion (Kristof, 1993). Furthermore, ultrasound was adopted in a piece-wise manner throughout China, with some provinces not gaining ultrasound-equipped facilities until the 1990s (Chen et al.: 2013). It therefore makes sense to assume imperfect access to ultrasound technology in China, as in India.

The model incorporates education in the form of an exogenous shock where the population is divided into a group of n^{e} individuals who are educated and n^{0} individuals who are not. Some portion ρ^{e} of the educated group, where $0 \leq \rho^{e} \leq 1$, exhibits son preference (as defined above) and some portion σ^{e} of the educated group has access to sex-selective technology. By merit of increased income and mobility associated with higher levels of education, we may assume that $\sigma^{e} > \sigma^{-}$, however, as we will soon see, the relationship between ρ^{e} and ρ^{-} is uncertain.

The n^{0} individuals who are unaffected by the aforementioned educational shock retain the characteristics of the population before the shock. That is, $\sigma^{-}n^{0}$ of these individuals have access to sex-selective technology (by merit of income and proximity), and $\rho^{-}n^{0}$ of these individuals exhibit son preference.

In order to fully conceptualize the effect of the educational shock on the realization of sex-preference (through sex-selective abortion) within the population following the shock, we introduce one final parameter: k where $0 \leq k \leq 1$. If ${n^e}/{n} \geq k$, then educated people are less likely to exhibit sex-preference than people who have not received an education, that is, $\rho^{e} < \rho^{-}$. However, this does not preclude the possibility that a higher portion of educated people will realize their preferences through active, sex-selective behavior (abortion). It may be helpful to think of a fall in sex-selective behavior following the shock as implying that ${n^e}/{n} \geq k$. Conversely, if ${n^e}/{n} < k$, then $\rho^{e} = \rho^{-}$, and sex-selective behavior will be more consistently realized within the educated segment of the population by $\sigma^{e} > \sigma^{-}$.

Thus, the effects of education on the prevalence of sex-selective behavior by parents are twofold. Education may cause *preference change* in individuals, which occurs if ${n^e}/{n} \geq k$, resulting in $\rho^{e} < \rho^{-}$. However, education also causes *technological constraint change*, where individuals who have higher incomes as a result of their educational attainment are more likely to have access to the procedures necessary to select for the sex of their child. Furthermore, despite legislation in China and India preventing doctors from disclosing the sex of an unborn child, parents often circumvent this law through bribery, a much more feasible option for parents with higher levels of income. This is represented by the inequality $\sigma^{e} > \sigma^{-}$.

Within the context of my empirical analysis, this model has some obvious shortcomings. For one thing, it conceives of education as a binary variable, where an individual has either received an education or not. However, education can mean many different things depending on level of attainment in addition to concentration of educated individuals within a community, which is the sole determinant of the likelihood of diminished son preference in Ezcurra and Echavarri's model. Some levels of education may more profoundly effect technological constraint change while others may be more likely to instill values that challenge the cultural beliefs instilled on an individual by his or her family and culture. Indeed, my empirical analysis finds a significant variety of marginal effects on son preference across seven different levels of educational attainment.

The model presented above may have more bearing when considering the effect of literacy on son preference, and this may be the main point of divergence between India and China. China's adult literacy rate exceeded 95% in 2010, while India's stood just below 63% (CIA World Factbook). In China, a country with much more universal literacy, a binary conceptualization of education is much less useful. Other aspects of an individual's education may have more profound effects on their attitudes towards long prevailing beliefs.

Ebenstein (2011) suggests a model of sex-selection under the One Child Policy using the framework of rational choice theory. One particularly common variation of the One Child Policy allows couples to have a second child provided that their first child is a girl. This results in an especially high sex ratio among second children in China, as couples with a preference for sons face a much greater incentive to engage in sex-selection when trying for a second child.

A couple living under this version of the One Child Policy faces up to three decisions within this framework. Assuming that they initially conceive a female child, they face a choice of engaging in sex-selection in order to have a male child yielding a payoff of θ_i where θ_i is the monetary value that household *i* associates with having a son or allowing the initial pregnancy to come to term, which yields a payoff of γ_i where γ_i is the monetary value that household *i* associates with having a daughter. However, selecting for a child's sex requires a household to incur a cost of A_i, which represents the cumulative total cost of the process of conception and abortion until a male child is conceived. This cost is clearly subjective since different couples will need to make different numbers of attempts and may also enjoy differing degrees of proximity to sex-selective technology.

The model assumes that couples whose first child is a son do not have any additional children. This assumption is realistic given that the common exception the One Child Policy allows couples with one daughter to have a second child. Thus, we can see that the final payoff to a couple that selects for a son at the first decision node is equal to $\theta_i - A_i$.

At the second decision node, a couple faces the choice of whether or not to have a second child. Since reaching this node is conditional on the couple having had a daughter, choosing not to have a second child dictates that their final payoff will be equal to γ_i, the monetary value that they associate with having just one daughter.

At the third decision node, a couple once again chooses whether or not to engage in sex-selection. We assume that the value to each household of having a second daughter is normalized to be zero and that the value that each household associates with having a son remains unchanged. Thus, the additional return to household *i* of a son after having a daughter and the return associated with having a second daughter are $.51(\theta_i - F) + .49(\theta_i - F - A_i)$[4] and $-F$ respectively where F is the amount of the fine associated with having a second child. Note that F may assume a value of zero given the many exceptions to the One Child Policy (see Gu et al.: 2007).

