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Chinese Fertility: Past, Present And Future

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Abstract
China has witnessed profound socioeconomic changes over the past four decades. This dissertation is comprised of three papers that investigate the demographic, social, and economic determinants of fertility trends in China. In Chapter 1, I discuss how birth control policies, which have been implemented since 1980, are related to Chinese women's timing of giving first birth during a period with substantial socioeconomic development. The results suggest that such birth control policies still influence women's childbearing behavior, even after controlling for the urban/rural distinction and provincial variation; however, this influence has diminished over time. In Chapter 2, I examine the relationship between different motherhood stages and urban women's economic positions in the labor market between 1991 and 2011, and how this relationship has changed with the development of local economies. The analysis shows that very young children have an inhibiting effect on mothers' labor force activities, and this effect is exaggerated with the development of local economies. On the other hand, women's income is positively correlated with the presence of school-aged children, but this positive relationship is eroded with local economic development. In Chapter 3, I propose that the legacies from state socialism, the reduction in educational gender inequality, and the marketization process lead to a modern-traditional mosaic that shapes a curvilinear relationship between gender-role ideology and fertility intentions in China. Capitalizing on three waves of data from the Chinese General Social Survey, I empirically explore the relationship between women's fertility intentions of having two or more children and different gender-role attitudes by using structural equation modeling. The results suggest that both the 'modern' (with more egalitarian gender-role ideology) and 'traditional' (with less egalitarian gender-role ideology) women show higher fertility intentions.

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CHINESE FERTILITY: PAST, PRESENT AND FUTURE

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ABSTRACT

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China has witnessed profound socioeconomic changes over the past four decades. This dissertation is comprised of three papers that investigate the demographic, social, and economic determinants of fertility trends in China. In Chapter 1, I discuss how birth control policies, which have been implemented since 1980, are related to Chinese women's timing of giving first birth during a period with substantial socioeconomic development. The results suggest that such birth control policies still influence women's childbearing behavior, even after controlling for the urban/rural distinction and provincial variation; however, this influence has diminished over time. In Chapter 2, I examine the relationship between different motherhood stages and urban women's economic positions in the labor market between 1991 and 2011, and how this relationship has changed with the development of local economies. The analysis shows that very young children have an inhibiting effect on mothers' labor force activities, and this effect is exaggerated with the development of local economies. On the other hand, women's income is positively correlated with the presence of school-aged children, but this positive relationship is eroded with local economic development. In Chapter 3, I propose that the legacies from state socialism, the reduction in educational gender inequality, and the marketization process lead to a modern-traditional mosaic that shapes a curvilinear relationship between gender-role ideology and fertility intentions in China. Capitalizing on three waves of data from the Chinese General Social Survey, I empirically explore the relationship between women's fertility intentions of having two or more children and different gender-role attitudes by using structural equation modeling. The results suggest that both the 'modern' (with more egalitarian gender-role ideology) and 'traditional' (with less egalitarian gender-role ideology) women show higher fertility intentions.

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CHAPTER 1 : Effects of Birth Control Policies on Women's Age at First Birth in China

Co-authored with Hans-Peter Kohler

Introduction

The fertility transition and fertility level in China have received considerable attention due to both the strict birth control policies and the country's sheer population size. The intention of limiting population growth in China started around 1953, when the population was 581 million. In 1962, the total population increased dramatically to 700 million, which pushed the government to advocate later marriage and promote a few urban educational programs directed towards maternal and child health. National population policies and population programs started in the early 1970s, when the total fertility rate (TFR) was above 5 and the population was 850 million. At this point, China accounted for more than one fourth of the world population, but only 7 percent of the world's arable farmland. The 'later, longer and fewer (*wan-xi-shao*)' campaign, which started in 1973, was the first influential national policy. It stressed *later* marriage (*wan*), *longer* intervals between births (*xi*), and *fewer* children (*shao*). The more widely known one-child policy was launched in 1980 when the population of China was almost 1 billion people and the majority were to be in childbearing ages (with half under 21 years old and two-thirds under 30 years old). However, great resistance to this strict policy resulted in a more flexible policy known as '*kai xiaokou, du dakou*' in 1984, allowing more couples to have a second child, and limited births of parity three and higher as well as unauthorized second births. On Oct 29th, 2015, the largest change in China's birth control policies since the 1990s was announced – a second child is now generally allowed.

The decline of fertility in China has been remarkable, dropping from a TFR higher than 5 in the early 1970s to replacement level (TFR around 2.1) in the early 1990s (UNPD 2015). It continued dropping until 2000 and has stabilized around 1.60 since then. The rapid decline of TFR has ushered in a new era with its own set of challenges, namely population aging. The proportion of the population older than 60 years is now more than 15 percent (NBS 2015), and the baby boomers (born between 1962 and 1970) will start to enter this group in the next couple of decades. This challenge, together with current low fertility levels, has pushed the government to relieve the birth control policy.

Popular media and policy discussions have hence focused on one critical question since the announcement of the policy reversal in 2015***: How much influence will the 2015 loosened policy have on Chinese childbearing behavior?*** While there seems to be some consensus that the potential effect is likely to be small (Attané 2016b; Buckley 2015; The Economist 2015; Zhao 2015) and that the policy should have been implemented earlier (Hesketh, Lu, and Xing 2005; F. Wang 2005; F. Wang, Cai, and Gu 2013), there is a lack of direct micro-level analysis on nationally representative data. After the 2015 two-child policy, there were about 17.86 million and 17.23 million births in 2016 and 2017, respectively, compared to around 16 million in the past decade. The number of second births increased from 6.48 million in 2015 to 7.15 million in 2016, and further to 8.82 million in 2017 (China Daily 2018).

In this chapter, based on nationally-representative micro-level data, we examine how past birth control policies are related to Chinese women's age at first birth, another indicator of childbearing behavior rather than fertility level, before 2005. The results suggest that women who were prescribed to different birth control policies entered into motherhood at different ages. This is even true for young cohorts during a period of rapid socioeconomic development in China in the late 1990s and early 2000s. After adjusting for geographic variation, women who were prescribed to follow less strict policies tended to have first births earlier than those who followed the strictest one-child policy. Besides, a U-shaped effect of policy among young cohorts is also indicated by our analysis, which shows that the less strict policies were more related to earlier timing of childbearing among the least educated and most educated groups.

Analyzing Effects of Birth Control Policies

The effects of the birth control policies on women's childbearing behavior have been debated. Some studies on policy effects claimed that around 300 to 400 million births were averted before the 21st century in China due to the policy influence (W. Chen and Zhuang 2004; J. Wang 2006; Mosher 2011) and more than half of the drop in Chinese fertility from pre-transitional levels before 1970 to near replacement level in 1990 were due to government influence (Feeney and Wang 1993). A simulation of the fertility rate (based on the experience of other countries) sought to examine what the fertility rate in China would have been in the absence of birth control policies, and put Chinese TFR at 2.5 in 2008 (Tao and Yang 2011), in contrast to the actual TFR of around 1.6. However, rapid socioeconomic development and globalization in recent decades have brought about an ideational shift from resisting to embracing the 'small family' ideal in Chinese families (Merli and Smith 2002; H. Zhang 2007). Some evidence suggests that China's current low fertility is not simply a prescribed result of the one-child policy, as socioeconomic development has played a decisive role (J. Chen et al. 2009; Zheng et al. 2009; Cai 2010). One meta-analysis reported that the ideal number of children has stabilized between 1.6 and 1.8 since 2000 (Hou 2015).

The task of assessing the impacts of birth control polices on women's childbearing behavior is complicated by the fact that, since 1984, local governments have started to make their own birth control policies. At least 20 minor exceptions have been made for a second child (Gu et al. 2007) and the localized policies can be grouped into four categories: 1) One-child policy: each couple is expected to have only one child. 2) One-and-a-half-child policy: couples are allowed to have a second child after a specified birth interval if the first birth is a girl. 3) Two-child policy: couples are allowed to have two children. 4) Three-or-more-child policy: couples from minority groups or couples who meet several criteria can have more than two children (Figure 1-1).

FIGURE 1-1 ABOUT HERE

It is true that these policy categories are closed related to couples' *hukou* status.[1] Specifically, the second policy category (one-and-a-half-child policy) was mainly applied to people with 'agriculture' *hukou*. However, the 'one-child policy' or other policies do not equal urban (including towns) or rural areas. Because of the rapid economic development since the late 1990s, more agricultural land was (Seto, Kaufmann, and Woodcock 2000, 20) and is being converted while the 'agriculture' *hukou* status of people live there stayed unchanged. According to 2000 Census, people with 'non-agriculture' *hukou* only accounted for about 25 percent of the total population while

[1] *Hukou* status is the status of each person registered in the Household Registration System in Mainland China. It mainly has two statuses: non-agriculture and agriculture. The distinction between 'non-agriculture' and 'agriculture' *hukou* (which has never been registered as 'urban' or 'rural' in hukou system) was first declared officially in 1958, and has not seen major reforms until recently (after 2010).

about 37 percent of the total population living in urban areas. In 2005, the proportion of people with 'non-agriculture' *hukou* increased trivially to 26 percent while the proportion of the population living in urban areas grew to about 45 percent. Gu et al. (2007) computed the average provincial and national policy fertility levels (*zhengce shengyulu*)[2] based on different birth policies of 420 prefecture-level units[3] in China. It turns out that during late 1990s, only about 35.4 percent of Chinese people were covered by the one-child policy while the majority of Chinese lived in areas with a policy fertility level at 1.3 to 2.0 children per couple. Thus, even in urban areas or in the same province, different women were prescribed to follow different policies, which is also verified in our data as shown later. One recent study decomposed China's fertility gaps by *hukou* and place of residence (rural areas versus urban areas) by using 2011 data. The results suggested that the effects of having a 'non-agricultural' *hukou* are more than three times larger than the effects of urban residence on fertility (Liang and Gibson 2017).

However, most of the current research has estimated the policy effects based on the change of aggregate fertility rate at either the regional or national level, which estimates the fertility level of a group of women who actually followed different policies. Given the large variation of birth control polices even *within* the same region, it is hard to connect individual's childbearing behavior to the exact policy settings by examining aggregate data (Attané 2016a; Morgan, Guo, and Hayford 2009; Wang 2011). Others have concentrated their studies on subgroups with less policy variation and indicated that socioeconomic development was the most important factor of the transition to below-replacement fertility in China (Zheng et al. 2009; Cai 2010). However, the conclusions

[2] Fertility levels that would be obtained locally if all married couples had births at the levels permitted by local policy.
[3] Prefecture-level units are directly under the jurisdiction of the province.

from these studies are only for highly-selected subgroups[4] (less than 10 percent of Chinese population) and not for the general population. In all, current studies on Chinese fertility level did not show clearly how the previous birth control policies shaped women's childbearing behavior at the individual level.

A further complication is that the impact of birth control policies on childbearing behaviors is intertwined with the influence of educational expansion. According to the sixth census conducted in 2010, only around 20 percent of the women in the 1970 birth cohort received at least high school education, while it rose to about 38 percent for women born in 1983 and further increased to around 50 percent for women in the 1989 birth cohort. Rapid educational expansion and socioeconomic development in China have changed people's fertility intentions, which mitigates the policy constraints for young cohorts. More importantly, in China, the educational expansion helped spread the knowledge of reproductive health and reasons for implementing birth control. Most people started to learn the same language (Mandarin) for communication after going to school, as the Chinese language consists of hundreds of local language varieties, many of which are not mutually intelligible.[5] According to diffusion theory (Bongaarts and Watkins 1996; McNicoll 2011) for contemporary fertility transitions observed in other countries, fertility decline is not simply an adjustment to changing socioeconomic circumstances. Social interaction, which is largely based on sharing the same language

[4] The two provinces (Zhejiang and Jiangsu) studied are the most developed provinces with the highest GDP per capita since the early 1990s. Zhejiang province was one of the only two provinces (another is Xinjiang with much less strict birth control because of a high proportion of minority groups) that actually accomplished the goal of birth control policies in 1989 (Peng 2009). Jiangsu province is one of the two provinces (another is Sichuan province) with the strict one-child policy since 1980 without loosened one-and-a-half-child policies.

[5] These varieties can be classified into seven to ten groups, the largest being Mandarin (e.g. Beijing dialect), Wu (e.g. Shanghainese), Min (e.g. Taiwanese Hokkien), and Yue (e.g. Cantonese). The differences are similar to those within the Romance languages, with variation particularly strong in the more rugged southeast, described as 'different accents for every 5 kilometers (*shili butong yin*)' in Chinese.

intelligible to one another, acts as a channel for fertility change. More rapid fertility decline occurs in countries where a multiplicity of channels connects communities, and slower fertility decline happens where such channels are sparse.

Thus, accompanied with educational expansion, the effects of birth control policies on childbearing behavior become unclear. Though education and urbanization were producing conditions for an incipient transition and the fertility decline was underway in some subgroups even before direct birth control policies were implemented (Lavely and Freedman 1990), we can never assign education as the ‘cause’ of the substantial drop of fertility level in China. This is because women’s education levels are also a proxy for other community-level factors, such as more developed cities with better health services and stricter birth planning programs. Previous studies proved that the strong relationship between education and fertility weakened in China after the onset of government-sponsored fertility control programs, undermined by policy goals and bureaucratic regulations tailored to specific urban levels (Lavely and Freedman 1990).

Further, concurrent with the rapid educational expansion, the composition of women, in terms of different policies, shifts across cohorts, and affects studies on the effects of birth control policies. A previous study has indicated that there is a lower selectivity into higher education over time for young women who achieve higher levels of grade attainment (Berelson 1974), especially under the rapid educational expansion. That is, because of rapid educational expansion and also the growing urban areas, the population composition of underlying factors affecting childbearing behaviors also shifted, as large numbers of students who would have had limited exposure to schooling could now have more access to educational resources (Grant 2015). In this sense, educational expansion has led to more heterogeneity in young cohorts.

As will be explained in the following data and method sections, we solve the first problem by coding the exact birth control policy that a woman was prescribed to follow and examining the timing of giving first birth rather than fertility level directly, after controlling for the urban/rural distinction and provincial variation. The second problem is solved by conducting statistical models separately for successive cohorts to capture the undergoing educational expansion and its impacts on women's childbearing behavior. Specifically, the semi-parametric method (Cox model) used in this chapter allows us to fit the models by allowing the hazard functions to vary across both urban/rural areas and provinces. This method helps control for the unknown impacts from various socioeconomic development levels and reduces the impact of the endogeneity that the birth control policies in each province were imposed based on local conditions.

Data and Variables

Data

The data used for this chapter are a 20 percent random sample drawn from China's 2005 1% Population Inter-census Survey (mini-census), conducted by the National Statistics Bureau. This nationally-representative survey covers demographic information of all household members, living conditions, and the number of children that a woman has ever borne.

Based on this micro-level information, the specific birth control policy that a woman was prescribed to follow can be identified according to the personal characteristics reported in the survey. It solves the problem embedded in the previous literature that the exact birth control policy cannot be identified from aggregate data. Also, because this survey covers samples from all provinces in mainland China, individuals are clustered in the provincial level, allowing us to control for the different socioeconomic development speed among provinces in our statistical models.

Dependent Variable: Age at First Birth

In this chapter, we look at the impact of different birth control policies on another important indicator of childbearing behavior, age at first birth (AFB).[6] Studying AFB contributes to our understanding about how the birth control policies are related to women's timing of entering into parenthood, one of the important life-course stages. Also, because the association between early childbearing and higher completed fertility has long been widely observed (Bumpass, Rindfuss, and Jamosik 1978; Trussell and Menken 1978; Morgan and Rindfuss 1999), [7] studying AFB also complements the discussions on the policy effects on women's childbearing behavior. In Chinese contexts, it would make sense for women who followed less strict policies to have more children during their lifespan than women who followed the one-child policy. This is because, under less strict policy settings in some places, the second child can only be allowed after certain years'

[6] Though we have children ever born reported in these data, we cannot conduct analysis on fertility level directly. This is because the complete cohort fertility level can only be calculated for women older than 49 years old (the oldest age of conventional childbearing age). However, because we focus on the effect of policies after 1984 on the childbearing behavior of women born between 1970 and 1983, women were between age 22 and age 35 in 2005. They were censored in terms of giving birth when the survey was conducted.