[4] Given that a natural sex ratio of 105 boys for every 100 girls implies that the probability that a couple will have a son is slightly higher than the probability that they will have a daughter, the model assumes that when couples do not take any sex selective measures, they have a son with a probability of .51 and a daughter with a probability of .49.

With these three expressions, we may solve for a couple's optimal course of action using backward induction. Assuming that they conceive a second daughter, a couple faces the following set of payoffs at the third node:

$$V^3_{S_2=1} = \theta_i - A_i - F + \gamma_i$$

$$V^3_{S_2=0} = -F + \gamma_i + .51\theta_i$$

where $S_2 = 1$ indicates that the couple has selected for a son and $S_2 = 0$ indicates that the couple has left the sex of their second child to chance. Thus, a couple will choose to engage in sex-selection for their second child if the cost of doing so is sufficiently low such that $E[V^3_{S_2=1}] > E[V^3_{S_2=0}]$.

Ebenstein assumes that the probability with which a couple selects for the sex of their child to be

$$\Pr(S_2 = 1) = \frac{e^{\theta_i - A_i}}{1 + e^{\theta_i - A_i}}$$

where the probability of sex-selection increases as the difference between the utility associated with having a son and the cost of selecting for a son increases. When these two variables are equal, a couple is indifferent between selecting for a son and carrying a pregnancy to term. That is, the probability that a couple will select for a son is exactly one-half.

At the second decision node, a couple again faces two sets of payoffs:

$$V^2_{K_2=0} = .51\theta_i + .49E[V^3] + \gamma_i$$

$$V^2_{K_2=0} = \gamma_i$$

Thus, the couple will choose to have a second child if $.51\theta_i + .49E[V^3] > 0$. This implies that couples with greater degrees of son preference are more likely to have second children within this framework.

Finally, at the first decision node, couples choose between the following utility values for engaging in sex-selection in order to have a son ($S_1 = 1$) and not doing so ($S_1 = 0$).

$$V^1_{S_1=0} = .51\theta_i + .49E[V^2]$$

$$V^1_{S_1=1} = \theta_i - A_i$$

For couples with son preference facing high fines, engaging in sex-selection at the first decision node is preferable to doing so at the third decision node. Thus, the fines associated with having second children exert a large influence over sex-ratio at birth among first children.

Ebenstein's model also establishes that couples with relatively high degrees of son preference are more likely to have a second child, suggesting that sex-ratio at birth may be higher among second children (and therefore among children born to families with two or more children in general). Thus, the determinants of parents' decisions regarding sex-selection may depend how many children they have already had.

Together, these two models illustrate the forces that affect the fertility decisions of Chinese parents. Income, education, and access to the technology required for engaging in sex-selection all play important roles in the decisions parents make about whether to realize their son preference through sex-selective behavior. This is especially true in developing countries where there is higher variation in the level of educational attainment and access to medical technology. Moreover, the policy framework in China has a direct effect on the choices that parents make about sex-selection. In the following section, my empirical analysis unearths some of the determinants of son preference in China, demonstrating that the One Child Policy has made a lasting impact on the way parents calculate the relative values that they associate with sons and daughters.

V. Empirical Approach and Results

The dataset from the 2000 Chinese National Household Survey contains observations for 1,180,111 individuals across all 31 provinces of China. Respondents answered a series of 72 questions for the survey ranging from the number of people living in their home to the type of material used in the construction of their homes. Since these responses are nearly all qualitative in nature, most of them can only be treated in empirical analysis as binary variables. In essence, empirical analysis on this particular data can, for the most part, only ask "yes or no" questions.

In order to isolate individuals relevant to my analysis of the effects of the One Child Policy, I have reduced this sample so that it only contains observations for married women who have had at least one child. Cutting the sample down in this way reduces the number of observations to 245,677, that is, the number of married mothers in the sample. Finally, I reshape the data so that each child receives one entry in the sample. To do this, I have generated a new variable, *chsex*, which assumes a value of 1 if a child is female and a value of 0 if a child is male. Doing this replaces each single entry representing a mother with multiple entries corresponding to each of her children differentiated only by their sex. The variable for the sex of each child is the dependent variable utilized in the following set of regressions.

To test the effects of maternal educational attainment and other variables on the probability that a Chinese child will be female under the One Child Policy, I employ a differences-of-differences approach to Chinese National Household Survey Data from 2000. The 2000 National Household Survey Data includes a large number of non-Chinese individuals living in China, who constitute an acceptable control group, since these individuals are unaffected by the One Child Policy. This allows me to differentiate between the effects of the introduction of ultrasound in China during the 1980s and changes in fertility policy that occurred during the same period.

In order to observe the effects of the One Child Policy, I have partitioned the sample into children of mothers (as of the year 2000) who married before 1975 and children whose mothers married after 1975. While the Chinese government did not officially enact the One Child Policy until 1981, partitioning the sample at 1975 leaves some cushioning between the year women were married and the year that they had children in an attempt to minimize the amount of "cross chatter" between the samples. Since there are nearly one hundred times as many women in the sample of women married after 1975 than in the sample of women married before 1975, the women married between 1975 and 1980 who had children during that period have a negligible effect on any results for the latter sample. For instance, 6384 Chinese marriages during the period from 1975-1980 (including 1975) resulted in the birth of a single child. This figure is nearly six times the number of Chinese mothers who had a single child and were married before 1975, while it comprises only a little bit more than 6% of mothers married during or after 1975 represented in the sample. Given that a number of the women married between 1975 and 1980 had children after 1980, including these women in the much smaller sample of women who had children before the ratification of the One Child Policy has a much more deleterious effect on the reliability of any results.

I have chosen only to consider families with either one or two children. One especially prevalent variation of the One Child Policy, discussed in Ebenstein (2011) and above, allows Chinese couples to have a second child, provided that their first child is female. Other couples have second children in defiance of China's national fertility policy and face large financial penalties. While looking at families with three or more children can certainly yield fruitful results

(Li, Yi, Zhang: 2010; Ebenstein, 2010), many births beyond two are the result of further exceptions to the One Child Policy (Gu, Wang, Guo, Zhang: 2007). The exceptions for families only having two children are more clear-cut, and analysis of families with one and two children has the potential to produce less ambiguous results. Unfortunately, in the case of families with two children, it is impossible to determine which couples have had a second child as a result of an exception to the One Child Policy and which families have had to pay a fine in order to do so. Therefore, these regressions cannot separate the effects of education, region, and income on these groups, although the effects of these variables may change considerably depending on the reason for a family's increased fertility.

Furthermore, while my dataset does not include information on the order in which children are born, the probability that a second child will be female conditional on his or her older sibling being male may be very different from the probability that a child will be female given that his or her older sibling is male. Thus, estimators for the two child case must be viewed as the aggregations of these two, presumably very different, probabilities. Nonetheless, given the increased levels of sex selection observed in families with multiple children, it is important to look at families with multiple children in addition to those with only one child.

My analysis considers families with one child and families with two children separately. Since different variables may play very different roles in the decisions of parents depending on the number of children they have, it makes sense to separate these two groups. This differs slightly from Ebenstein's (2008) analysis, which considers first, second, and third-born children separately. Since my dataset contains no information about the order in which children were born, I separate the sample based on family size. Since adding families with three or more children to my analysis will not add a great deal to the insights presented in this paper, I have elected to limit my focus to families with one or two children.

Each entry in the data represents one child. In keeping with the linear probability differences-of-differences framework, the dependent variable is a binary variable for the sex of each child. The variable assumes a value of one when the child is female and a value of zero when the child is male. Therefore, estimations may be interpreted as the probability that a child will be female given certain characteristics of his/her mother and the composition of his/her family. Since nearly all of the independent variables used in these regressions are also binary, it makes little sense to use Maximum Likelihood probability models such as Probit and Logit, since results from these regressions are much harder to interpret.

The probabilities estimated in the following regressions imply sex ratios at birth among different subsets of the Chinese population. Dividing the estimated probability by 100 and then subtracting 100 gives a figure for the expected number of boys per 100 girls born in a set of individuals with a given set of characteristics.

I make use of ten independent variables in my regression analyses. There are six dummy variables representing maternal educational attainment. These variables are denoted *Primary School*, *Junior Middle*, *Senor Middle*, *Vocational*, *Junior College*, and *College* in the regression tables on pages 35-38. A variable will assume a value of 1 if it corresponds to the highest level of education that a child's mother has completed. These six categories are mutually exclusive, implying that, at most, only one of these variables will assume a value of 1. Furthermore, if all six of these variables take a value of zero, this indicates that an individual's mother did not complete primary school and has had little or no education.

Two dummy variables, *City* and *Town*, indicate whether an individual lives in an urban, town, or rural community. If both *City* and *Town* assume a value of zero, we may assume that an individual lives in a rural area, while *City* denotes an urban area and *Town* a less densely populated urban area.

Finally, I employ two discrete variables which are presumably highly correlated with income. While respondents to the 2000 National Household Survey do not give figures for their annual incomes, they indicate a range for either the price of their home or the cost of their monthly lease. I use the lower bound of each of these categories as a discrete variable that I substitute for household income in the regressions that follow.

The R-squared figures in each of the following regressions are quite low. While in some other context, this might indicate an extremely low amount of explanatory power in the regressions, it is important to note that these regressions do not directly explain the effects of education on sex-selection. While the probability that a child will be female is intimately related to the level of sex-selection among people similar to his or her mother, these two variables are still quite separate. Since the vast majority of Chinese couples choose to leave the sex of their child to chance, it is impossible to come close to explaining the determinants of a child's sex based on characteristics of his or her mother.

For the purposes of this paper, I define any result that is different from zero at a significance level of 5% to be statistically significant. While this figure is, in some sense, arbitrary, it provides a reliable and frequently used benchmark for judging the significance of my estimators.

Table 1 displays regressions of the conditional probabilities that a child will be female within each of the four subsets of the Chinese population across families with one child and families with two children. One immediately apparent result is the relative high rates of significance for the estimators of effects of education on the probability with which Chinese children whose mothers married after 1975 are female. The magnitudes of the estimators for the sample of children whose parents married after 1975 are also quite high relative to the other samples. While the coefficient on primary school does not appear to be significantly different from zero, the other coefficients increase in magnitude with the level of maternal educational attainment. With the exception of the coefficients for junior college and university, the estimators in this regression are all different from one another at a significance level of five percent.