[7] Empirical research has also proved that, after eliminating possible genetic influences, there are connections between age at first attempt to become pregnant and the number of children or the propensity to have any children (Kohler, Rodgers, and Christensen 1999). A recent study based on longitudinal data also underscored the importance of combining timing and number of outcomes, which might fruitfully be employed together in demographic modeling (Miller, Rodgers, and Pasta 2010). All these studies suggest that the more children a couple wants to have, the sooner they want to start having them.

spacing. Families that have the chance to have a second child will try to avoid a late first birth to make sure that they will not have the second child too late.[8]

Further, by learning how much the timing of childbearing has been affected by these policies, we also warrant further research estimating how much the TFR change under the universal two-child policy can be attributed to the changing timing of giving birth and how much to the quantum fertility level. Scholars have long highlighted that the conventional estimate of observed period TFR is biased if the timing of childbearing is changing (Ryder 1956, 1980; Bongaarts and Feeney 1998), known as the tempo effect or tempo distortion. Both the quantum and tempo changes, confounded with period and cohort changes, give rise to the observed year-by-year changes in fertility rate (Bongaarts and Sobotka 2012). The tempo-affected TFR might introduce both some misinterpretation of fertility level trends and exaggeration of the gap between intended and achieved family size. If the loosened policy will affect women's AFB, further research about the impacts of the 2015 loosened policy should take the tempo distortion into account when studying the fluctuation of the period TFR that will be observed in the near future.

The data provide the birth year of women and her children, so we can estimate the AFB for women from different birth cohorts. Because different birth control policies were implemented in 1984, we only focus on women born between 1970 and 1983 (22 to 35 years old in 2005). When the policies were localized, the 1970 cohort was 14 years old, one year younger than the conventional used youngest age (15 years old) of childbearing

[8] Our final analytical data also showed that, for those who have given birth, the younger the age at first birth, the more children they have had. The number of children ever born (CEB) is 1.9 on average for those who gave their first births before 20 years old, while it's 1.4 for those whose AFB is between 20 and 24 years old. For those whose AFB is between 25 and 29 years old, though excluding the youngest cohort born between 1980 and 1983, the number of CEB is 1.2.

age for women. Those born in 1983 were 22 years old[9] in 2005. The AFB is not explicitly incorporated in the mini-census questionnaire, so we estimate AFB by subtracting the birth year of the household head or the wife of the household head from her first child's birth year (see detailed description of the estimation procedure in Appendix).[10] For any study concerning the timing of life-course events, observed cases are censored in cross-sectional data. Women who had not had their first birth before 2005 are right censored and are also included in our data.

Specifically, we also consider the potential selection issue resulting from getting information from the women who are the household head or the wife of the household head. That is, single or childless women are less likely to be a household head or a wife of a household head, especially women in young cohorts who are likely to receive more education and postpone getting married. To eliminate this selection issue, we also draw childless women who were coded as 'daughters' in the household (34,162 observations), into our database.

Independent Variable: Birth Control Policies

The coding of birth control policy for each woman is based on the major policy settings of different local policies in 1984 as shown in Figure 1-1,[11] because other

[9] In China, a student who progressed through school on time and without interruptions would be expected to finish middle school by age 15 and graduate from a university by age 22.

[10] The estimation procedure is based on the assumption that whether women are matched with their children is unrelated with their AFB because we have random samples from the original data. We are aware of the potential bias lead from the violation of this assumption. Specifically, the numbers of children ever born (CEB) of migrant mothers are less likely to be matched with the number of children within household. However, because rural-urban migrants account for most of the migrants in China, the likelihood of separation is expected to be higher for women from less development places with loosened birth control (and also those who are more likely to give birth early). Thus, the exclusion of women whose reported CEB is unmatched with their children within household tend to give us more conservative estimates of the policy impacts.

[11] For those who can follow less strict policies, information of both couple is needed, thus there is a potential selection in that who can follow less strict policies are selected with higher risk of giving birth by being married. We also run robust test (Appendix Table 1-1 and Appendix Table 1-2) after adopting a different strategy of coding, in which the

exceptions for a second child or child at higher order only cover a trivial proportion (Gu et al. 2007, 20). Two categories of birth control policies are specified in this analysis: the strictest one-child policy and the less strict policies, including the one-and-a-half-child policy, two-child policy and the three-or-more-child policy.

The criteria for different birth control policies mainly consist of three components: *hukou* status, minority or not, and provinces where the *hukou* is registered for both the women and her husband. As explained, the distinction between 'non-agriculture ' and 'agriculture' in *hukou* status is not equivalent to the distinction between urban and rural area, especially under rapid development and the urbanization process. Actually, according to the published aggregate data of the 2005 mini-census, people with 'non-agriculture' *hukou* only account for 53.43 percent in the urban population, which means almost half of the urban population have 'agriculture' *hukou*. Even in Beijing, about 35 percent people had 'agriculture' *hukou* in 2005, and this proportion was around 33 percent in Shanghai. As will be explained later, we also include the variable indicating the distinction between urban and rural areas into our model. In fact, in our final analytic data, about 37 percent of the women who could follow less strict policies lived in urban areas and 12 percent of women who had to follow the one-child policy lived in rural places.

For married women with matched husband's information or women with non-agricultural *hukou*, the birth control policies that they were prescribed to follow can be easily identified. However, the policy cannot be directly identified for women who are

exact birth control policy that a woman has to follow only depends on her own characteristics. Because only the information of female is needed by this strategy, all the 145,025 observations are utilized in the robust tests. The results of these robust tests also support our argument.

married but missing husbands' information or single with agricultural *hukou*, because the information on the husband is needed to meet the criteria for less strict birth control policies. We solve this problem in two steps. First, we assume that those who were not migrants in 2005 were likely to be married to males with the same *hukou* and follow less strict policies. This assumption is legitimate because our sample only consists of those older than age 22, and most of them should have finished their education. It is unlikely for them to change *hukou* status, because the transition of *hukou* status is most likely to happen when people graduate from universities or colleges. Also, even if single women with agricultural *hukou* moved to urban areas after 2005, they were unlikely to marry a man with non-agricultural *hukou*, who was considered more advantageous, because of the traditional hypergamy in China (Mu and Xie 2014; Yu and Xie 2015). Second, single female migrants with agricultural *hukou* are also coded to follow the less strict policies and contribute person months to this category to provide a relatively conservative estimate. That is, we code the policies only based on the eligibility of female. Less than 1.8 percent of the cases cannot be coded for this main independent variable in our study. Our final dataset has 142,475 observations. The descriptive statistics are shown in Table 1-1.

TABLE 1-1 ABOUT HERE

Statistical Methods and Model Specification

We use the extended Cox regression to model the effects of different birth control policies on the hazard rate of entry into parenthood. Compared with parametric models of event history analysis, the Cox model uses partial likelihood estimation (semi-parametric model). This method works reasonably well with a wide range of baseline hazard functions when the shape of the hazard function is not *a priori* known, which allows us to control for the possible socioeconomic effects, differences in urban and rural area, and also the provincial variation even when their impacts are unknown. We stack the data into a person-month structure and the Efron method is used for better approximation of Cox regression for discrete-time data (Allison 2014). For this analysis, the risk of giving birth is assumed to begin at age 15. Though the legal age of marriage in China is 22 years old for males and 20 years old for females since 1981, some people still take the wedding date as the start of marriage (instead of registered marriage), which is accepted by friends and relatives. Births given after this culturally accepted marriage are rarely considered as births out of wedlock. Some Chinese studies have suggested it true even for recent cohorts (Yu and Xie 2015).

As explained, selectivity[12] is high for old cohorts, because women who had more access to education were living in urban areas and also had to follow the strictest one-child policy. Nevertheless, women in young cohorts within high educational level tended to show more variation of birth control policies, and revealed stronger policy effects than women from older cohorts because of more heterogeneity within them. To capture the changing relationship between policies and education over time, we conduct analysis on childbearing behavior separately for successive birth cohorts. Due to fast socioeconomic change, especially educational expansion, we divide all the birth cohorts (born between 1970 and 1983) into three groups: Cohort I (born between 1970 and 1974), Cohort II (born between 1975 and 1979), and Cohort III (born between 1980 and 1983).

[12] In this chapter, 'selectivity' is termed as women who are the most educated and tend to be those who have to follow the strictest one-child policy.

For control variables, because the *hukou* status (non-agriculture or agriculture) is the main criterion of birth control policy and different from urban/rural distinction, it is not included in the model. Instead, we conduct Cox models with stratification by both actual urban/rural distinction and provinces in our analysis, with the assumption that the baseline hazard is different for urban and rural area, and also different for each province. So both the urban/rural differences and impact of endogeneity of local policies across provinces can be controlled in our analysis.[13]

Results

Patterns of Timing at First Birth

We describe how patterns of timing at first birth changed with respect to different policies and educational levels for different cohorts, respectively. We present the first quartile (25%), median (50%) and third quartile (75%) of the age at first birth by cohorts and policies in Table 1-2, and also by cohorts and educational levels in Table 1-3. For example, in Table 1-2, for women from Cohort II following the one-child policy, 25% gave birth before age 24 and half of them gave birth before age 27. Because the sample is censored at age 22-25 for Cohort III, some information is missing in some of the percentiles. For the women in the youngest cohort group following the one-child policy, less than 25% gave birth when they took the 2005 mini census.

TABLE 1-2 ABOUT HERE

TABLE 1-3 ABOUT HERE

[13] There are 31 provinces in the data and binary distinction between rural and urban area. We use the option 'strata' with both variables included.

Comparing the timing of giving first birth, young cohorts postponed their childbearing behavior substantially. 25% of women from Cohort I and Cohort II gave birth to their first child before age 21 and before age 22, respectively. But for Cohort III, one-quarter of them gave birth before 24 years old. We also find a general pattern of earlier childbearing across women who followed less strict birth control policies within each cohort group. For example, in Cohort I, 25% of women following the one-child policy had their first birth before age 22, but for those following less strict policies, it was age 21. In Cohort II, half of the women who followed the one-child policy gave birth before age 27, but for women who followed less strict policies, half of them gave birth before age 23. Less than one quarter of the women who followed the one-child policy in Cohort III gave birth before 2005, but of those who followed less strict policies, 25% gave birth before 23 years old. Additionally, within each cohort group, women with higher educational levels tended to give birth later (Table 1-3). This corresponds to the findings in other research about the timing of first birth and education.

In sum, the postponement of childbearing behavior is clear across cohorts. Within each cohort group, both the birth control policies and educational attainment are associated with the timing of first birth.

Impacts of Birth Control Policies and Educational Expansion

Table 1-4 presents coefficients from the Cox models by different cohort groups. Negative coefficients indicate lower risks of entry into parenthood, namely older age at first birth and/or higher chance of childlessness. The first columns for each cohort group are the baseline models with our main independent variables. The results in the second columns are non-proportional models after specifying the stratification by urban/rural distinction and provinces, which allows for different hazard functions of time for both urban/rural distinction and for each province without making any parametric assumption (Allison 2014). Thus, these models not only account for the significant urban/rural differences within China, but also take the impact of varying development speeds or trajectories of different provinces into account. By comparing the coefficients of policies between models with and without varying hazard functions across rural/urban area and provinces within each cohort group, we can see that the effect sizes of policies are bigger in models with varying hazard functions.

TABLE 1-4 ABOUT HERE

The models for all three cohorts show positive impacts of less strict birth control policies on hazards of entering into motherhood.[14] For Cohort I, compared with women following one-child policy, women who were eligible for less strict policies have 32.84% ($(e^{0.284} - 1) * 100\%$) higher hazards of parenthood. For Cohort II and Cohort III, the hazards are 23.49% and 14.57% higher for women following less strict policies than those who followed one-child policy. These persistent policy effects suggest that women who were eligible for less strict polices tended to give birth earlier than those who followed the one-child policy for all the cohorts. However, the coefficient of policies is getting smaller[15], which is consistent with the claim made in previous studies that the

[14] For the youngest cohort group, we also conducted analysis on the data from 2015 inter-census survey (1984 birth cohort is also included). With more information available, we have more controlled variables and specified the policy variables as time-varying variables. As shown in Appendix Table 1-3, the results support our argument that the birth control policies still affect women's childbearing behavior, and the least educated and the most educated groups are more likely to be affected by the policy change.

[15] The difference between the coefficients in Model A2 and Model B2 is significant at 0.05 level, because z score = $\frac{0.284 - 0.211}{\sqrt{0.014^2 + 0.018^2}} = 3.20$

The difference between the coefficients in Model B2 and Model C2 is significant at 0.1 level, because z score = $\frac{0.211 - 0.136}{\sqrt{0.018^2 + 0.037^2}} = 1.82$

impact of birth control policies is smaller in younger cohorts. Besides, the effect sizes of educational levels are a lot bigger in young cohorts, which also suggests that socioeconomic development has gradually changed people's fertility intentions independently of policies.

TABLE 1-5 ABOUT HERE

The results in Table 1-5 present the coefficients of policies, education, and their interaction terms. For Cohort I, none of the coefficients of the interaction terms is statistically significant, which indicates the same policy effects for all the educational levels. For Cohort II, one interaction term shows significant different hazards of giving birth. For women who were illiterate or finished primary school, those who followed less strict policies have 33.78% ($(e^{0.21+0.081} - 1) * 100\%$) higher hazards of giving first birth than those who followed the one-child policy. Moreover, for Cohort III, both of the interaction terms become statistically significant and positive, which indicates that after the educational expansion, there was more heterogeneity within each educational level. The AIC and BIC also indicate that the inclusion of the interaction terms improve the models for the young cohorts but not the older cohorts. Both of the measures show that for the Cohort I, the model without the interaction terms is better than that with the interaction terms. However, for Cohort III, the model with the interaction terms has smaller AIC and BIC than the model without the interaction term. Thus, we expect a U-shaped influence of policy among people with different educational levels. That is, the least educated and the most educated groups are more likely to be affected by the policy than the average educated group.

As suggested in previous sections, the rapid educational expansion might have changed the composition of fertility intentions among those who can follow the less strict policy in the highly educated group, contributing to the strong interactive effects. To verify this speculation, we further compare the composition of women following different birth control policies among those who graduated from high school or above across cohorts in Table 1-6. In Cohort I, only 9.99% of women who had finished at least high school were eligible for less strict policies, but this proportion increased to 15.42% in Cohort II and further grew to 21.40% in Cohort III. We can also find some proof by comparing the educational composition within woman who followed the same policy across cohorts in Table 1-7. Overall, educational improvement was fast across cohorts. The biggest absolute increase of the proportion of women graduated from high school or above happened to women who followed the one-child policy. However, the proportion of those graduating from high school or above tripled from about 4% in Cohort I to around 15% in Cohort III for those who were eligible for less strict policies. Thus, for women who followed less strict policies, the educational expansion was more efficient than those who followed one-child policy. With the educational expansion, women who followed less strict policies from Cohort III were more likely to achieve higher educational level than previous cohorts. [16] Also, for those who were highly educated, the variation of birth control polices was bigger in Cohort III than in Cohort I and II.

TABLE 1-6 ABOUT HERE

TABLE 1-7 ABOUT HERE

[16] The odds of graduating from high school or above if being eligible for less strict policies for Cohort III are 1.49 times the odds of Cohort II, and the odds for Cohort II are 1.64 times the odds for Cohort I.

In summary, our analyses of policies and comparisons between cohorts suggest that Chinese women's childbearing behavior postponed considerably under the rapid socioeconomic development, and the constraints imposed by the policies weakened over time. However, even for young cohorts, the birth control polices still affected women's childbearing behavior significantly after controlling for both urban/rural differences and regional variation. Along with educational expansion, the underlying shifting composition in more educated women across cohorts promised greater heterogeneity of childbearing behaviors and larger variation of birth control policies in younger and more educated cohorts. The results also showed that even for the more educated population, women who were eligible for less strict policies tended to give birth earlier and might have had more children than their counterparts. Thus, for young cohorts, the policies presented a U-shaped impact, implying that the least educated and the most educated groups were likely to be most affected by a less restrictive birth-control policy.

Conclusion and Discussion

Previous studies on the impact of China's birth control policies on childbearing behaviors provided a mixed picture. The controversies over policy effects rise from the difficulty in disentangling the influences of socioeconomic development on changing people's childbearing behavior. Also, the complicated birth control polices (Gu et al. 2007) prevented the studies on aggregate-level fertility from revealing the policy effects on individual's childbearing behavior. Capitalizing on micro-level data with individual-level policy identification, we try to solve these two problems by 1) identifying the exact policy that a woman is prescribed to follow, 2) conducting analysis separately for successive cohorts to control for cohort effects, and 3) adopting stratification methods in the Cox model to control for both urban/rural and regional differences, and also minimize the period effects. We also contribute to the studies on Chinese women's childbearing behavior by examining the timing of giving first births rather than fertility level directly. Our descriptive results suggest that the postponement of childbearing behavior was remarkable across cohorts. Within each cohort group, women with higher educational level tended to have their first births later, which is consistent with other studies. Besides, women who were eligible for less strict policies also had their first birth earlier than those who had to follow the strictest one-child policy, suggesting strong effects of the policy on women's childbearing behavior even among young women in recent cohorts.