There is also significant variation across levels of maternal educational attainment in the probabilities with which children in two-child Chinese families with parents married during or after 1975 are female. With the exception of the coefficient on the variable signifying that a child's mother has attended university,[5] the estimators follow a similar pattern to those in the one child case, increasing with the level of maternal educational attainment. The results of these two regressions indicate a positive correlation between maternal educational attainment and the probability that a child will be female in Chinese families with one child and two children.

While the first regression predicts that a single child born to a college-educated Chinese mother who married before 1975 will always be female, further investigation (in addition to common sense) dictates that this is preposterous. The sample only includes three such children, and all of them happen to be female. Therefore, it is safe to regard this estimator as unreliable.

Coefficients for Chinese children whose parents married before 1975 or non-Chinese families are much less consistently significant and much smaller. The sample of non-Chinese

[5] Since there are only 104 children whose mother attended college in this sample, we can regard this estimator as somewhat unreliable. This fact is corroborated by the large standard error on the estimator. By contrast, the sample of single Chinese children contained nearly 2000 children whose mother had attended university.

families with one child married before 1975 is too small to yield any reliable estimations since it contains only 56 observations. That aside, no coefficient on any variable for non-Chinese families or Chinese families married before 1975 is significantly different from zero.[6]

The constant terms in each of the regressions on Chinese individuals indicate that mothers with no education have daughters at a rate far below what is biologically normal. Since the probability estimations in these regressions imply sex ratios at birth for children born to mothers in each of these subsets of the Chinese population, an estimated probability below .48 indicates significant levels of sex-selection. According to the estimators in Table 1, individuals who have not completed senior middle school or some higher level of educational attainment tend to have daughters at a rate significantly below the biologically normal level. Thus, I conclude that the majority of sex-selective behavior occurs in these subsets of the Chinese population.

Table 2 adds variables related to region to the regressions from Table 1. This appears to have a damping effect on the coefficients for maternal education among Chinese children whose mothers married during or after 1975. This is likely the result of multicollinearity within the explanatory variables. Women who live in more densely populated areas are more likely to have attended further years of school. For instance, approximately 46% of urban mothers with one child have attended at least senior middle school, while this figure falls to 7% among rural mothers with one child. Thus, using these two (nontrivially correlated) sets of variables can cause large changes in the values of the estimators when compared to regressions using either of the two sets of variables on its own. That said, the probability that a child will be female appears to be positively correlated with the population density of the area where he or she lives. This holds, to a lesser extent, for children whose mothers married before 1975 as well as children whose

[6] Except for the coefficient for University in the very first regression, discussed above.

parents are not Chinese. Since ultrasound technology only began to see widespread use in China during the 1980s, the nearly universally significant coefficients on region-related variables for the pre-1975 subsample demand further explanation. It is highly unlikely that this variation is the result of biological factors, so under-reporting female births in rural areas and female infanticide may provide the most realistic explanation.

Table 3 includes variables for the value of the home in which children live or the monthly rental price on their home. Each of these variables is likely to be highly correlated with parental income. Furthermore, since income is undoubtedly positively correlated with educational attainment and the population density of the area in which a family lives, including income in these regressions also introduces some multicollinearity to the regressions, changing the values of the other estimators. However, doing so may ameliorate some omitted variable bias in the first regressions, allowing us to observe a truer estimation of the *ceteris paribus* effect of a higher level of maternal educational attainment.

In contrast to the regressions in Table 2, which contain variables relating to region, the inclusion of income-related variables in Table 3 has an amplifying effect on the estimators for educational attainment for children born to Chinese mothers married after 1975, again a result of multicollinearity Wealthier individuals are more likely to have completed additional years of schooling, and are also more likely to live in urban areas, implying correlation between the variables in the regressions. Income-related variables are insignificant in every regression involving non-Chinese families or for Chinese families before 1975. Since fines for second and higher parity children were only introduced after the enactment of the One Child Policy, this likely reflects the costs imposed by the government on families who have two or more children.

In the case of families with one child, the significant negative value of the variable for home-price may also reflect the cost of taking sex-selective measures.

Table 4 consolidates the results of Tables 2 and 3, incorporating both regional and income-related variables. The estimators for the coefficients on education-related variables are lower than in Table 1, indicating that the damping effect of including regional variables dominates the amplifying effect observed in Table 3, which included income-related variables. Again, the difference in the significance and magnitude of estimators for Chinese families after 1975 and estimators in all other regressions indicates that the One Child Policy effected a significant shift in the determinants of China's sex ratio at birth.

Differences in the significance and magnitude of coefficients between mothers married before 1975 and Chinese mothers married after 1975 indicate that parents' calculus with regards to the sex of their children underwent a significant shift starting in the 1980s. While, for mothers married before 1975, son preference appears to be dictated by regional differences, regardless of a mother's nationality, the consistently positive correlation between maternal educational attainment and the probability that a child will be female (for Chinese mothers married after 1975) stands in contrast to the scattershot set of estimators of the effects of maternal education for children born in non-Chinese families. Furthermore, comparing the magnitude of the coefficients for non-Chinese and Han individuals across these periods indicates that the One Child Policy had a significant effect on the determinants of the sex ratio at birth in China. Another intriguing change across these two periods is the significance of the coefficients on income-related variables. In the context of Echavarri and Ezcurra's (2010) assertion that, assuming the presence of the technology required for sex-selection, income becomes a vehicle of technological constraint change, this change may also be a result of the financial penalties associated with additional births. The coefficients on income-related variables are only significant during the latter period, which is consistent with both the introduction of ultrasound in China and new financial penalties associated with having additional children.

Thus, in the context of Ebenstein's (2008) model, it makes sense to conceive of the value A_i as a continuous variable, where A_i is the normalized cost to an individual of selecting for the sex of their child. This variable must be negatively correlated with income, since families with higher income will incur a lower relative cost when they select for the sex of their children. Furthermore, different families enjoy different levels of proximity to ultrasound technology, where "proximity" is defined to measure the normalized costs of selecting for a child's sex that are not captured by income. This could include the price of sex-selective procedures in a given area or the convenience of simply going to a clinic to seek an abortion.

Furthermore, the increasing magnitude of the estimators of the effect of maternal educational attainment on the expected sex of a child suggest that the probability with which an individual mother will exhibit son preference is negatively correlated with her level of educational attainment. In the context of Ebenstein's (2008) model, this suggests that son preference is negatively related to maternal education for individuals living under the One Child Policy.

Chow tests on the estimators for the members of the control (non-Chinese) group also indicate significant differences in the estimators for children whose parents married before 1975 and children whose parents married during or after 1975, indicating that there was also some change in the behavior of non-Chinese parents during the 1980s. However, simple observation reveals the relative magnitude of the changes in the behavior of Chinese parents was profoundly different and far more pronounced than changes in the behavior of non-Chinese parents. Indeed, it makes sense that the introduction of ultrasound technology in China would have an influence on the sex-selective tendencies of parents whether or not they were subject to the One Child Policy, though perhaps not as visible an influence as it has had on parents living under its purview. This variation in the estimators for the non-Chinese group justifies the use of differences-of-differences in my empirical analysis, since it confirms that the One Child Policy was not the only factor in China's rising sex ratio at birth. However, the magnitudes of the differences in estimators of the effects of education and income on the behavior of Chinese parents, especially when considered in contrast to the estimators of these effects for non-Chinese families, indicate that the One Child Policy had a significant effect on sex-selective behavior in China.

VI. Sources of Error and Topics for Further Research

As identified by Goodkind (2011) any data on sex ratio at birth may be clouded by incentives to under-report children due to the One Child Policy. This may be especially true in the case of daughters, which would imply that there is some downward bias on my estimators due to sample selection error. One possible explanation for the variation in sex ratio at birth across segments of the population in the sample predating the One Child Policy is that parents who commit infanticide following the birth of a daughter simply deny ever having had their daughters to begin with. This may also cloud responses from more recent years, when the prospect of fines and other deterrents have created an environment where many parents hide their children from the eyes of the state. Increased enforcement of national fertility policy during the 1990s may have had an especially detrimental effect on the quality of data collected from families who had children during this period.

Furthermore, lack of information on the availability of ultrasound technology across districts may introduce omitted variable bias to my regressions. Since the availability of sex-selective technology may be highly correlated with many of the variables that I have included, especially those relating to region and income,. one way to expand upon the research presented in this paper would be to incorporate GIS data on the diffusion of ultrasound technology into an empirical analysis of the determinants of sex ratio at birth in China.

Without information on the magnitude and prevalence of fines, in addition to the lack of information on the availability of ultrasound, it is impossible to distinguish effects related to the "1.5 Child Policy" and those related to financial disincentives in families with multiple children. Incorporating this information would allow for the normalization of the cost of a second child across different regions, as in Ebenstein (2011). Furthermore, including information on various local exceptions to the One Child Policy (discussed in Part II) might further improve the quality of these results.

The lack of a continuous[7] variable for education in China also leaves some doubt about the exact nature of the effects of education on son preference and sex-selection. Household survey data from 1982, 1990, and 2000 simply groups individuals into discrete categories of educational attainment. This may produce a more reliable set of responses, but having a variable for the number of years of education an individual has had could give a more precise idea of the effects of education on son preference. For instance, Echavarri and Ezcurra (2010) imply that there may be a nonlinear relationship between education and son preference. However, it is impossible to test for such a relationship without a (semi) continuous variable for education. Instead, based on the

[7] On the natural numbers.

analysis presented in this paper, I may only state that there appears to be a negative correlation between maternal educational attainment and son preference.

Additionally, non-Chinese individuals may not be a perfect control group. It is possible that the various cultural values represented in these groups do not mirror those of Han individuals. Thus, in the absence of the One Child Policy, the introduction of ultrasound technology might not have had the same effect on these individuals as it would have had on Han Chinese individuals. A possible modification to this approach might be to consider the effects of the introduction of ultrasound technology on the fertility practices of Han Chinese individuals living in countries other than China such as Taiwan or Malaysia.

Finally, I have no way of measuring the impact that maternal education has on the voice that women have in the household. Fertility decisions may be made by both parents, or even solely by the male parent. Without a way to observe the process of fertility decision making in the context of each household, it is impossible to see the effect that educational attainment may have on female empowerment in marriage or in the community. This is a question that demands efforts of a more ethnographic variety, since statistics cannot easily capture the effects in question.