Through the comparisons of multivariate analyses among cohorts, we find that both birth control policies and education were important factors shaping young Chinese women's childbearing behavior after controlling for urban/rural distinction and regional variation. More importantly, we find that the interactions between policies and education were significant for women in younger cohorts while no strong interactive effects were shown for older cohorts. For young cohorts, the least educated group is selected to be those who live in least developed area with more traditional high fertility intentions, so they're more likely to react to the policy change. However, for the most educated group, the intuitive explanation is different. Under rapid educational expansion, some of the highly educated younger cohorts, who still live in less developed area and have not converged to very low fertility intentions, still tend to have a second child and give birth early under more loosened policy. Though the rural reforms initiated in the early 1980s gradually convinced couples of the benefits of fewer children, it does not weaken the motivation for at least one son (Greenhalgh, Zhu, and Li 1994) or having more than one child. As a result, there is a U-shaped effect of policy: being subject to a more relaxed policy regime had the strongest accelerating effect on childbearing among the least educated (a group diminishing in size) and among the most educated (a group that is rapidly expanding).

Some studies indicate that socioeconomic development is the reason for the drop of fertility level in China (Zheng et al. 2009; Cai 2010; F. Wang, Whyte, and Cai 2015). However, our results suggest that we cannot come to this conclusion for sure, because birth control policies are still imposed in China and counterfactual facts can hardly be built. Highly educated people showed higher acceptance of birth control policies (Merli and Smith 2002) partly because they were more likely to have lower fertility intentions, but they were also who were most likely to understand the rationale of implementing birth control policies in China. Now, after decades of rapid educational expansion, the highly educated groups had more heterogeneity and more variation of birth control policies, so the strong policy effects started to show for these highly educated people. An old Chinese proverb goes, 'It takes ten years to grow trees but a hundred years to rear people.' Even though fast urbanization, educational expansion, and low fertility intentions produced the conditions for low fertility level in China, some Chinese still constrain their childbearing behavior to keep the low birth rate.

Our analysis also points to the impacts of 2015 loosened policy on the timing of giving first birth. Because women who followed less strict birth control policies tended to have their first births earlier, after controlling for other variables, we would expect that, under the 2015 universal two-child policy, women will give birth earlier and might have more children during their lifespan. This will push up the quantum level of period fertility rate. Also, the changing timing of giving birth will bring tempo distortion to the fertility measure. However, the rise of the fertility rate might be temporary, because the results also show that the effect size of policies is declining with the impact of education growing across cohorts. Besides, as revealed in some studies, any serious change in China's birth control policies is likely to derive from initiatives at the local level (Merli, Qian, and Smith 2004). The policy change was made only after the government believed there will be an appropriate reaction, which is neither a remarkable rise nor no effects at all. The elimination of the strict one-child policy, in our opinion, is therefore likely to lead to a rise of fertility rate in the short term, while overall, fertility will remain at a low level in the long run.

The great shift of Chinese ideational change toward small family makes the strict birth control unnecessary. The change to a general two-child policy might not receive impressive reaction from the young cohorts. The long-term low fertility intentions guarantee that the fertility rate will not rise substantially under the loosened policy. Also, the increasing cost of raising a child has become a main concern of young cohorts about giving birth (Attané 2016b). Besides, research has suggested that women's position in the labor market has deteriorated in urban China (S. Li and Ma 2007; C. Li and Li 2008), after the government stopped guaranteeing jobs to graduates after 1996. Specifically, the worsening trend is concentrated among mothers (Y. Zhang and Hannum 2015). The increasing wage gap between mothers and childless women in urban China was partly due to the economic transition that shifted part of the cost of childbearing from the state and employers back to women (Jia and Dong 2012). The growing gender inequality might lead to lower fertility of women.

This increasing gender inequality might be a resistance to the decreasing trend of son preference. Many studies revealed that the son preference affects the fertility level positively and the actual fertility level is higher than the desired fertility level due to son preference (J. Song and Tao 2012). Empirical analysis on fertility intentions of migrants (Yang 2015) indicates that people may internalize the norms of having fewer children, but having a son remains a must. This will lead to the uncertainty of Chinese fertility level, and it may maintain higher fertility in China than that in South Korea or Japan. So other related policies should be accompanied with the loosening of the birth control, either for embracing the challenge or for people's wellbeing.

As with most studies on this topic, this study is limited in some ways. First, we do not have enough details to identify the individuals who were prescribed to less strict policies, including whether either husband or wife came from one-child family. Second, the policies are identified only based on provincial information, while more complicated policies (more exceptions to allow a second child) were implemented at prefectural level. Third, other possible variables - household economic conditions, family background, local culture/neighborhood pressure of son preference - that are also related to the policy status are not included in the analysis should be considered in further research.

Tables and Figures

Table 1-1 Descriptive statistics of main variables by cohort groups

	Cohort I (born in 1970-1974)	Cohort II (born in 1975-1979)	Cohort III (born in 1980-1983)
Birth Policy (%)			
One-child policy	43.00	45.64	43.23
Less strict policies	57.00	54.36	56.77
Education (%)			
Illiteracy or primary school	31.78	22.98	14.54
Middle school	44.90	42.72	45.81
High school or above	23.32	34.30	39.65
Urban or rural area			
Urban (%)	48.09	41.42	41.21
Rural (%)	51.91	58.58	58.79
Number of observations	61,179	43,037	38,259
Number of births	56,665	29,232	8,137

Table 1-2 Younger age at first birth for women

who are prescribed to follow less strict policies across three cohort groups

	Age at First Birth			
	25%	50%	75%	*N*
Cohort I (born in 1970-1974)	21	23	26	61,179
One-child policy	22	25	27	26,309
Less strict policies	21	23	25	34,870
Cohort II (born in 1975-1979)	22	25	.	43,037
One-child policy	24	27	.	19,640
Less strict policies	21	23	27	23,397
Cohort III (born in 1980-1983)	24	.	.	38,259
One-child policy	.	.	.	16,539
Less strict policies	23	.	.	21,720

Note: because the sample is censored at age 25-30 for Cohort II and age 22-25 for Cohort III, some information is missing in some of the percentiles.

Table 1-3 Younger age at first birth for women with lower educational levels across three cohort groups

	Age at First Birth			
	25%	50%	75%	*N*
Cohort I (born in 1970-1974)	21	23	26	61,179
Illiteracy or Primary School	20	22	24	19,445
Middle School	21	23	25	27,468
High School or above	24	26	29	14,266
Cohort II (born in 1975-1979)	22	25	.	43,037
Illiteracy or Primary School	20	22	25	9,888
Middle School	22	24	27	18,386
High School or above	25	29	.	14,763
Cohort III (born in 1980-1983)	24	.	.	38,259
Illiteracy or Primary School	21	24	.	5,564
Middle School	23	.	.	17,526
High School or above	.	.	.	15,169

Table 1-4 Cox model predicting hazard of first birth, by cohort

	Cohort I (born in 1970-1974)		Cohort II (born in 1975-1979)		Cohort III (born in 1980-1983)	
	Model A1	Model A2	Model B1	Model B2	Model C2	Model C2
Birth Control Policies (Ref: One-child policy)						
Less strict policies	0.221^{***}	0.284^{***}	0.195^{***}	0.211^{***}	0.115^{***}	0.136^{***}
	(0.010)	(0.014)	(0.014)	(0.018)	(0.029)	(0.037)
Educational Level (Ref: Middle school)						
Illiteracy or primary school	0.218^{***}	0.160^{***}	0.374^{***}	0.277^{***}	0.720^{***}	0.548^{***}
	(0.010)	(0.010)	(0.014)	(0.015)	(0.025)	(0.027)
High school or above	-0.553^{***}	-0.455^{***}	-0.864^{***}	-0.768^{***}	-1.326^{***}	-1.300^{***}
	(0.012)	(0.013)	(0.017)	(0.018)	(0.037)	(0.039)
Hazard functions vary across rural/urban area	No	Yes	No	Yes	No	Yes
Hazard functions vary across provinces	No	Yes	No	Yes	No	Yes
Number of subjects	61,179	61,179	43,037	43,037	38,259	38,259
Number of births	56,665	56,665	29,232	29,232	8,137	8,137
AIC	1,150,763	709,323	583,415	353,844	160,776	96,383
BIC	1,150,790	709,350	583,441	353,870	160,802	96,408

Note: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1-5 Cox models predicting hazards of first birth, by cohort, with interaction between education and policy

	Cohort I (born in 1970-1974)	Cohort II (born in 1975-1979)	Cohort III (born in 1980-1983)
Birth Control Policies (Ref: One-child policy)			
Less strict policies	0.270^{***}	0.210^{***}	-0.017
	(0.016)	(0.022)	(0.042)
Educational Level (Ref: Middle school)			
Illiteracy or primary school	0.135^{***}	0.208^{***}	0.355^{***}
	(0.023)	(0.037)	(0.077)
High school or above	-0.467^{***}	-0.763^{***}	-1.517^{***}
	(0.015)	(0.021)	(0.048)
Interaction between Education and Policy			
Illiteracy or primary school * Less strict policies	0.034	0.081^{*}	0.235^{**}
	(0.025)	(0.040)	(0.082)
High school or above* Less strict policies	0.048	-0.037	0.550^{***}
	(0.033)	(0.038)	(0.075)
Hazard functions vary across rural/urban area	Yes	Yes	Yes
Hazard functions vary across provinces	Yes	Yes	Yes
Number of subjects	61,179	43,037	38,259
Number of births	56,665	29,232	8,137
AIC	709,323	353,842	96,333
BIC	709,368	353,885	96,375

Note: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1-6 Proportion of following different policies

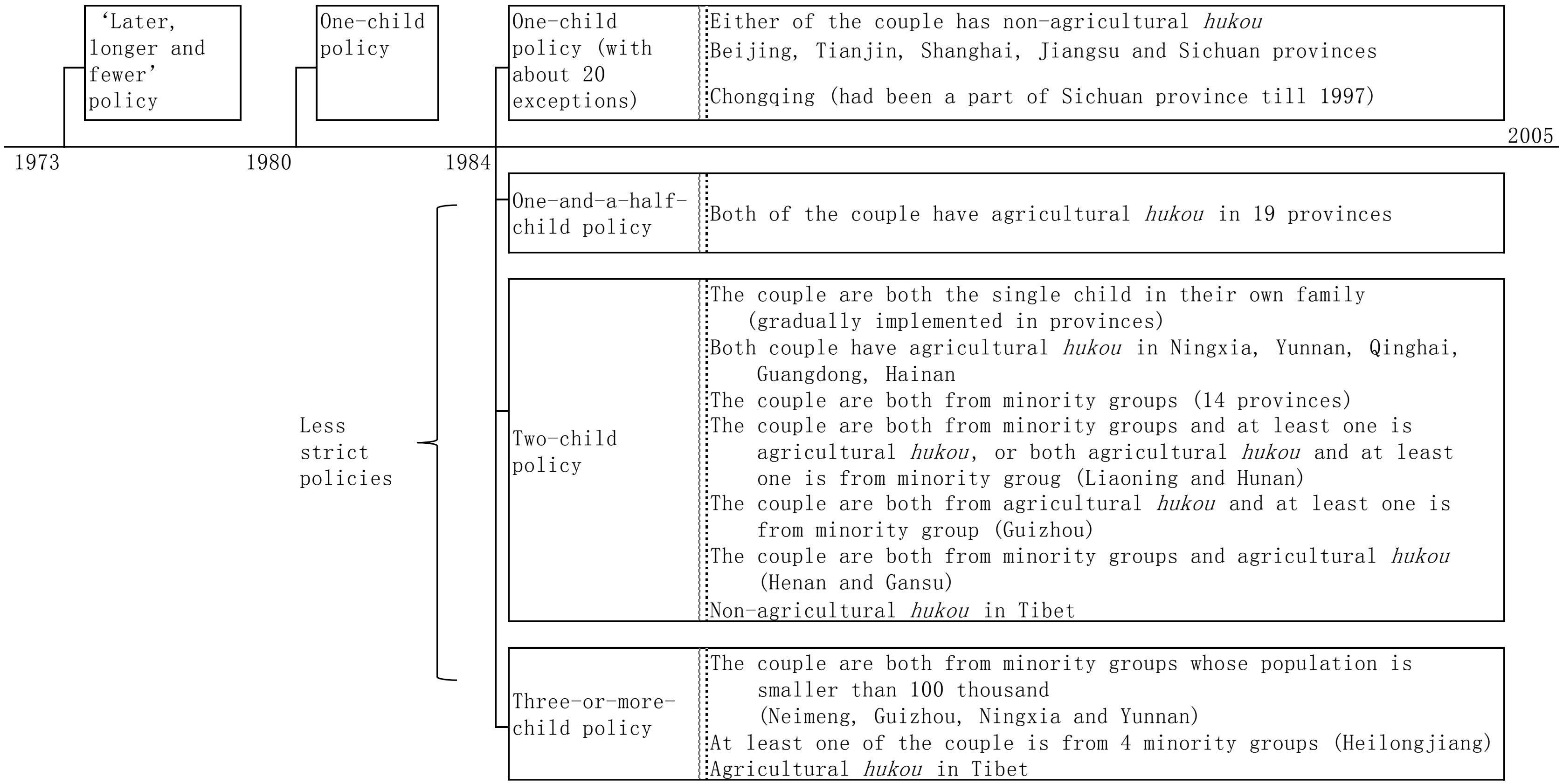
for women who graduated from high school or above

	Proportion of Following Different Policies (%)	
	One-Child policy	Less strict policies
Cohort I (born in 1970-1974)	90.01	9.99
Cohort II (born in 1975-1979)	84.58	15.42
Cohort III (born in 1980-1983)	78.60	21.40

Table 1-7 Proportion of graduating from high school or above for women who followed different policies

	Proportion of Women Who Graduated from High School or above (%)		
	Cohort I (born in 1970-1974)	Cohort II (born in 1975-1979)	Cohort III (born in 1980-1983)
One-Child Policy	48.81	63.58	72.09
Less strict policies	4.09	9.73	14.94

Figure 1-1 Variation in birth control policies in China between 1973 and 2005



Note: Only major birth control policies are listed.

Appendix

APPENDIX Table 1-1 Robust tests for models in Table 1-4

	Cohort I (born in 1970-1974)		**Cohort II (born in 1975-1979)**		**Cohort III (born in 1980-1983)**	
	Model A1	Model A2	Model B1	Model B2	Model C2	Model C2
Birth Control Policies (Ref: One-child policy)						
Less strict policies	0.194^{***}	0.260^{***}	0.200^{***}	0.266^{***}	0.210^{***}	0.323^{***}
	(0.010)	(0.014)	(0.015)	(0.019)	(0.030)	(0.038)
Educational Level (Ref: Middle school)						
Illiteracy or primary school	0.223^{***}	0.160^{***}	0.377^{***}	0.276^{***}	0.706^{***}	0.542^{***}
	(0.010)	(0.010)	(0.014)	(0.015)	(0.025)	(0.027)
High school or above	-0.556^{***}	-0.446^{***}	-0.839^{***}	-0.724^{***}	-1.267^{***}	-1.221^{***}
	(0.012)	(0.013)	(0.017)	(0.018)	(0.037)	(0.039)
Hazard functions vary across rural/urban area	No	Yes	No	Yes	No	Yes
Hazard functions vary across provinces	No	Yes	No	Yes	No	Yes
Number of subjects	62,088	62,088	44,016	44,016	38,921	38,921
Number of births	57,484	57,484	29,931	29,931	8,418	8,418
AIC	1,169,456	721,499	598,847	363,628	166,614	99,956
BIC	1,169,484	721,526	598,873	363,654	166,640	99,982

Note: For those who can follow less strict policies, information of both couple is needed, thus there is a potential selection in that who can follow less strict policies are selected with higher risk of giving birth by being married. Thus, models in Appendix Table 1-1 and Appendix Table 1-2 are conducted as robust tests, in which the exact birth control policy that a woman has to follow only depends on her own characteristics.
Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX Table 1-2 Robust tests for models in Table 1-5

	Cohort I (born in 1970-1974)	Cohort II (born in 1975-1979)	Cohort III (born in 1980-1983)
Birth Control Policies (Ref: One-child policy)			
Less strict policies	0.248***	0.246***	0.209***
	(0.016)	(0.022)	(0.043)
Educational Level (Ref: Middle school)			
Illiteracy or primary school	0.142***	0.224***	0.388***
	(0.023)	(0.039)	(0.081)
High school or above	-0.457***	-0.742***	-1.381***
	(0.015)	(0.022)	(0.050)
Interaction between Education and Policy			
Illiteracy or primary school * Less strict policies	0.023	0.061	0.182*
	(0.026)	(0.042)	(0.086)
High school or above* Less strict policies	0.046	0.048	0.377***
	(0.032)	(0.039)	(0.076)
Hazard functions vary across rural/urban area	Yes	Yes	Yes
Hazard functions vary across provinces	Yes	Yes	Yes
Number of subjects	62,088	44,016	38,921
Number of births	57,484	29,931	8,418
AIC	721,501	363,629	99,935
BIC	721,546	363,672	99,978

Note: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX Table 1-3 Cox model predicting hazard of first birth

	Cohort born in 1980-1984		
Birth Control Policies (Ref: One-child policy)			
Two-child policy	0.100**	0.078*	-0.116
	(0.032)	(0.032)	(0.073)
1.5-chd policy	0.150***	0.163***	0.160***
	(0.026)	(0.027)	(0.033)
Educational Level (Ref: Middle school)			
primary school or lower	0.099**	0.130***	0.083
	(0.031)	(0.031)	(0.053)
high school/vocational school	-0.310***	-0.331***	-0.339***
	(0.024)	(0.025)	(0.031)
college or above	-0.752***	-0.831***	-0.845***
	(0.025)	(0.030)	(0.033)
Interaction between Education and Policy			
Two-child policy * primary school or lower			0.452**
			(0.152)
Two-child policy * high school/vocational school			0.151
			(0.098)
Two-child policy * college or above			0.245**
			(0.082)
1.5-chd policy* primary school or lower			0.045
			(0.065)
1.5-chd policy* high school/vocational school			0.014
			(0.052)
1.5-chd policy* college or above			-0.094
			(0.077)
Pension (ref: rural pension)			
No pension		-0.123***	-0.123***
		(0.029)	(0.029)
State-owned pension		-0.059	-0.055
		(0.071)	(0.071)
Urban residential pension		-0.104*	-0.104*
		(0.041)	(0.041)
Health insurance (ref: rural health insurance)			
No health insurance		-0.194***	-0.192***
		(0.043)	(0.043)
State-owned insurance		-0.156*	-0.159*
		(0.072)	(0.072)
Urban residential insurance		-0.036	-0.034
		(0.037)	(0.037)
Housing (ref: self-built)			
Self-owned		0.122***	0.121***
		(0.029)	(0.029)
Rent		0.033	0.032
		(0.034)	(0.034)
Others (no house or live collectively)		-0.006	-0.005
		(0.043)	(0.043)
Car ownership (ref: no car)			
<100,000RMB car		0.354***	0.353***
		(0.024)	(0.024)

100,000-200,000RMB car		0.368^{***}	0.366^{***}
		(0.027)	(0.027)
>200,000RMB car		0.419^{***}	0.415^{***}
		(0.041)	(0.041)
Hazard functions vary across rural/urban area	Yes	Yes	Yes
Hazard functions vary across counties (*xian*)	Yes	Yes	Yes
No. of subjects	28,163	28,163	28,163
No. of births	22,812	22,812	22,812
AIC	76007	75543	75538
BIC	76061	75725	75785

Note: In 2013, a minor change in China's birth control policies allowed couples to have a second child if one of the couple comes from a one-child family. Because the 2015 inter census survey asked about family types (whether the couple is from one-child family), women who transited from following one-child policy to two-child policy after 2013 can be identified. Thus, the variables of policies can be coded according to the exact year that policy changed and become time-varying variables.
Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Description of the estimation procedure

To estimate AFB for each woman, we need to know the birth date of her first child. However, the birth date of the first child is not explicitly incorporated in the mini-census questionnaire. Instead, it includes a question on the number of children ever born (CEB). Therefore, the women's AFB is established using the following procedure, which is an innovation, because previous studies in this line of research have not tried to calculate AFB in this way.

1. For each woman selected, we have information on the children that live in her household. The original data frame was transformed from one observation per individual to be one observation per household (i.e. from long form to wide form) (Appendix Figure 1-1). Then, only women whose reported CEB equals to the number of children living in the household are kept in our final analytical data, leading to 145,025 matched women out of 160,180 observations (for women born between 1970 and 1983), based on the assumption that whether being matched or not is unrelated to woman's AFB.

APPENDIX FIGURE 1-1 ABOUT HERE

2. After matching the number of CEB reported by the women and the number of children living together, the first child can be identified by comparing children's years of birth. Because the mini census reports the year and month of births of all household members, woman's AFB can be estimated as the difference between the birth year of the woman and her first child identified. All the women were between 22 and 35 years old in our sample and under-five mortality in China is low (< 40 per 1,000 in 2000 and <23 per 1,000 in 2005 (WHO 2015)), so it is reasonable to assume that children are living together with their mother.

APPENDIX Figure 1-1 Data transformation from long form to wide form

Household Id	Individual Id	Variable 1
1	1	A
1	2	B
1	3	B
2	1	B
2	2	A
…		
50	1	A
50	2	C
…		

→

Household Id	Variable 1 for 1st Individual	Variable 1 for 2nd Individual	Variable 1 for 3rd Individual
1	A	B	B
2	B	A	.
…			
50	A	C	
…			

CHAPTER 2 : From Motherhood Premium to Motherhood Penalty? Heterogeneous Effects of Motherhood Stages on Women's Economic Outcomes in Urban China

Introduction

When an egalitarian division of labor within households exists and public policies make it easier for women to balance work and childrearing, women typically have more children. This relationship between fertility and women's labor has played out across socioeconomic contexts and policy regimes, revealing much about trends in gender equity (McDonald 2000; Esping-Andersen and Billari 2015; Rindfuss, Choe, and Brauner-Otto 2016; Brinton and Lee 2016).

Over the past three decades, China has witnessed an unprecedented pace of economic development and remarkable social changes. Chinese women have experienced labor equity and benefitted from public policies that provided working mothers with benefits including childcare. However, with the transition from a state-controlled to a market-oriented economy, gone are the traditional protections and assistance for women in the workplace. As a result, there is growing gender disparity in the labor market and a widening gap between what women and men earn (Zhang and Hannum, 2015). What is the contemporary relationship between fertility and women's labor market activities?

China presents an interesting setting for the analysis of the interrelation of fertility, women's economic activities, gender-role ideologies, and the impact of changes in public policy and labor market forms. At the height of the socialist period, a state-controlled economy guaranteed employment. Unemployment was an unknown phenomenon and most women worked because governmental policies made it easier for them to do so. With the transition to a market-oriented economy, these protections were lost, and the country saw a decline in the number of women working outside the home. This runs counterintuitively to what happens in developed nations where female labor force participation rates and income increase rapidly during industrialization (Goldin 2006). Although, all socialist societies once shared common economic and political institutions, differences between the former Soviet Bloc and other socialist societies have become more pronounced over time (Brainerd 2000; Fodor and Glass 2018; Heyns 2005). For example, China did not embrace capitalism and institutional arrangements that promised economic achievement equal to that of Western countries. Instead, China achieved its development by gradually experimenting with market mechanism. Also, the underlying fertility and family changes in China differ from those of other former socialist societies. China implemented strict birth control and experienced a rapid decline in fertility level from 6 in the 1960s to below-replacement level in 1990s. By comparison, the fertility level in most Soviet Bloc societies was already less than 3 in the 1960s (UNPD 2015), and some of them even implemented pro-natalist policies (Sobotka et al. 2008).

In the decades before transition to a market-oriented economy, Chinese women were in the labor force because state policies promoted their participation. When the market economy cost urban women job benefits such as free child care, women began to leave the workforce (Fincher 2016). This is partly because the traditional gender-role ideologies and gender divisions within household still persist in Chinese society (Lu and Zhang 2016; Zuo and Bian 2001). Whether they work outside the home or not, women bear a greater burden for childcare and domestic work than men. This traditional gendered labor division tends to lower women's labor force participation (Hare 2016; Zhang and Hannum 2015). Labor market reforms have led to competition for the best jobs, and women perceive that they are routinely discriminated against by employers who favor hiring, promoting, and paying higher salaries to men. Previous studies support this perception and report that discrimination against female workers leads to two-thirds of the gendered pay gap (Xiu and Gunderson 2013). Do family obligations account for the rest of the gap in employment and financial outcomes? If so, do mothers catch a break when their children are infants, school-age, or older?

Previous studies on the relationship between women's economic outcomes and their responsibilities for childrearing have rarely taken into account the relationship between the stages of motherhood and women's economic activities. Even fewer studies have linked this relationship to the development of local economies after 1990s, a period of profound socioeconomic and institutional changes in mainland China. Capitalizing on data from a longitudinal survey, this study uses a person-fixed-effects model to examine how urban Chinese women's economic outcomes are related to different stages in the growth of their children.

Motherhood and Women's Economic Activities

Since the end of World War II, women's educational attainment and labor force participation have increased globally (Charles 2011), and human fertility has declined. Although the causal mechanisms linking fertility to women's labor market participation remain elusive, the association between the two indicates the challenges of balancing work and family in industrialized societies. At the individual level, the negative effect of children on women's economic outcomes has been observed and called 'the motherhood penalty' (Waldfogel 1997; Angrist and Evans 1998; Budig and England 2001). Based on the comparative advantages of men and women, the economic model of within-household specialization posits a gendered labor division with the higher wage earner (usually the husband) specializing in market work, while the other spouse (usually the wife) specializes in domestic work (Becker 1991).

However, recent macro-level evidence suggests a positive relationship between fertility and development level measured by Human Development Index (Myrskylä, Kohler, and Billari 2009), and even an positive association between fertility and women's labor force participation, in societies reaching a certain development level (Goldscheider, Bernhardt, and Lappegård 2015). This positive relationship between children and women's economic outcomes challenges the dominant discourse about the negative relationship and warrants a closer examination.

A number of theories, such as gender equity (McDonald 2000; T. Anderson and Kohler 2015; Esping-Andersen and Billari 2015), labor market institutions and related social policies (Rindfuss, Choe, and Brauner-Otto 2016; Brinton and Lee 2016), have been introduced to explain the changing effects of children on women's economic activities. Broadly speaking, the expansion of education (especially for women), the advent of modern labor economics, and the development of household labor-saving technologies have led to a change in women's economic roles (Goldin 2006; Stevenson and Wolfers 2007). Women have transitioned from secondary workers, who accepted the burden of domestic work and child care as well, to active participants in the workforce, who expect to hold jobs and make decisions with other household members about the division of labor at home (Goldin 2006). These opportunities for employment coupled with the greater share of domestic work have led to very low fertility in advanced countries over the past century. However, as men step up their participation in childcare and domestic work, a higher level of within-household gender equity and economic outcomes can be achieved (Goldscheider, Bernhardt, and Lappegård 2015). Specifically, highly-educated husbands and wives are more likely to share household chores more equitably (Cherlin 2016). As a result, these wives are less likely to experience the motherhood penalty (D. J. Anderson, Binder, and Krause 2003; Budig and Hodges 2014).

Overall, the relationship between women's economic outcomes and having children varies across different socioeconomic institutions, related policy regimes and the gender equity levels in both public and private spheres.

Women's Economic Activities in China during Transition

Since the founding of the People's Republic of China in 1949, Chinese women have been encouraged to join the labor market (Croll 1983). State propaganda promoted the image of 'Iron Girls', which represented women who are sturdy and able to do heavy physical work (M. Zhang and Liu 2015), and the slogan of 'Women can hold up half the sky' (Honig 2000). Like the other planned economies in the former Soviet Bloc, this was in accordance with Marx and Engles' doctrine that women's emancipation is contingent on their participation in social production. Under state socialism, the work units (*danwei*) in urban China helped organize social production and build facilities to support workers—dining halls, laundries, and childcare centers—that were either free or charged nominal fees. Birth control policies implemented in China for more than three decades (Gu et al. 2007) also reduced women's time commitment to family obligations and increased their economic activity (Wu, Ye, and He 2014). Also, because of the shrinkage of the family size due to birth control, it is easier for families to accommodate childcare supports from grandparents or other family members. All of these factors helped women cope with the demands of childrearing and labor market employment.

At the height of the socialist period, women in China had some of the highest labor force participation rates in the world (UNDP 1995, 1995). Recently, those rates have declined and gender gap in wages has increased (Appleton, Song, and Xia 2014; Berik, Dong, and Summerfield 2007; Chi, Li, and Yu 2011), suggesting that women's position in the labor market has deteriorated (Zhang et al. 2004; Wang 2005; Li and Li 2008). The worsening trend is concentrated among mothers (Zhang and Hannum 2015; Zhang, Hannum, and Wang 2008).

According to the data from surveys on women's status, among women who experienced work interruption in non-agricultural economic activities, only about 6 percent were due to childbearing during 1970s, while this proportion increased dramatically to 35 percent during the first decade in this century (Huang 2014). Several events contributed to this change. In 1989, the publicly-funded child care system that provided care to children from the earliest months until primary school stopped taking children under 3 years of age (Du and Dong 2013). At roughly the same time, in order to become more profitable, many urban enterprises cut subsidized childcare services for the children of employees (Cook and Dong 2011). Further, after 1992, state-owned enterprises became more and more privatized, causing large-scale layoffs. Women were laid off disproportionally, and the length of unemployment was longer for women than men (Du and Dong 2009). These changes shifted the burden of childcare back to women and put them in an unfavorable position in the labor market, which was observed in other transitional economies as well (Hunt 2002; UNICEF 1999).[17]

More recent studies give more weight to the traditional gendered roles within households and the intact gendered labor division (Zuo 2012; Ji et al. 2017). At historical junctures, Chinese women's liberation was an integral part of nationalism, and their equity was less of a right than an obligation. Women were expected to take on almost the same work as men for the good of socialist production (Zuo 2012). However, even with state services that alleviated some of women's domestic responsibilities, women were still obligated to do the rest of the unpaid household work, which was treated as secondary to social production (S. Song 2012). Thus, working women, especially those with lower incomes and less help from other family members, still suffered from the double burden of paid and domestic work (Ji et al. 2017). Thus, traditional gender ideals about family roles went unchallenged at home and at work even as China transitioned to a market economy.

Further, during the market transition, the public discourse shifted from a state-dominated Marxist political discourse to a market-oriented discourse. This market discourse asserts that gendered market outcomes result from distinct abilities derived from essential gender differences. This belief closely aligns with, and contributes to, the continued support of traditional patriarchal norms in urban China (Sun and Chen 2015). In post-socialist Vietnam, gender disparities in the household division of labor have increased as a result of a resurgence in male-centered family relations (Luong 2003). This revitalization of traditional gender values also contributes to the decline of women's

[17] After reunification, East German employment rates were sharply lowered and the unemployment was disproportionally high among women (Rosenfeld, Trappe, and Gornick 2004). In Russia, the wage inequality between men and women increased across all percentiles of the wage distribution between year 1991 and 1994 (Brainerd 1998).

position in the labor market. In other more developed East Asian countries that share patriarchal norms and Confucian ideology with China, the reduced labor force participation of women after marriage or childbirth has long been observed. In Japan, women tend to show similar labor force participation with men immediately after leaving school. However, their labor force participation then decreases sharply after marriage or childbearing and does not recover (Brinton 1989). A similar situation is also observed in South Korea, where married women are 40-60% less likely to participate in the labor force than unmarried women, even among college graduates (Lee, Jang, and Sarkar 2008). In Japan where masculinity is preferred in the workplace, women are concentrated in low-level positions (Nemoto 2013). In South Korea, a demand for long working hours and rare part-time employment makes it hard for South Korean women to balance work and family (Ma 2014).

Although the extant research has provided insightful discourse into the position of women in China's post-reform marketplace, limited research has focused on the relationship between mothers' decisions to join the labor force and the ages of their children at the time. As suggested by previous studies, women's labor market decisions are based on their life course events (Waite 1980). Typically, western empirical studies suggest that a small child has an inhibiting effect on mother's work activity (Waite 1976; Maron and Meulders 2008), and a woman who is pregnant or has preschoolers is less likely to make voluntary job changes to increase her salary or further her career (Looze 2017). However, the negative effect of children decreases with the age of the youngest child (Maron and Meulders 2008), and older children seem to prompt women to join the workforce (Budig 2003). In China, the conflict between work and family is also most intense when children are young, and the presence of preschoolers lessens the likelihood that a woman will join the workforce (Maurer-Fazio et al. 2011; Hare 2016). Thus, we expect women's labor activities will vary with the stages of their children's growth and independence.