VII. Conclusion

China's imbalanced sex ratio at birth has swelled to perilously high levels since the enactment of the One Child Policy. While Chinese polities have attempted to alleviate this unintended consequence of China's national fertility policies, the gap in the number of boys and girls born in China continues to grow. In the coming decade, there are expected to be more than 30 million excess males in China's adult population as a result of a consistently unbalanced birth population. While the social consequences of this development remain largely unrealized, predictions of their nature and magnitude are less than optimistic (den Boer, Hudson: 2004). Furthermore, any attempt to fully reverse thirty-four years of damage will undoubtedly require many more years of highly concentrated efforts. As of now, China must deal with its glut of males while making more deliberate efforts to curb their growing numbers.

At the close of "More Than 100 Million Women Are Missing," a seminal text in the study of the worldwide deficit of women, Amartya Sen issues this call to action:

> A great many more than 100 million women are simply not there because women are neglected compared with men. If this situation is to be corrected by political action and public policy, the reasons why there are so many 'missing' women must first be better understood. We confront here what is clearly one of the more momentous, and neglected, problems facing the world today. (1990)

Today, China is the most egregious contributor to the global surplus of men. With even larger numbers of newborn males relative to females in China, efforts to combat its widening gender gap have largely failed. However, in order to mobilize more effective policy responses to China's demographic woes, it is essential that scholars continue to investigate the determinants of son preference in China.

This paper has drawn on models of sex-selection in China and India to inform its focus. Little scholarship has focused on the link between education and son preference, though work by Echavarri and Ezcurra (2010) implies that son preference is negatively correlated with education, while the propensity of individuals to engage in sex-selective behavior is positively correlated with income, itself a positive function of educational attainment. Ebenstein (2008) demonstrates that, in the context of the One Child Policy, parents decide whether to engage in sex-selection based on the excess utility they associate with having a male child, as well as the costs they will incur if they elect to engage in sex-selection.

While son preference is exogenously determined in Ebenstein's (2008) model, I propose that, in the context of the One Child Policy, the relative amount of utility an individual associates with having a son as opposed to having a daughter is a negative function of their educational attainment. The empirical results presented in Section V support this claim, demonstrating a consistently positive relationship between maternal educational attainment and the probability that a child will be female in the cases of families with one and two children. In fact, women who have reached the highest levels of educational attainment tend to have children around the biologically normal level, while women who have not reached high levels of educational attainment produce male children at rates well below it.

This result implies that greater investment in women's education may, in the long run, promote a more balanced birth population with respect to gender. However, given the lag time that such a measure would require to take effect, it can only be regarded as a secondary tool in the set of policy measures that the Chinese government may employ in this dire situation. Shorter-term measures could include subsidies for families with female children to try to lower the relative utility that parents associate with having sons. Additionally, the government has already enacted laws to prevent doctors from divulging to parents the sex of their unborn children, though sex-selection clearly remains a problem in spite of this change.

Recent relaxations of the One Child Policy may also have some positive effect on the sex ratio at birth. The Chinese government now allows couples consisting of two individuals with no siblings to have two children instead of just one. While this amendment to the One

Child Policy may diminish its negative effects in some small way, there is still little reason to believe that it will make any significant dent in the glut of male newborns in China.

The negative correlation between maternal education and son preference implied by the results of my empirical analysis indicates that China's surplus of male babies is a holdover from traditional society. China's rapid and uneven development has left areas of the country's consciousness still rooted in the patriarchal values that dictated nearly every aspect of daily life in China for millennia. While there is no surefire way to rebalance China's sex composition, it is likely that further advancements along the developmental ladder will help to bring it closer to an acceptable level.

Definition of Variables:

Primary School: Assumes a value of 1 if an individual's highest level of educational attainment is either primary school or an adult literacy course. I have chosen to group these two categories together since very few individuals have received the latter course of education and because these two types of education instill very similar sets of knowledge in individuals.

Junior Middle: Assumes a value of 1 if an individual's highest level of educational attainment is the completion of junior middle school. In China, a large plurality of individuals do not attend school beyond this point, with senior middle schooling often serving as a course of study in preparation for application to a junior college or university.

Senior Middle: Assumes a value of 1 if an individual's highest level of educational attainment is the completion of senior middle school, which is analogous to high school in America.

Vocational: Assumes a value of 1 if an individual's highest level of educational attainment is the completion of vocational training. Some individuals who have attended vocational school may also have attended senior middle school, while some may not have done so.

Junior College: Assumes a value of 1 if an individual has completed a degree at a junior college, equivalent to a two-year associate's degree.

College: Assumes a value of 1 if an individual has completed college or university.

City: Assumes a value of 1 if an individual lives in an urban area.

Town: Assumes a value of 1 if an individual lives in a suburban area.

Home Price: Data on home prices in the 2000 National Household Survey groups individuals into discrete categories based on the price of their home. This variable is coded as the lower bound of the category identified in the Survey.

Monthly Lease: Data on lease prices in the 2000 National Household survey also groups individuals into discrete categories based on the rental price they pay for their home each month. I have also coded this variable as the lower bound on the category identified on the Survey. Note that Home Price and Monthly Lease are mutually exclusive variables, meaning that no individual supplies data for both.

Table 1

Table 2

	One Child				Two Children			
	Chinese		Non-Chinese		Chinese		Non-Chinese	
VARIABLES	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/Aft -er 1975 P(daughter)
Primary School	0.0644	-0.00475	-0.150	-0.0456*	0.0101	0.0165***	0.0604	0.000940
	(0.0441)	(0.0129)	(0.157)	(0.0258)	(0.0118)	(0.00610)	(0.0448)	(0.0136)
Junior Middle	0.0919*	0.0284**	0.0261	-0.0428*	0.0356**	0.0280***	0.0600	0.0156
	(0.0480)	(0.0127)	(0.213)	(0.0256)	(0.0141)	(0.00615)	(0.0554)	(0.0146)
Senior Middle	0.0834	0.0612***		0.0105	0.0655**	0.0297***	0.0831	0.0400*
	(0.0764)	(0.0132)		(0.0302)	(0.0319)	(0.00786)	(0.130)	(0.0224)
Vocational	0.166**	0.0726***	0.471***	0.0357	0.0277	0.0381**	0.312**	0.0773**
	(0.0839)	(0.0142)	(0.126)	(0.0343)	(0.0403)	(0.0149)	(0.142)	(0.0343)
Junior College	0.0216	0.0883***		-0.0280	0.0870	0.0883***	-0.354***	0.0372
	(0.113)	(0.0142)		(0.0376)	(0.0616)	(0.0203)	(0.0382)	(0.0510)
University	0.744***	0.0876***		-0.0936**	0.00175	-0.0292		-0.0114
	(0.0398)	(0.0173)		(0.0469)	(0.155)	(0.0485)		(0.0757)
Constant	0.256***	0.392***	0.529***	0.487***	0.398***	0.433***	0.354***	0.443***
	(0.0398)	(0.0125)	(0.126)	(0.0236)	(0.0108)	(0.00578)	(0.0382)	(0.0123)
Observations	1,158	105,767	56	6,752	15,910	140,038	786	13,764
R-squared	0.010	0.003	0.046	0.003	0.001	0.000	0.009	0.001

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3

	Families with One Child				Families with Two Children			
	Chinese		Non-Chinese		Chinese		Non-Chinese	
VARIABLES	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)
Primary School	0.0618	-0.00377	-0.116	-0.0466*	0.00876	0.0166***	0.0496	0.000523
	(0.0448)	(0.0129)	(0.161)	(0.0257)	(0.0118)	(0.00610)	(0.0449)	(0.0136)
Junior Middle	0.0664	0.0208	0.0904	-0.0538**	0.0245*	0.0255***	0.0133	0.0114
	(0.0500)	(0.0127)	(0.222)	(0.0259)	(0.0144)	(0.00616)	(0.0592)	(0.0148)
Senior Middle	0.0495	0.0406***		-0.0133	0.0461	0.0228***	0.0297	0.0301
	(0.0778)	(0.0133)		(0.0317)	(0.0323)	(0.00793)	(0.128)	(0.0229)
Vocational	0.125	0.0529***	0.953***	0.0134	0.00649	0.0295**	0.237	0.0685**
	(0.0863)	(0.0143)	(0.168)	(0.0354)	(0.0408)	(0.0150)	(0.145)	(0.0348)
Junior College	-0.0102	0.0651***		-0.0559	0.0616	0.0742***	-0.452***	0.0202
	(0.115)	(0.0144)		(0.0392)	(0.0620)	(0.0204)	(0.0638)	(0.0517)
University	0.697***	0.0603***		-0.121**	-0.0267	-0.0478		-0.0331
	(0.0468)	(0.0175)		(0.0484)	(0.156)	(0.0486)		(0.0766)
City	0.0523	0.0402***	-0.0381	0.0343**	0.0359***	0.0288***	0.110**	0.0442***
	(0.0343)	(0.00374)	(0.241)	(0.0171)	(0.0106)	(0.00393)	(0.0543)	(0.0166)
Town	0.105**	0.0145***	-0.484***	0.0402**	0.0277**	0.0102**	0.0831	0.00262
	(0.0427)	(0.00454)	(0.114)	(0.0179)	(0.0117)	(0.00408)	(0.0531)	(0.0136)
Constant	0.233***	0.383***	0.532***	0.482***	0.391***	0.429***	0.343***	0.442***
	(0.0424)	(0.0126)	(0.128)	(0.0236)	(0.0110)	(0.00581)	(0.0382)	(0.0123)
Observations	1,158	105,767	56	6,752	15,910	140,038	786	13,764
R-squared	0.016	0.004	0.092	0.004	0.002	0.001	0.016	0.001