Recent studies have examined women's increasing losses in the labor market over time. Capitalizing on data from the China Health and Nutrition Survey in 1991–2011, Hare (2016) suggested that having children under age 7 had a larger inhibiting effect on women's labor force participation after 2000 than before. Using the same survey data, Jia and Dong (2012) conducted fixed-effects models and found that urban women experienced a substantial motherhood penalty from 1999–2005 when compared to their counterparts in 1990–1996. By interacting gender variable with year dummies, Zhang and Hannum (2015) also observed that mothers were increasing disadvantaged in wage earnings by the late 2000s. However, few empirical studies have directly examined how urban women's labor market outcomes have changed with the development of local economy following the transition to a market-oriented economy.

To fill the gap in the literature, this chapter uses longitudinal survey data from 1991–2011 to investigate the heterogeneous relationship between urban women's economic activity and income with the ages and stages of their children. We also explore these relationships in light of local economic development.

Data and Methods

This chapter uses data from the China Health and Nutrition Survey (CHNS), a collaborative project between the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute for Nutrition and Health at the Chinese

Center for Disease Control and Prevention. This survey captured family changes from 1989 to 2011, the period during which China experienced rapid economic development. The CHNS is a panel/longitudinal study of households in eight provinces (Liaoning, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi, and Guizhou) begun in 1989. The survey added a ninth province (Heilongjiang) in 1997.[18] This survey covers roughly half of China's population in provinces that are geographically diverse (Jones-Smith and Popkin 2010). The original survey used a multi-state, random cluster design to select a stratified probability sample. The initial primary sampling units consisted of 190 communities with substantial variations in level of economic development, including 31 urban neighborhoods, 31 suburban neighborhoods, 32 towns, and 96 rural villages. Our study uses eight waves of surveys (1991, 1993, 1997, 2000, 2004, 2006, 2009, and 2011), excluding the 1989 wave because it included a partial sample and used questionnaires substantially different from those in the later waves (Gong, Xu, and Han 2015).

Because the focus of this chapter is on urban women, we exclude women who live in rural villages. Then, we confine our analysis to women ages 18–50 for any wave observed. That is, women who joined the survey in later waves/years are also kept in the analysis.[19] Only married women who stay in their first marriages are included, minimizing the impact of selectivity into marriage. For the selected women, the information about the children can be easily obtained, because the marriage and fertility histories of all women who are ever married under 52 years old are recorded in the data.[20]

[18] Liaoning was unable to participate in the CHNS for 1997 wave but was added back in 2000.

[19] In this chapter, women are included in our analytical sample once they meet the criteria. Though a balanced sample starting from the same baseline year would be desirable, there are not enough observations. Still, we believe it is worthwhile to use these data because of the limited number of longitudinal surveys conducted in China during this period.

[20] Childless women are also included in our analysis. However, because we only focus on married women, the observations that are childless only account for about 2%. These observations are excluded in conditional fixed-effects

Further, the data are stacked into a women-wave structure for conducting fixed-effects models. These only use the within-individual variations, so only women with at least two waves of observations are kept in our analytical sample. This exclusion does not substantially affect the distribution of the observations in terms of educational levels, sampling stratums, labor force participation, and the various ages and stages of children.

To better capture the impact of children on urban women's economic outcomes rather than limit the analytical sample to wage workers (Jia and Dong 2012; Yu and Xie 2014; Zhang and Hannum 2015), all women (having worked or not) are included in analytical data. The final analytical sample has 6,374 person-wave observations for 1,933 women,[21] the size of which is similar to the analytical sample size of previous studies using the same data source. Among them, 118 women (with 307 observations) reported never working, 691 women (with 2,671 observations) experienced work interruption, 1,124 women (with 3,396 observations) worked during all the waves. As shown in Table 2-1, the last group is more educated than the first two groups.

TABLE 2-1 ABOUT HERE

Fixed-effects Model

Person-fixed-effects models are conducted in this study to reveal how the within-person change in labor force participation and income (across waves) is associated with different stages in children's growth and independence. By only using within-person

model because of collinearity. To keep consistent, we do not include this category into our model. However, as a robustness check, we also conduct random-effects models with the dummy variable of 'no child' included. The effect of this variable is not statistically significant, which might result from the limited number of observations. We also obtain consistent results for our main independent variables.

[21] Because of the settings of conditional fixed-effects models and the selectivity that only those who stayed in the labor force would report income, the analytical sample size for each model is different. Specifically, the full sample will only be used for the random-effects logistic model predicting working as a robustness check in Appendix Table 2-1 and the Heckman selection model in Appendix Table 2-2.

variations, these fixed-effects models control for all unmeasured, unchanging characteristics of persons that contribute additively to the estimation of their probability of working and earning income (Allison 2009). However, fixed-effects models only capture the relationship between different stages of children and the economic outcomes of women who choose to be mothers. Results from random-effects models are also included for comparison.

The conditional fixed-effects logistic regression model analyzes women's labor activity where p_{it} is the probability of working for woman i at time t:

$$\log\left(\frac{p_{it}}{1-p_{it}}\right) = \mu_t + \beta x_{it} + \gamma z_{jt} + \alpha_i$$

Because the fixed-effects model uses the within-person variation, only women who have experienced work interruption are included. As a robustness test, we also use random-effects models with all women (Appendix Table 2-1). For women who had jobs and reported income, the dependent variable is the logarithm of their annual income, which is adjusted for CPI (inflated to 2009 *yuan*). The fixed-effects linear model is:

$$\log(annual\ income)_{it} = \mu_t + \beta x_{it} + \gamma z_{jt} + \alpha_i + \varepsilon_{it}$$

where μ_t allows for different constants at different waves. x_{it} is a column vector of variables that varies over individuals and time. z_{jt} represents community-level variables that vary over community and over time. α_i represents all differences between individuals that are stable over time, a set of fixed constants that can be correlated with other measured predictors. ε_{it} is the idiosyncratic error term.

For analysis of income, we also take into account the sample selection bias that income is observed only for women choosing to participate in the labor force (Heckman 1977; Wu and Xie 2003) by using the Heckman's selection model (Appendix Table 2-2) as a robustness check.[22] Results from the models that control for this selection bias are also shown in Appendix Table 2-3.

Variables

Our main analytical outcome variables include women's labor force participation and the logarithm of annual income. Women's labor activity (working or not) depends on the reported working status.[23] By defining work as income-earning activities rather than employment for wages, we take into account any moneymaking activities and capture the changing economic status of women more comprehensively. Women's annual income is taken from the CHNS which added up various income sources. Because the wage is imputed from adjacent waves if it is missing, observations with imputed wage are not included in our analysis to avoid bias when estimating the effects of children.

The main time-varying variables are the different stages of motherhood: having children under 3 years old (very young children), having children ages 3–6 (young children), having children 7–15 (school-aged children), and having children older than 15 (children at working age). Because publicly subsidized childcare centers stopped providing services to children under 3 in 1989 (Du and Dong 2013), we categorize having children under age 3 as the first stage of motherhood. In China, most children start compulsory education at age 7, thus the second and third stages are split at age 7. The last

[22] First, Heckman model for maximum likelihood estimates is fitted to obtain the nonselection hazard (inverse Mills ratio). As shown in Appendix Table 2-2, inverse Mills ratio is estimated from a probit model for working. In addition to the variables that have been included in the income model, husband's labor force participation and the income of household excluding women's income are also used in the probit model to predict women's labor force participation. Then, the nonselection hazard is included in the fixed-effects and random-effects linear model to account for the selection bias. For the outcome model of women's logged income, we also try between-within method (Allison 2009) as a robustness check. That is, we decompose the time-varying variable of different motherhood stages into time-invariant mean/average values and time-varying deviations from those averages, and then put all of these variables into the model. Thus, the variables of time-varying deviations can have similar interpretations as in a person-fixed-effects model. It shows consistent results with our main analysis that having children at school age has positive impacts on women's income.

[23] Robustness tests are conducted with women considered as working if she reported working or had positive income. The results of the robustness tests lead to the same conclusion.

stage starts at age 15, usually the last year that a child receives compulsory education and/or enters the labor force. These measures capture different stages of motherhood by the age and independence of children. While most previous research only focused on the effects of motherhood or number of children on women's wages (Jia and Dong 2012; Yu and Xie 2014), our study focuses on the relationship between children and women's economic outcomes across the stages of motherhood. Typically, a small child depends more on his or her mother and has an inhibiting effect on mother's work, but the negative effect decreases as the child becomes older, goes to school, and becomes independent.

Other time-varying variables are included in the model to control for women's household contexts, such as proximity of other relatives (mother and mother in-law) who may provide child care so that a mother's employment is not constrained. Five categories (living in the same household, living in the same neighborhood/village, living in the same city/county, living in other city/county, and not alive or unknown) represent different levels of help. 'Living in the same household' suggests that a women has the greatest opportunity of child care. 'Not alive or unknown' represents the least chance for child care. Husband's labor activity and household income excluding woman's income—a proxy for family economic resources—are included in the model of women's labor force participation.[24] In random-effects models, we also control for women's age, educational level, and the sampling stratum of this survey.

To capture the community economic environments that change over time, we employ the community-level scale created by CHNS team: *economic component score*

[24] We do not include these two variables in the model of income. This is because we conduct Heckman selection model, which needs different variables in the selection model and the outcome model, to account for the selection bias towards being in the labor force as a robustness test. By excluding these two variables from the outcome model, we assume husband's labor activity and the income excluding woman's income only in the selection model, we assume that these two variables affect a woman's probability of being in the labor force but do not directly affect her income. We also conduct an analysis on women's logged income with these two variables included. The results are consistent.

(Jones-Smith and Popkin 2010). An economic component score measures economic activity with a range of 0–10, including the typical daily wage for ordinary male workers and the percentage of the population engaged in nonagricultural work. This information was obtained from a community survey of area administrators and official records (Monda et al. 2007). The increasing values of the economic component scores indicate the development of local economies (Table 2-2).

TABLE 2-2 ABOUT HERE

Furthermore, to better control for the exogenous changes in the community, we also include a *quality of health score* in the model to measure health infrastructure, including the number and the type of health facilities and pharmacies in or near (≤ 12 kilometers) the community. We include this variable because an increase in the availability of health facilities might represent a time-saver for mothers, especially those with young children. *Sanitation score* and *housing score* for the community are also included. A sanitation score is a measure of the proportion of households with treated water and the prevalence of households without excreta present outside the house. A housing score measures the availability of electricity, indoor tap water, flush toilets, and gas for cooking. We include these two variables as a measure of the standard of living, which might reduce the demand for domestic labor. Although the *social services score*, which measures the provision of preschool for children under age 3 and the availability of different kinds of insurance, is also in the CHNS, it is not included in our analysis because it only covers waves after the year 2000.

Results

Women's Labor Activity

Table 2-3 shows the descriptive statistics by year from 1991 to 2011. The labor activity of women in the sample dropped substantially from the 1990s to 2000s, especially during the period from 2000 through 2004.[25] The last four panels of Table 2-3 show the proportion of working mothers with children in different age groups: children under age 3, children ages 3–6, children ages 7–15, and children older than age 15. As shown, except for women who have children older than 15, the mean ages of mothers for different motherhood stages in 1991–2011 do not differ substantially, which ensures the comparison is less likely to be affected by mother's age. The decline of female labor force participation is most striking for those who have very young children. While nearly 90% of women in this group were employed in 1991, only around 55% were employed in 2004–2011. More than 90% of women with young children were in the labor force until 2000. While their numbers dropped precipitously after 2000, more than 60% remained employed. The labor force participation of mothers with school-aged children was around 95% in 1991, and it remained high; after a drop in 2000–2004, 70% of these mothers were in the workforce from 2006 through 2011. For women with children older than 15, the proportion of working mothers also dropped from about 90% in 1991 to less than 60% in 2004. However, it recovered a bit after 2004 and remained higher than the rate proportion of working women among those with very young children.

[25] During this period, China joined the World Trade Organization (WTO) and launched a drastic privatization in socialized services, shifting the family-related responsibilities back to women (Hare 2016). However, because we do not have balanced data, it is hard to distinguish whether the drop of women's labor activity reflects the impact of having children across women entering in different waves or the change of the impact of having children over time. Thus, we further conduct statistical analyses and interact motherhoods stages with the economic component score to see how the impact of having children changes with the development of the local economies.

TABLE 2-3 ABOUT HERE

We conduct both conditional fixed-effects models and random-effects models of women's labor activity as shown in Model F1 and Model R1 of Table 2-4, respectively. In random-effects models, we include women's ages, sampling stratum, and educational levels. Both of these models suggest a negative relationship between having very young children and mothers' labor market participation. Specifically, as suggested by conditional fixed-effects models, the odds of working are 58.73% ($1 - e^{-0.885}$) lower for a mother with children under 3 years of age than without children under age 3.[26] The work interruption we found for those who gave birth after the 1990s contradicts earlier findings that mothers in mainland China continued to work after the births of their children (Yi and Chien 2002). The deepening reform of the state-owned enterprises after 1992 and the demise of publicly funded childcare have contributed to the unfavorable labor market position of mothers with young children in recent decades. However, this negative relationship disappears in other stages of motherhood. Also, the results suggest that husband's working status is positively associated with his wife's. Although we do not have a clear explanation for this association, it might be related to the dismantling of state-owned enterprises during the economic reforms in 1990s. Before the economic reform, it was common that household members worked in the same state-owned enterprise (Tian and Li 2016). Thus, when the economic reforms started, wives and husbands who worked in the state-owned enterprise privatized were likely to be laid off

[26] Because about 20% of the observations have children at different age groups, we can only interpret the coefficients as comparing to the period without children in this age group all the other stages rather than one specific reference stage. We also conduct analyses on the impacts of different age of the youngest child on women's economic outcomes as robustness checks. Having youngest child older than 15 years old is the reference group because, as shown in our main analysis, mothers' economic activity is less likely to be affected by children older than age 15. The results are shown in Appendix Table 2-4 and Appendix Table 2-5.

together,[27] leading to a positive relationship in our model results. As shown in Table 2-3, the proportion of working husbands also dropped substantially between 2000 and 2004.

In Model R2 and Model F2, we include the interaction terms between different stages of motherhood and the community-level economic component score of local economy. As shown, all four interactions are statistically significant. Specifically, the relationship between having very young children and mothers' labor force participation becomes more negative when the local economies develop. The magnitude of the positive relationship between mothers' labor activity and school-aged children[28] becomes smaller when the economic component scores increase.

TABLE 2-4 ABOUT HERE

Women's Income

Further analysis on mothers' income is conducted by using both fixed-effects and random-effects models.[29] To account for the selection bias towards labor force participation, we also run robustness tests by including an inverse Mills ratio generated from a Heckman's selection model (Appendix Table 2-2) into the main model. The results in Appendix Table 2-3 are also consist with our findings.

Women's income has increased since the 1990s as demonstrated by the dummies for waves showing growing and positive coefficients in Table 2-5. Also, there is little

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[27] Though the official policy considered this situation and suggested not lay off both of them, there is no significant evidence of the policy effect on the probability of being laid off (Appleton et al. 2002).

[28] The main effect of having children between seven and fifteen years old is statistically significant in random-effects model but not in fixed-effects model. This might result from the bigger standard error in fixed-effect model, because the effect will be significant at 0.1 level if we replace the standard error from fixed-effects model (0.177) with the standard error from random-effects model (0.125). Thus, we suggest that the relationship between women's labor activity and having children at school age is positive. This finding is consistent with previous literature suggesting that Chinese women are likely to feel that it is their duty to work for the good of their children (Short et al. 2002).

[29] We also include years of working (which is estimated by taking the differences between age and the approximate age of obtaining the highest educational level) as a proxy for working experience in the random-effects models for a robustness check. The results are consistent.

evidence that mothers' income is negatively related to very young children because the coefficients of children under 3 years old are not statistically significant at the 0.05 level. Nevertheless, both the fixed-effects and random-effects models suggest a positive relationship between school-aged children and mothers' income. Specifically, mothers tend to have 11.18% higher income if they have school-aged children than if they do not, suggesting that, in response to the rising costs of children's education or other needs as children grow up, mothers are motivated to work harder or resort to alternative moneymaking activities to increase income. This is also consistent with findings from previous studies that families employ adaptive strategies to support the education and wellbeing of children (F. Chen and Korinek 2010).

The interactive terms are then included in both fixed-effects and random-effects models. Overall, the interactive terms are negative, suggesting a smaller positive relationship between school-aged children and mothers' income in more developed local economies. Specifically, according to fixed-effect model, having school-aged children is correlated with 10.5% ($e^{0.100} - 1$) higher income of mothers when the economic component score is at 5, which is around its mean value. But the income will be 7.2% ($1 - e^{0.100-0.035*(10-5)}$) lower for mothers with school-aged children when the economic component score is at 10 (the highest value). Thus, there is no strong evidence that mothers with young children earn less, but rather, they have higher incomes when their children go to school. This positive association between mothers' income and the presence of school-aged children gets smaller, and even turns to a negative one, when the local economies develop.

TABLE 2-5 ABOUT HERE

Conclusion and Discussion

This chapter contributes to the literature on the deteriorating position of urban Chinese mothers in the labor market by focusing on the heterogenous relationship between different stages of motherhood and women's economic outcomes. By applying a fixed-effects model to the longitudinal survey data, we use only information on within-person variation, controlling for unobserved factors that may be correlated with mothers' economic outcomes. This study also connects the market changes to the variation of mothers' labor force participation by linking the relationship between children and women's labor force participation with local economic development.

We find that Chinese women's labor activity declined after 1990, and that women's economic activities respond to the demands of her family, which vary across different motherhood stages. The probability of working is much lower for mothers of young children, while mothers with school-aged children are earning higher incomes than at any other time in their careers. This corresponds with the findings from Western studies that the ages of children and family expenses affect mothers' decisions about market activity (Waite 1980). When children begin school, mothers engage in adaptive strategies, such as multiple moneymaking activities, in response to increasing expenses.

This historic trend of Chinese mothers' labor force participation is different from that of mothers in other industrialized societies. In this sense, our research also complements studies that focus on gender equity and institutional changes by addressing how labor market changes might contribute to gender inequality in the labor market as well as in the family. Before economic reform, women were encouraged by the state to participate in social production and they were relieved of much of their domestic work (especially childcare) with the help of publicly funded services. However, during the economic transition, both the more gender-egalitarian state sectors and the state-dominated Marxist political discourse retreated. Thus, in contrast to the growth of the female labor force during periods of rapid economic development in industrialized countries, Chinese women's labor force participation declined. Our analysis suggests that, for mothers in the early stages of motherhood, the inhibiting effect of very young children is exacerbated with the development of local economies. For women who have school-aged children, the positive association is eroded with the development of local economies. This decline is partly because the high level of female labor force participation before China's economic reform has regressed to the mean level of other market economies during plan-to-market economic style transition. This resurgence of gender inequality in China's labor market can also be attributed to the fact that traditional gender-role ideologies within households that persistently dominate in East Asian regions remained intact under state socialism (Ji et al. 2017). Women are still expected to take the main responsibility of childrearing and household chores even when they have full-time jobs.

Recently, there have been heated discussions about whether the 2015 government decision to allow couples to have more than one child will result in increased fertility (Z. Zhao 2015; Attané 2016a). Some say the change in birth control policies will not be enough to encourage families to have more than one child; inadequate protection of Chinese women in the labor market and the lack of state policies supporting families with children will continue to be a deterrent (Attané 2016a).

According to McDonald (2000), very low fertility is likely to be observed in postindustrial societies, where women's labor market participation is normatively accepted but a highly gendered division of labor remains at home. We believe that women's conflict between work and family has only gotten worse in recent years. Employers are not helping. They already expect women to be less devoted to their work and more devoted to their families, even those who already have one child and are not eligible to have a second child before the policy change. Further, the growing gender inequities in the labor market are likely to reduce women's power in decision making in families, because women's influence in family life largely depends on their relative economic resources to their husbands.(Qian and Jin 2018). Thus, we suggest that government policies that support families in childrearing and promote gender equality within households should be promoted (Hu and Peng 2012; Zhao 2016; Zheng 2016). Studies of the impacts of various policies on fertility trends in western countries have suggested that policies which help women to combine the work and mother roles are more likely to result in higher fertility rates (Rindfuss, Choe, and Brauner-Otto 2016; Brauner-Otto 2016). In East Asia, a study of supportive policies found a positive impact on family fertility in South Korea (Yoon 2017). Overall, the long-term fertility trend in China will depend on the interactions among gender-role ideology, public policies, and labor market institutions.

As with most studies on this topic, our research is limited in some ways. First, living with family members, such as sisters' or brothers' family, who are also likely to provide/need childcare supports might affect our results. Second, we do not have enough childless observations to depict women's employment/income trajectories. Third, because our analyses focus on women in urban areas, the results might not generalize to rural areas, where the economic structure is different. Previous studies suggest that, in rural China, economic development does not uniformly increase gender inequities within households (Matthews and Nee 2000). The increasing rural-urban migration will also affect women's childbearing (Guo 2010; Xu 2016).

Tables

Table 2-1 Descriptive statistics of analytical sample by different working experience

	Women who have never worked (n=118)	Women who experienced work interruption (n=691)	Women who have been working for all waves (n=1,124)
Age at first wave/Std.Dev	34.51/7.81	32.48/6.30	34.83/6.82
Mean age/Std.Dev	37.28/7.70	37.93/7.07	38.09/6.86
Highest education level (%)			
Primary school or lower	14.41	22.43	23.40
Middle school	52.54	43.85	28.11
High school	27.12	23.88	19.48
College or above	5.93	9.84	29.00
Stratum (%)			
Cities	27.12	22.58	29.45
Suburban neighborhoods	40.68	41.68	35.94
Towns or county capital cities	32.20	35.75	34.61

Table 2-2 Value of economic component score of communities by year

Wave	1991	1993	1997	2000	2004	2007	2009	2011
Mean	3.96	4.11	5.70	6.74	7.70	8.13	8.65	8.72
Std.Dev	1.63	1.42	3.14	2.92	3.05	2.75	2.64	2.60

Table 2-3 Descriptive statistics by year

Year	1991	1993	1997	2000	2004	2006	2009	2011
Number of observations	859	865	913	914	801	778	689	555
Age	34.46	36.26	36.95	38.24	38.90	39.66	40.17	41.03
Proportion of working women	92. 43%	92.83%	86.53%	77.90%	62.80%	64.91%	66.04%	72.61%
Income of working women	4075	5044	6514	8314	10990	12662	17426	18758
Logarithm of income	8.1	8.3	8.5	8.8	9.0	9.2	9.5	9.6
Highest educational level								
Primary school or lower	34.23%	33.76%	29.46%	20.68%	15.23%	12.47%	9.58%	9.37%
Middle school	33.41%	32.95%	32.53%	34.35%	36.95%	38.69%	38.17%	39.46%
High school	22.00%	22.31%	21.58%	23.96%	23.97%	23.52%	20.75%	18.38%
College or above	10.36%	10.98%	16.43%	21.01%	23.85%	25.32%	31.49%	32.79%
Stratum								
City	25.15%	26.47%	27.60%	25.82%	23.35%	23.26%	22.06%	23.60%
Suburban	38.77%	36.30%	41.95%	40.37%	43.45%	42.67%	41.80%	40.72%
Town or county capital city	36.09%	37.23%	30.45%	33.81%	33.21%	34.06%	36.14%	35.68%
Proportion of working husband	98.84%	98.38%	96.17%	91.25%	80.52%	81.23%	81.86%	86.13%
Logarithm of household income excluding women’s income	9.0	9.0	9.2	9.3	9.6	9.5	9.9	10.1
Living status of mother								
Living in the same household	3.96%	3.12%	2.19%	3.17%	2.37%	2.57%	2.90%	3.06%
Living in the same neighborhood/village	16.76%	14.45%	13.69%	15.65%	11.99%	13.11%	11.32%	11.71%
Living in the same city/county	42.02%	42.77%	46.11%	47.16%	48.69%	47.04%	49.78%	45.77%
Living in other city/county	15.60%	14.34%	13.14%	11.60%	13.23%	13.11%	12.19%	11.35%
Not alive or unknown	21.65%	25.32%	24.86%	22.43%	23.72%	24.16%	23.80%	28.11%
Living status of mother in law								
Living in the same household	24.33%	25.78%	23.66%	21.99%	21.97%	21.21%	22.06%	24.68%
Living in the same neighborhood/village	25.15%	23.47%	20.92%	24.29%	27.84%	24.29%	21.04%	20.18%
Living in the same city/county	13.50%	13.41%	18.51%	17.83%	15.61%	15.81%	23.37%	19.81%
Living in other city/county	7.22%	6.94%	6.68%	6.13%	4.74%	5.66%	3.48%	4.86%
Not alive or unknown	29.80%	30.30%	30.23%	29.76%	29.84%	33.03%	30.04%	30.45%
Women who have children under age 3								
Number of observations	150	87	96	71	64	53	41	33
Age	27.93	27.89	27.73	27.90	28.98	29.70	30.23	31.03
Proportion of working women	88.67%	87.36%	88.54%	70.42%	53.13%	56.60%	56.10%	54.55%
Income of working women	3483	3811	5327	7696	9994	13563	16933	17122

Logarithm of income	7.9	7.8	8.2	8.6	8.7	9.4	9.4	9.6
Women who have children between age 3 and 6								
Number of observations	290	254	141	108	93	84	88	53
Age	30.88	31.51	31.04	30.48	31.72	31.97	33.44	32.80
Proportion of working women	92.76%	90.94%	92.20%	86.11%	67.74%	60.71%	61.36%	75.47%
Income of working women	3623	4716	5949	7844	10668	14944	18251	20187
Logarithm of income	8.0	8.2	8.4	8.7	8.9	9.4	9.5	9.7
Women who have children between age 7 and 15								
Number of observations	475	515	522	476	340	283	284	197
Age	36.93	37.00	37.13	37.68	37.60	37.44	38.24	38.23
Proportion of working women	94.74%	92.82%	88.89%	80.04%	64.61%	69.26%	71.19%	75.13%
Income of working women	4229	5202	6755	8512	10667	12079	16813	18115
Logarithm of income	8.1	8.3	8.5	8.8	9.0	9.1	9.5	9.6
Women who have children older than age 15								
Number of observations	262	282	373	428	455	459	403	336
Age	38.53	41.60	41.52	42.88	42.67	43.32	43.95	45.05
Proportion of working women	90.08%	93.62%	81.77%	74.30%	57.80%	59.69%	60.05%	69.64%
Income of working women	4358	5557	6725	7852	10623	11798	17259	18218
Logarithm of income	8.1	8.3	8.5	8.6	9.0	9.0	9.6	9.6

Table 2-4 Coefficients of logistic model predicting working (Reference group: not working)

	Random-effects Model				Conditional fixed-effects Model			
	Model R1		Model R2		Model F1		Model F2	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Children under 3 years old	-0.742***	0.193	-0.704***	0.198	-0.885**	0.279	-0.929***	0.270
***economic component score**			-0.119*	0.057			-0.207**	0.071
Children between 3 and 6 years old	-0.033	0.158	0.019	0.164	-0.161	0.209	-0.172	0.204
***economic component score**			-0.098*	0.047			-0.167**	0.065
Children between 7 and 15 years old	0.342**	0.125	0.416**	0.132	0.233	0.177	0.302^{+}	0.167
***economic component score**			-0.109**	0.039			-0.176**	0.056
Children older than 15 years old	0.082	0.146	0.127	0.152	-0.096	0.197	-0.170	0.202
***economic component score**			-0.107**	0.041			-0.127*	0.062
Age	-0.040***	0.011	-0.040***	0.011				
Highest education level (ref: Primary school or lower)								
Middle school	0.262*	0.132	0.268*	0.134				
High school	0.458**	0.148	0.448**	0.149				
College or above	0.612**	0.208	0.552**	0.209				
Stratum (ref: city)								
Suburban	0.291^{+}	0.150	0.311*	0.150				
Town or county capital city	-0.053	0.144	-0.005	0.144				
Working status of husband (ref: not working)	1.994***	0.168	1.982***	0.168	2.054***	0.258	2.069***	0.262
Income of household excluding women's income	-0.210***	0.035	-0.212***	0.035	-0.201***	0.045	-0.211***	0.046
Living status of mother (ref: Living in the same household)								
Living in the same neighborhood/village	0.134	0.306	0.157	0.305	0.342	0.517	0.454	0.522
Living in the same city/county	0.130	0.291	0.154	0.290	0.039	0.458	0.150	0.462
Living in other city/county	-0.086	0.311	-0.070	0.310	-0.073	0.510	0.042	0.515
Not alive or unknown	-0.024	0.301	-0.000	0.300	-0.219	0.466	-0.139	0.468
Living status of mother in law (ref: Living in the same household)								
Living in the same neighborhood/village	-0.155	0.140	-0.172	0.141	-0.356	0.243	-0.400^{+}	0.234
Living in the same city/county	-0.435**	0.163	-0.458**	0.164	-0.630**	0.231	-0.654**	0.225
Living in other city/county	-0.237	0.245	-0.244	0.244	-0.144	0.415	-0.157	0.404
Not alive or unknown	-0.356*	0.143	-0.376**	0.143	-0.362	0.277	-0.419	0.270

Community-level variables								
Economic component score	-0.042*	0.021	0.086+	0.046	-0.009	0.033	0.174*	0.069
Quality of health score	0.073**	0.024	0.070**	0.024	0.081**	0.025	0.077**	0.025
Sanitation score	-0.075*	0.030	-0.065*	0.030	-0.072	0.061	-0.068	0.060
Housing component score	0.048	0.035	0.050	0.035	-0.020	0.081	-0.002	0.080
Dummies for wave (ref: year 1991)								
Year 1993	-0.076	0.232	-0.071	0.233	-0.057	0.232	-0.035	0.235
Year 1997	-0.649**	0.219	-0.630**	0.223	-0.856**	0.265	-0.784**	0.273
Year 2000	-1.204***	0.224	-1.181***	0.227	-1.583***	0.345	-1.486***	0.355
Year 2004	-1.725***	0.238	-1.702***	0.240	-2.372***	0.388	-2.302***	0.400
Year 2006	-1.434***	0.244	-1.416***	0.246	-2.221***	0.403	-2.153***	0.416
Year 2009	-1.418***	0.260	-1.409***	0.262	-2.277***	0.455	-2.234***	0.467
Year 2011	-0.843**	0.270	-0.829**	0.272	-1.812***	0.480	-1.753***	0.491
Number of observations	2671		2671		2671		2671	

Note: Only women who experienced work interruption are included because of the settings of conditional fixed-effects logistic model. For a robustness check, random-effects logistic model is conducted (Appendix Table 2-1).

Economic component score measures community-level economic activity with a range between 0 and 10, including typical daily wage for ordinary male workers and percentage of the population engaged in nonagricultural work. The variable is centered at 5.