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4

	Families with One Child				Families with Two Children			
	Chinese		Non-Chinese		Chinese		Non-Chinese	
VARIABLES	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)
Primary School	0.0598	-0.00400	-0.156	-0.0450*	0.00917	0.0168***	0.0651	0.000839
	(0.0443)	(0.0129)	(0.160)	(0.0258)	(0.0119)	(0.00610)	(0.0453)	(0.0136)
Junior Middle	0.0843*	0.0296**	0.116	-0.0420	0.0342**	0.0287***	0.0683	0.0151
	(0.0484)	(0.0127)	(0.263)	(0.0257)	(0.0141)	(0.00616)	(0.0564)	(0.0147)
Senior Middle	0.0758	0.0632***		0.0125	0.0632**	0.0313***	0.0970	0.0393*
	(0.0765)	(0.0132)		(0.0304)	(0.0321)	(0.00790)	(0.134)	(0.0226)
Vocational	0.159*	0.0752***	0.574***	0.0377	0.0242	0.0395***	0.327**	0.0770**
	(0.0837)	(0.0142)	(0.210)	(0.0346)	(0.0404)	(0.0150)	(0.144)	(0.0345)
Junior College	0.0221	0.0917***		-0.0242	0.0837	0.0907***	-0.349***	0.0360
	(0.113)	(0.0143)		(0.0380)	(0.0617)	(0.0204)	(0.0387)	(0.0515)
University	0.736***	0.0919***		-0.0900*	5.77e-05	-0.0259		-0.0128
	(0.0408)	(0.0174)		(0.0473)	(0.155)	(0.0484)		(0.0768)
Home Price	0.000541	-0.000162***	-0.00585	-0.000225	0.000189	-8.84e-05*	-0.000647	2.03e-05
	(0.000382)	(5.26e-05)	(0.00938)	(0.000270)	(0.000153)	(5.18e-05)	(0.000670)	(0.000271)
Monthly Lease	-0.000449	4.08e-05		0.000182	-2.08e-05	-9.29e-05***	-2.91e-05	0.000152
	(0.000796)	(3.42e-05)		(0.000166)	(0.000112)	(3.51e-05)	(0.00110)	(0.000191)
Constant	0.254***	0.393***	0.543***	0.487***	0.396***	0.434***	0.356***	0.443***
	(0.0402)	(0.0125)	(0.130)	(0.0236)	(0.0109)	(0.00579)	(0.0383)	(0.0123)
Observations	1,158	105,767	56	6,752	15,910	140,038	786	13,764
R-squared	0.012	0.003	0.053	0.003	0.001	0.000	0.009	0.001

Robust standard errors in parentheses   *** p<0.01, ** p<0.05, * p<0.1

	One Child				Two Children			
	Chinese		Non-Chinese		Chinese		Non-Chinese	
VARIABLES	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/After 1975 P(daughter)	Married Before 1975 P(daughter)	Married During/Afte 1975 P(daughter
Primary School	0.0581	-0.00288	-0.117	-0.0459*	0.00835	0.0172***	0.0558	0.000664
	(0.0449)	(0.0129)	(0.165)	(0.0257)	(0.0119)	(0.00610)	(0.0453)	(0.0136)
Junior Middle	0.0590	0.0222*	0.0986	-0.0522**	0.0241*	0.0265***	0.0218	0.0116
	(0.0504)	(0.0127)	(0.282)	(0.0260)	(0.0144)	(0.00617)	(0.0594)	(0.0149)
Senior Middle	0.0441	0.0427***		-0.00991	0.0462	0.0246***	0.0619	0.0308
	(0.0775)	(0.0133)		(0.0318)	(0.0324)	(0.00795)	(0.130)	(0.0230)
Vocational	0.118	0.0557***	0.957***	0.0168	0.00518	0.0307**	0.249*	0.0695**
	(0.0861)	(0.0143)	(0.184)	(0.0355)	(0.0408)	(0.0150)	(0.148)	(0.0350)
Junior College	-0.0104	0.0687***		-0.0499	0.0612	0.0763***	-0.463***	0.0219
	(0.115)	(0.0144)		(0.0394)	(0.0621)	(0.0205)	(0.0656)	(0.0520)
College	0.689***	0.0654***		-0.115**	-0.0268	-0.0447		-0.0302
	(0.0486)	(0.0176)		(0.0486)	(0.155)	(0.0485)		(0.0773)
City	0.0554	0.0417***	-0.0385	0.0341*	0.0354***	0.0336***	0.131**	0.0437**
	(0.0351)	(0.00379)	(0.244)	(0.0175)	(0.0107)	(0.00404)	(0.0567)	(0.0170)
Town	0.103**	0.0156***	-0.478***	0.0406**	0.0271**	0.0125***	0.0988*	0.00276
	(0.0428)	(0.00456)	(0.143)	(0.0180)	(0.0118)	(0.00411)	(0.0542)	(0.0137)
Home Price	0.000443	-0.000217***	-0.000565	-0.000315	8.95e-05	-0.000170***	-0.00124*	-7.26e-05
	(0.000379)	(5.29e-05)	(0.00966)	(0.000269)	(0.000156)	(5.28e-05)	(0.000636)	(0.000273)
Monthly Lease	-0.000674	-1.26e-05		0.000139	-5.59e-05	-0.000153***	-0.000750	6.86e-05
	(0.000800)	(3.43e-05)		(0.000161)	(0.000114)	(3.55e-05)	(0.00108)	(0.000190)
Constant	0.231***	0.384***	0.533***	0.483***	0.390***	0.430***	0.344***	0.442***
	(0.0426)	(0.0126)	(0.133)	(0.0236)	(0.0111)	(0.00582)	(0.0383)	(0.0123)
Observations	1,158	105,767	56	6,752	15,910	140,038	786	13,764
R-squared	0.018	0.004	0.092	0.004	0.002	0.001	0.018	0.001

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

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