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2-5 Coefficients of linear model of women's logged income

	Random-effects Model				Fixed-effects Model			
	Model R3		Model R4		Model F3		Model F4	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Children under 3 years old	-0.067	0.045	-0.082^{+}	0.046	-0.054	0.054	-0.094	0.059
***economic component score**			-0.010	0.013			-0.025^{+}	0.014
Children between 3 and 6 years old	0.042	0.036	0.020	0.036	0.059	0.047	0.021	0.049
***economic component score**			-0.014	0.010			-0.020	0.014
Children between 7 and 15 years old	0.111***	0.030	0.119***	0.031	0.106**	0.038	0.100*	0.040
***economic component score**			-0.040***	0.009			-0.035**	0.012
Children older than 15 years old	0.016	0.035	-0.010	0.035	0.009	0.048	-0.035	0.052
***economic component score**			-0.012	0.010			-0.005	0.012
Age	0.010***	0.003	0.010***	0.003				
Highest education level (ref: Primary school or lower)								
Middle school	0.078*	0.038	0.074*	0.038				
High school	0.132**	0.042	0.126**	0.042				
College or above	0.437***	0.049	0.421***	0.049				
Stratum (ref: city)								
Suburban	0.076	0.070	0.074	0.070				
Town or county capital city	-0.070	0.066	-0.062	0.066				
Living status of mother (ref: Living in the same household)								
Living in the same neighborhood/village	0.106	0.073	0.101	0.073	0.053	0.121	0.062	0.121
Living in the same city/county	0.030	0.069	0.027	0.069	-0.033	0.110	-0.022	0.111
Living in other city/county	0.054	0.073	0.050	0.073	0.043	0.124	0.053	0.125
Not alive or unknown	0.029	0.071	0.027	0.071	-0.010	0.108	0.006	0.109
Living status of mother in law (ref: Living in the same household)								
Living in the same neighborhood/village	0.028	0.035	0.024	0.034	0.121^{+}	0.063	0.113^{+}	0.063
Living in the same city/county	-0.031	0.039	-0.035	0.039	0.007	0.070	0.003	0.070
Living in other city/county	-0.058	0.054	-0.059	0.054	0.020	0.085	0.020	0.083
Not alive or unknown	-0.039	0.035	-0.043	0.035	-0.059	0.061	-0.065	0.060
Community-level variables								
Economic component score	-0.003	0.006	0.024*	0.011	-0.008	0.010	0.014	0.014
Quality of health score	-0.015*	0.006	-0.017**	0.006	-0.012	0.010	-0.014	0.010
Sanitation score	0.027**	0.009	0.027**	0.009	-0.006	0.019	-0.005	0.018

Housing component score	0.040***	0.010	0.044***	0.010	0.005	0.026	0.012	0.026
Dummies for wave (ref: year 1991)								
Year 1993	0.112**	0.035	0.111**	0.035	0.158**	0.047	0.156**	0.047
Year 1997	0.271***	0.041	0.271***	0.041	0.468***	0.080	0.466***	0.079
Year 2000	0.459***	0.046	0.460***	0.046	0.697***	0.113	0.694***	0.112
Year 2004	0.656***	0.054	0.652***	0.054	0.970***	0.131	0.956***	0.130
Year 2006	0.780***	0.056	0.773***	0.056	1.150***	0.124	1.134***	0.124
Year 2009	1.153***	0.060	1.142***	0.060	1.616***	0.134	1.586***	0.135
Year 2011	1.247***	0.063	1.236***	0.063	1.781***	0.141	1.744***	0.142
Number of observations	4965		4965		4965		4965	

Note: All models are not adjusted for employment selection

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix

Appendix Table 2-1 Coefficients of random-effects logistic model predicting working (Reference group: not working)

	Model 1		Model 2	
	Coefficients	S.E.	Coefficients	S.E.
Children under 3 years old	-0.980^{***}	0.197	-0.926^{***}	0.205
***economic component score**			-0.135^{*}	0.055
Children between 3 and 6 years old	-0.314^{+}	0.166	-0.261	0.173
***economic component score**			-0.128^{**}	0.048
Children between 7 and 15 years old	0.063	0.132	0.164	0.140
***economic component score**			-0.139^{***}	0.039
Children older than 15 years old	-0.374^{*}	0.155	-0.324^{*}	0.162
***economic component score**			-0.127^{**}	0.042
Age	0.014	0.012	0.015	0.012
Highest education level (ref: Primary school or lower)				
Middle school	0.283^{+}	0.165	0.290^{+}	0.167
High school	0.710^{***}	0.188	0.705^{***}	0.189
College or above	2.756^{***}	0.245	2.715^{***}	0.246
Stratum (ref: city)				
Suburban	0.387	0.275	0.407	0.273
Town or county capital city	-0.058	0.260	-0.004	0.258
Working status of husband (ref: not working)	2.187^{***}	0.154	2.194^{***}	0.155
Income of household excluding women's income	-0.254^{***}	0.036	-0.259^{***}	0.036
Living status of mother (ref: Living in the same household)				
Living in the same neighborhood/village	-0.004	0.335	0.010	0.335
Living in the same city/county	0.061	0.318	0.085	0.318
Living in other city/county	-0.145	0.338	-0.123	0.338
Not alive or unknown	-0.173	0.325	-0.153	0.325
Living status of mother in law (ref: Living in the same household)				
Living in the same neighborhood/village	-0.381^{*}	0.158	-0.388^{*}	0.159
Living in the same city/county	-0.627^{***}	0.179	-0.644^{***}	0.180
Living in other city/county	-0.339	0.259	-0.336	0.260
Not alive or unknown	-0.431^{**}	0.158	-0.447^{**}	0.159
Community-level variables				
Economic component score	-0.020	0.023	0.134^{**}	0.047
Quality of health score	0.082^{**}	0.025	0.076^{**}	0.025
Sanitation score	-0.092^{*}	0.039	-0.088^{*}	0.040
Housing component score	0.013	0.046	0.027	0.046
Dummies for wave (ref: year 1991)				
Year 1993	-0.069	0.216	-0.058	0.216
Year 1997	-1.036^{***}	0.223	-1.012^{***}	0.225

Year 2000	-1.841***	0.237	-1.813***	0.239
Year 2004	-2.612***	0.258	-2.599***	0.259
Year 2006	-2.483***	0.270	-2.483***	0.272
Year 2009	-2.558***	0.290	-2.565***	0.291
Year 2011	-2.117***	0.304	-2.115***	0.305
Number of observations	6374		6374	

Note: All women are included. Though the coefficient of having children older than age 15 is negative, we are conservative about interpreting it as imposing negative impacts on women's probability of working, because random-effects model also uses between-person variation/differences.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2-2 Coefficients of Heckman selection model (between-within method)

Outcome model of women's logged income	Coefficients	S.E.
Deviations		
Children under 3 years old	-0.078	0.062
Children between 3 and 6 years old	0.032	0.058
Children between 7 and 15 years old	0.125*	0.053
Children older than 15 years old	0.037	0.056
Averages		
Children under 3 years old	-0.131	0.095
Children between 3 and 6 years old	-0.000	0.064
Children between 7 and 15 years old	0.063	0.047
Children older than 15 years old	-0.015	0.053
Age	0.008**	0.003
Highest education level (ref: Primary school or lower)		
Middle school	0.032	0.045
High school	0.092+	0.049
College or above	0.425***	0.053
Stratum (ref: city)		
Suburban	0.217***	0.035
Town or county capital city	-0.030	0.031
Living status of mother (ref: Living in the same household)		
Living in the same neighborhood/village	0.042	0.086
Living in the same city/county	-0.049	0.081
Living in other city/county	0.002	0.088
Not alive or unknown	-0.041	0.084
Living status of mother in law (ref: Living in the same household)		
Living in the same neighborhood/village	-0.011	0.038
Living in the same city/county	-0.026	0.035
Living in other city/county	-0.084	0.056
Not alive or unknown	-0.047	0.036
Community-level variables		
Economic component score	0.013*	0.006
Quality of health score	-0.011	0.007

Sanitation score	0.055***	0.008
Housing component score	0.047***	0.008
Dummies for wave (ref: year 1991)		
Year 1993	0.099**	0.033
Year 1997	0.204***	0.040
Year 2000	0.362***	0.045
Year 2004	0.509***	0.055
Year 2006	0.624***	0.056
Year 2009	0.970***	0.058
Year 2011	1.029***	0.060
Selection model of probability of working (probit model)		
Children under 3 years old	-0.400***	0.089
Children between 3 and 6 years old	-0.125+	0.070
Children between 7 and 15 years old	0.014	0.058
Children older than 15 years old	-0.229**	0.069
Age	0.011*	0.005
Highest education level (ref: Primary school or lower)		
Middle school	0.042	0.070
High school	0.190*	0.083
College or above	1.097***	0.106
Stratum (ref: city)		
Suburban	0.151*	0.074
Town or county capital city	0.028	0.072
Working status of husband (ref: not working)	1.091***	0.074
Income of household excluding women's income	-0.140***	0.020
Living status of mother (ref: Living in the same household)		
Living in the same neighborhood/village	-0.235	0.157
Living in the same city/county	-0.121	0.147
Living in other city/county	-0.245	0.159
Not alive or unknown	-0.244	0.151
Living status of mother in law (ref: Living in the same household)		
Living in the same neighborhood/village	-0.294***	0.071
Living in the same city/county	-0.298***	0.078
Living in other city/county	-0.285**	0.110

Not alive or unknown	-0.304***	0.072
Community-level variables		
Economic component score	-0.028**	0.010
Quality of health score	0.025*	0.011
Sanitation score	-0.054***	0.014
Housing component score	0.032+	0.016
Dummies for wave (ref: year 1991)		
Year 1993	-0.008	0.082
Year 1997	-0.401***	0.086
Year 2000	-0.702***	0.091
Year 2004	-1.034***	0.096
Year 2006	-0.972***	0.101
Year 2009	-0.980***	0.108
Year 2011	-0.789***	0.111
Number of observations	6374	

Note: All women are included with clustering at individual level. Lambda is 0.056 with standard error equaling to 0.039. The Wald test of independent equations shows that $\chi^2(1) = 2$, with p-value at 0.1452. These statistics suggest that there is no strong evidence of selection bias.

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2-3 Coefficients of linear model of women's logged income

	Random-effects Model				Fixed-effects Model			
	Model R3		Model R4		Model F3		Model F4	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Children under 3 years old	-0.082^{+}	0.047	-0.095*	0.047	-0.055	0.059	-0.091	0.064
***economic component score**			-0.011	0.013			-0.025^{+}	0.014
Children between 3 and 6 years old	0.039	0.036	0.017	0.036	0.059	0.047	0.022	0.049
***economic component score**			-0.014	0.010			-0.020	0.014
Children between 7 and 15 years old	0.114***	0.030	0.121***	0.031	0.106**	0.037	0.099*	0.040
***economic component score**			-0.039***	0.009			-0.035**	0.012
Children older than 15 years old	0.009	0.035	-0.016	0.036	0.009	0.049	-0.034	0.052
***economic component score**			-0.012	0.010			-0.005	0.012
Age	0.011***	0.003	0.010***	0.003				
Highest education level (ref: Primary school or lower)								
Middle school	0.078*	0.038	0.074*	0.038				
High school	0.137**	0.042	0.130**	0.042				
College or above	0.474***	0.056	0.453***	0.056				
Stratum (ref: city)								
Suburban	0.079	0.070	0.077	0.070				
Town or county capital city	-0.069	0.066	-0.061	0.066				
Living status of mother (ref: Living in the same household)								
Living in the same neighborhood/village	0.099	0.073	0.095	0.073	0.052	0.120	0.063	0.120
Living in the same city/county	0.026	0.069	0.024	0.069	-0.033	0.109	-0.022	0.111
Living in other city/county	0.046	0.074	0.043	0.073	0.043	0.123	0.054	0.124
Not alive or unknown	0.021	0.071	0.021	0.071	-0.011	0.107	0.007	0.108
Living status of mother in law (ref: Living in the same household)								
Living in the same neighborhood/village	0.020	0.035	0.017	0.035	0.121^{+}	0.065	0.114^{+}	0.065
Living in the same city/county	-0.039	0.040	-0.042	0.040	0.006	0.072	0.005	0.071
Living in other city/county	-0.066	0.055	-0.066	0.055	0.020	0.084	0.022	0.082
Not alive or unknown	-0.049	0.035	-0.051	0.035	-0.060	0.062	-0.063	0.061
Community-level variables								
Economic component score	-0.004	0.006	0.023*	0.011	-0.008	0.010	0.015	0.014
Quality of health score	-0.014*	0.006	-0.016*	0.006	-0.012	0.010	-0.015	0.010

Sanitation score	0.025**	0.009	0.026**	0.009	-0.006	0.018	-0.005	0.018
Housing component score	0.040***	0.010	0.044***	0.010	0.005	0.026	0.012	0.026
Dummies for wave (ref: year 1991)								
Year 1993	0.111**	0.035	0.110**	0.035	0.158**	0.047	0.156**	0.047
Year 1997	0.260***	0.042	0.261***	0.042	0.468***	0.080	0.467***	0.079
Year 2000	0.435***	0.049	0.440***	0.049	0.696***	0.117	0.697***	0.115
Year 2004	0.613***	0.062	0.615***	0.062	0.968***	0.144	0.962***	0.142
Year 2006	0.741***	0.063	0.740***	0.063	1.148***	0.135	1.139***	0.133
Year 2009	1.114***	0.067	1.108***	0.067	1.615***	0.142	1.591***	0.142
Year 2011	1.215***	0.067	1.209***	0.067	1.779***	0.146	1.748***	0.146
Inverse Mills ratio	0.109	0.079	0.093	0.079	0.006	0.119	-0.018	0.118
Number of observations	4965		4965		4965		4965	

Note: All models are adjusted for employment selection (by including inverse Mills ratio estimated from Heckman two-step selection model show in Appendix Table 2-2)

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2-4 Coefficients of logistic model predicting working (Reference group: not working)

	Random-effects Model				Conditional fixed-effects Model			
	Model R1		Model R2		Model F1		Model F2	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Age of youngest child (ref: older than 15 years old)								
Under 3 years old	-0.763***	0.230	-0.689**	0.236	-0.884**	0.291	-0.717*	0.301
***economic component score**			-0.066	0.054			-0.136*	0.067
Between 3 and 6 years old	-0.053	0.192	0.020	0.202	-0.109	0.244	0.073	0.267
***economic component score**			-0.037	0.047			-0.086	0.064
Between 7 and 15 years old	0.251*	0.123	0.319*	0.137	0.217	0.156	0.390*	0.169
***economic component score**			-0.033	0.033			-0.073*	0.032
Age	-0.039***	0.011	-0.040***	0.011				
Highest education level (ref: Primary school or lower)								
Middle school	0.261*	0.132	0.244+	0.133				
High school	0.446**	0.148	0.428**	0.148				
College or above	0.588**	0.208	0.583**	0.208				
Stratum (ref: city)								
Suburban	0.307*	0.150	0.307*	0.150				
Town or county capital city	-0.031	0.143	-0.026	0.144				
Working status of husband (ref: not working)	1.999***	0.168	1.993***	0.168	2.057***	0.258	2.054***	0.260
Income of household excluding women's income	-0.214***	0.035	-0.214***	0.035	-0.203***	0.044	-0.206***	0.044
Living status of mother (ref: Living in the same household)								
Living in the same neighborhood/village	0.118	0.306	0.124	0.306	0.349	0.514	0.401	0.522
Living in the same city/county	0.130	0.291	0.138	0.291	0.044	0.456	0.088	0.462
Living in other city/county	-0.082	0.311	-0.083	0.311	-0.063	0.506	-0.022	0.511
Not alive or unknown	-0.011	0.300	-0.003	0.301	-0.202	0.465	-0.160	0.470
Living status of mother in law (ref: Living in the same household)								
Living in the same neighborhood/village	-0.151	0.140	-0.155	0.141	-0.326	0.242	-0.330	0.234
Living in the same city/county	-0.427**	0.163	-0.426**	0.163	-0.593*	0.231	-0.581**	0.225
Living in other city/county	-0.243	0.245	-0.241	0.245	-0.124	0.415	-0.151	0.413
Not alive or unknown	-0.354*	0.143	-0.356*	0.143	-0.343	0.279	-0.345	0.273

Community-level variables								
Economic component score	-0.043*	0.021	-0.020	0.028	-0.010	0.032	0.038	0.036
Quality of health score	0.072**	0.024	0.070**	0.024	0.080**	0.025	0.074**	0.024
Sanitation score	-0.079**	0.030	-0.076*	0.030	-0.071	0.061	-0.066	0.060
Housing component score	0.047	0.035	0.048	0.035	-0.012	0.080	0.001	0.080
Dummies for wave (ref: year 1991)								
Year 1993	-0.037	0.231	-0.024	0.231	-0.039	0.230	-0.020	0.233
Year 1997	-0.628**	0.218	-0.591**	0.221	-0.877***	0.259	-0.810**	0.267
Year 2000	-1.196***	0.223	-1.154***	0.226	-1.637***	0.344	-1.551***	0.357
Year 2004	-1.709***	0.237	-1.669***	0.239	-2.453***	0.393	-2.390***	0.405
Year 2006	-1.423***	0.243	-1.381***	0.245	-2.314***	0.400	-2.243***	0.414
Year 2009	-1.405***	0.259	-1.372***	0.262	-2.391***	0.461	-2.342***	0.470
Year 2011	-0.847**	0.269	-0.805**	0.271	-1.941***	0.486	-1.881***	0.495
Number of observations	2671		2671		2671		2671	

Note: Motherhood stages are differentiated based on the age of the youngest child.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2-5 Coefficients of linear model of women's logged income

	Random-effects Model				Fixed-effects Model			
	Model R1		Model R2		Model F1		Model F2	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Age of youngest child (ref: older than 15 years old)								
Under 3 years old	-0.048	0.054	-0.011	0.054	-0.082	0.067	-0.043	0.067
***economic component score**			-0.015	0.013			-0.033*	0.016
Between 3 and 6 years old	0.051	0.043	0.090*	0.044	0.024	0.056	0.069	0.055
***economic component score**			-0.023*	0.010			-0.027^{+}	0.015
Between 7 and 15 years old	0.103***	0.029	0.153***	0.031	0.068	0.041	0.118*	0.046
***economic component score**			-0.035***	0.008			-0.031*	0.012
Age	0.011***	0.003	0.011***	0.003				
Highest education level (ref: Primary school or lower)								
Middle school	0.079*	0.038	0.071^{+}	0.038				
High school	0.134**	0.042	0.123**	0.042				
College or above	0.436***	0.049	0.427***	0.049				
Stratum (ref: city)								
Suburban	0.085	0.070	0.086	0.070				
Town or county capital city	-0.064	0.065	-0.061	0.065				
Living status of mother (ref: Living in the same household)								
Living in the same neighborhood/village	0.109	0.073	0.107	0.073	0.054	0.122	0.063	0.122
Living in the same city/county	0.033	0.069	0.031	0.069	-0.031	0.110	-0.022	0.112
Living in other city/county	0.059	0.073	0.054	0.073	0.044	0.124	0.051	0.126
Not alive or unknown	0.032	0.071	0.028	0.071	-0.013	0.109	-0.001	0.110
Living status of mother in law (ref: Living in the same household)								
Living in the same neighborhood/village	0.032	0.034	0.029	0.034	0.127*	0.064	0.123^{+}	0.064
Living in the same city/county	-0.029	0.039	-0.030	0.039	0.012	0.070	0.010	0.070
Living in other city/county	-0.053	0.054	-0.054	0.054	0.026	0.085	0.027	0.083
Not alive or unknown	-0.037	0.034	-0.039	0.034	-0.059	0.062	-0.064	0.061
Community-level variables								
Economic component score	-0.002	0.006	0.017*	0.007	-0.007	0.010	0.011	0.013

Quality of health score	-0.015*	0.006	-0.016**	0.006	-0.012	0.010	-0.014	0.010
Sanitation score	0.027**	0.009	0.027**	0.009	-0.006	0.019	-0.005	0.018
Housing component score	0.038***	0.010	0.042***	0.010	0.005	0.026	0.012	0.027
Dummies for wave (ref: year 1991)								
Year 1993	0.111**	0.035	0.112**	0.035	0.154**	0.048	0.156**	0.048
Year 1997	0.266***	0.041	0.271***	0.041	0.448***	0.081	0.454***	0.080
Year 2000	0.449***	0.046	0.455***	0.046	0.666***	0.115	0.674***	0.114
Year 2004	0.648***	0.054	0.651***	0.054	0.930***	0.133	0.934***	0.134
Year 2006	0.770***	0.056	0.773***	0.056	1.108***	0.126	1.112***	0.127
Year 2009	1.145***	0.060	1.142***	0.060	1.570***	0.138	1.563***	0.140
Year 2011	1.239***	0.063	1.234***	0.063	1.732***	0.144	1.719***	0.146
Number of observations	4965		4965		4965		4965	

Note: Motherhood stages are differentiated based on the age of the youngest child. Though the coefficient of having the youngest child between age 7 and 15 is not significant in fixed-effects model, it might result from the bigger standard error in fixed-effect model. The effect will be significant at 0.05 level if we replace the standard error from fixed-effects model (0.041) with the standard error from random-effects model (0.029).

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

CHAPTER 3 : Between Tradition and Modernity: the Driving Force of Chinese Fertility

Introduction

Based on the observation of heightened couple instability and very low fertility over the second half of the 20th century in developed countries, both New Home Economics and Second Demographic Transition theories depict less-family and low-fertility societies across the world (Becker 1991; Lesthaeghe 2010). However, recent evidence in developed societies suggests that this depiction is possibly invalid. First, macro-level evidence shows a positive relationship between fertility and development, and even a positive association between fertility and women's labor force participation, in advanced societies (Myrskylä, Kohler, and Billari 2009). Second, at the micro level, a growing body of literature suggests that the propensity to have children is higher among the highly educated (Testa 2014).

With respect to these historical dynamics, Esping-Andersen and Billari (2015) further depicted a U-shape curve between fertility rate and gender equity. That is, fertility tends to be high when gender equity is low (i.e. the traditional male breadwinner-female housekeeper model is dominant) and high (i.e. gender egalitarianism is dominant). The lowest fertility level occurs when there is an ongoing 'female (or gender) revolution' in a society. Nevertheless, most studies focus on the changes in the family system in developed societies during post-demographic transition period, while developing countries remain less studied. As increasing number of less developed societies are experiencing below replacement fertility and have completed demographic transition, family change has emerged as a global phenomenon (Pesando et al. 2018). By using census data in 1991, 2000 and 2010 in Brazil, one recent study on the relationship between gender equality and women's probability of having children found that a reversal trend (Castanheira and Kohler 2017). That is, the gender equality index was negatively associated with giving birth in 1991, while this association turned to positive in 2000 and 2010. In this chapter, I suggest that this depiction might have important implications for the relationship between fertility intentions and gender equity in contemporary China.

As revealed by previous studies, contemporary China is markedly distinctive from Western societies, or even its Eastern Asian neighbors, in terms of demographic and political structural trends (Raymo et al. 2015; Yeung and Hu 2016). Strict birth control policies starting in 1980 largely spearheaded Chinese fertility decline and thus the demographic transition (Feeney and Wang 1993), while current low fertility is also a result of ongoing socioeconomic, political and cultural changes (Cai 2010; Z. Zhao, Xu, and Yuan 2017). With more families shifting from resisting to embracing the 'small family' ideal (Merli and Smith 2002; H. Zhang 2007), the interrelations of gender-role ideology, institutional arrangements, and policy support toward families start to play a decisive role in determining long-term fertility trends (Attané 2016b; M. Zhao 2016). Second, the evolution of the marriage and family institution in China involves the socialist heritage, the influx of Western values, and the resurgence of Confucian tradition, which lead to a modern-traditional mosaic temporality that differs from the family modes in Western contexts (Ji 2017).

Our theoretical framework for understanding the variation in the association between gender egalitarian attitudes and fertility intentions draws upon the work of both New Home Economics and the gender equity theory in relation to fertility. The former pays particular attention to the impact of women's growing opportunity costs of having children on fertility (Becker 1991), while the latter emphasizes tensions between high levels of gender equity in individual institutions and low levels of gender equity in family-oriented institutions (McDonald 2000). Specifically, with rapid development and growing regional disparities in contemporary China, we propose that implications from the early promotion of gender equity and the recent deterioration of women's labor market position are different for various subgroups. Among the 'traditional' group, which usually consists of those who are less educated and negatively affected by women's worsening position in the labor market during the economic transition, those who have higher gender equity attitudes are more likely to have perceptions of unfairness. However, for the 'modern' subgroup, not only has first stage of the 'gender revolution' (Goldscheider, Bernhardt, and Lappegård 2015) – growth of female educational attainment and labor force participation – been achieved, but also the second stage – men join women in the private sphere of the family – has been promoted (Mu and Xie 2016, 201). Thus, we suggest that the disparities in gender-role attitudes and perceptions about unfairness among subgroups will lead to a U-shaped relationship between gender equity and fertility intentions in China. That is, women with high and low gender equity attitudes will tend to show higher fertility intentions.

This chapter enhances the perspectives of earlier work in at several ways. First, we situate the Chinese context in the ongoing discussion about gendered fertility theory in Western societies. Specifically, we examine the non-linear relationship between different attitudes towards gender egalitarianism and fertility intentions. Second, we go beyond taking the time performing housework or childcare as a proxy for gender equity within heterosexual marriages. Instead, we develop a latent variable measuring egalitarian gender-role attitudes and connect it to people's fertility intentions, enriching the growing theoretical discussions on the association between gender equity and fertility. Further, studying gender-role ideology might also help our understanding in fertility decisions and fertility trends in the future. For a woman with more traditional gender-role ideology, her reported fertility intention might be more likely to reflect her husband's intention, as she is more subject to male dominance (Qian and Jin 2018). However, for a woman with modern gender ideology, she is more likely report her own ideas because of greater autonomy. In this sense, under the assumption that more gender equity is expected with development, fertility intentions reported by women with modern gender-role ideology have more important implications for projecting future fertility trends.

We first sketch existing theories and research, coming to a deeper understanding of the process that links gender equity and fertility. Within this section, we also highlight relevant demographic changes in the marriage market, such as a reversal of the gender gap in education and its implication for family outcomes. Then we introduce Chinese contexts to draw hypotheses about the relationship between gender-role ideology and fertility intentions. This is followed by a description of the data and methods used in this chapter, and a presentation of the main results. We conclude with a reflection on our findings and pay particular attention to future policy directives related to Chinese fertility trends.

Gender Equity and Fertility

Gender equity, rather than classical explanations that focus on the economic reasons behind childbearing decisions (such as opportunity costs, economic uncertainty, quantity-quality trade-off of having children etc.), has been embraced by demographers to explain the variation of fertility across developed societies (McDonald 2000). The expansion of education (especially for women) and the birth of modern labor economics have transitioned women into active participants in economic production (Goldin 2006). The development of household labor-saving technology has further facilitated this transition. Using time diary data collected from people between 25 and 49 years old in the United Kingdom and the United States between 1961 and 1985, Gershuny and Robinson (1988) found that domestic work time has been declining for women. However, with power in modern societies increasingly determined by labor market positions, the relative success that women have gained in the public sector has not yet translated into the private sector. The retained gender division within households results in the increasing pressure for women to bear the brunt of conflicts between the demands of domestic work and labor market work. As suggested by some scholars, the change of women's economic role is only one of the two stages in a 'gender revolution', and low fertility is the reaction of women's perception of unfairness and a reflection of the incompleteness of the gender revolution (Goldscheider, Bernhardt, and Lappegård 2015).

The second stage of the 'gender revolution' involves men's participation in the domestic sphere that propels higher levels of within-household gender equity, driving the upward trend of fertility in more developed societies. Taking gender division of housework as a proxy for within-household gender equality, which is often used as a surrogate for gender equity, a growing number of empirical studies support gender equity theory about fertility. Using European Community Household Survey data for Italy and Spain, where the traditional male breadwinner model is prevalent, Cooke (2003) concluded that fathers' greater contribution in childcare activities for the first child facilitates the transition to the second child among dual-earner families. According to Austrian data, even for men, those with an egalitarian attitude in gender issues show higher intentions for a(nother) child than those living in traditional partnerships (Tazi-Preve, Bichlbauer, and Goujon 2004).

Changes in public policies and traditions might also push the gender revolution and thus drive up fertility (Brewster and Rindfuss 2000). European countries with institutional arrangements and related policies that promote gender equity and help women better balance work and family tend to see a recovery of fertility (Rindfuss, Choe, and Brauner-Otto 2016). Comparing Hungary with Sweden, where the dual-earner family model has a fairly long history in both countries, Oláh (2003) found that improved public childcare and parental leave accelerate the transition to the second child. In Japan and South Korea, where the educational expansion and increase in women's education attainment are more rapid than in the West while the patriarchal tradition remains unchanged, there has been a long period of ultra-low fertility (Frejka, Jones, and Sardon 2010; T. Anderson and Kohler 2015).

Reversal of the gender gap in education

The changing demographic realities, aside from the transition of women's economic role from housekeepers or secondary workers to active participants, also contribute to the evolving gender-role ideology. Traditionally, women tend to marry men who are as highly educated as themselves (educational homogamy) or more educated (educational hypergamy), in accordance with male dominance in education. With the global trend of the reversal of the gender gap in education, the proportion of hypogamy (wives having more education than husbands) also increases, suggesting that marriage patterns adapt to the changing demographic and marriage market realities (Esteve et al. 2016). Based on data collected in 2009 and 2010 from divorced Belgian men and women, Theunis et al. (2015) argued that divorced men are more likely to get married to highly-educated women. This post-divorce (assortative) re-partnering is closely related to the growing number of potential highly-educated female mates in the marriage market, which is in accordance with the reversal of the gender gap in educational attainment.

This adaptation has important implications for gender egalitarian attitudes and family outcomes (Van Bavel 2012). First, compared with traditional assortative marriage (hypergamy), the instability of hypogamous marriage has declined. Using data from multiple sources on marriages formed between 1950 and 2004 in the United States, Schwartz and Han (2014) suggested that the importance of relative education between husband and wife for marriage outcomes has diminished over time. Specifically, the once-observed association between women's higher education than their husbands and higher chances of divorce has declined remarkably. Instead, these couples no longer show higher probability of divorce in recent marriage cohorts, and homogamous couples have become less likely to divorce than hypergamous couples. The convergence in the risks of marital dissolution of hypogamous and hypergamous marriage is also found in twelve European countries (Grow, Schnor, and Van Bavel 2017). The association between wives' earnings advantage and marital dissolution also weakened between 1968 and 2009 according to a study using data from Panel Study of Income Dynamics in the United States (Schwartz and Gonalons-Pons 2016).

Second, contrary to classical depictions of lower fertility in highly-educated groups because of higher opportunity costs of having children, a growing number of studies support that highly-educated groups are less likely to have a motherhood penalty (D. J. Anderson, Binder, and Krause 2003; Budig and Hodges 2014) and more likely to progress to higher parities. Using data covering 18 European countries, Nitsche et al. (2015) argue that though highly-educated homogamous couples display later entry into parenthood, they have the highest progression rates to second and third births in most countries. One study on longitudinal data from Sweden also shows that most educated homogamous couples have the lowest risk of divorce and higher chance of having another child (Dribe and Stanfors 2010).

One of the explanations is that households with two highly-educated spouses have greater economic production and future stability to have another child. Second, high educational attainment is associated with more egalitarian gender-role attitudes such that male partners might be more supportive of female labor force participation and willing to take part of the housework. Moreover, highly-educated women may have more bargaining power either for more domestic household tasks taken on by their husbands or for market solutions such as paying for nannies or cleaners.

Chinese Context and Hypotheses

Since the founding of the People's Republic of China in 1949, gender equity has been zealously advocated. Government intervention has largely affected the process of Chinese women's status improvement. First, the Chinese constitution guarantees women equal rights with men in all spheres of life (Maurer-Fazio, Rawski, and Zhang 1999) and gender equality is also a basic state policy (*ji ben guo ce*) for China, demonstrated by the slogan of ‘women can hold up half the sky’. Second, the birth control policies that have been implemented in China for more than three decades (Gu et al. 2007) have largely sped up the demographic transition (Feeney and Wang 1993) and also played a strong role in changing women’s status. The fast declining fertility reduces women’s time commitment to family obligations and improves women’s status (Wu, Ye, and He 2014). Research has also shown that fertility decline has increased family investment in children’s education (Qin, Zhuang, and Yang 2017) and reduced educational gender inequality (Wu and Zhang 2010; Lu and Zhang 2016).

However, during the market transition, the more gender-egalitarian state sectors have gradually retreated and many publicly-subsidized childcare centers have stopped providing services (Cook and Dong 2011). China’s deeper integration into the world economy after joining the WTO (World Trade Organization) in 2001 has also led to greater exposure to Western attitudes, ideals, values and lifestyles. The state-dominant Marxist political discourse has gradually shifted to a market-oriented discourse that emphasizes distinct abilities deriving from essential gender differences (Sun and Chen 2015). Some recent studies suggest that the traditional gender ideology largely remains intact even under state socialism (Zuo 2012; Ji et al. 2017) and women still take the main responsibility for household chores and raising children. Empirical studies also find that women, especially mothers, are increasingly in an unfavorable position in the labor market (L. Zhang, Brauw, and Rozelle 2004; Yuping Zhang, Hannum, and Wang 2008; Y. Zhang and Hannum 2015). Given the increasing competition in the labor market during the market transition, highly-educated women, who are more likely to hold egalitarian gender ideology, will face higher opportunity costs of having children. In other East Asian societies, such as Japan and the 'Asian Tigers' (Hong Kong, Taiwan, South Korea, and Singapore), unequal gender relations in the private sphere and the child quantity-quality trade-off with increasing educational expectations for children have been considered the main driving forces for the very low fertility (Frejka, Jones, and Sardon 2010). An empirical analysis on 2012 data from Hong Kong also suggests that, for women who have had two children, the intention for a third child is negatively correlated with unequal division of housework (M. Chen and Yip 2017, 2017). Also, with the persisting universal, early marriage in China and the recent resurgence of patriarchal Confucian traditions, women who are not yet married by their late 20s are castigated as 'leftover' women. These women are usually highly-educated, experiencing the clash between the egalitarian gender ideology that they were brought up with and the resurgence of traditional gender-role ideology (Ji 2015). According to the gender equity theory of fertility change (McDonald 2000; Goldscheider, Bernhardt, and Lappegård 2015), this conflict reflects the first stage of the 'gender revolution' that women have pioneered toward gender egalitarianism, while men have not joined women in the private sphere of the family, leading to lower fertility intentions. Thus, we develop the first hypothesis that corresponds to the fertility decline in classical demographic transition theory:

H1: women with more egalitarian gender-role ideology tend to have lower fertility intentions.

Nevertheless, the intense socioeconomic transformations that have occurred in China within a much shorter period than other societies might provide a more complicated story rather than a simple monotonic relationship depicted by this hypothesis. Because of the policy - 'Let some people get rich first' - implemented during the economic reforms since the 1980s, there have been growing regional disparities and rural-urban gaps in developmental levels in China (Xie and Zhou 2014). Coastal areas are the first to enjoy rapid economic development and some places have reached the same level of many developed countries in the world. People in these areas also have greater exposure to Western attitudes, values, and lifestyles. Cohabitation, which used to be unacceptable, is found to be more prevalent in the highly-educated group and in more developed coastal regions (Raymo et al. 2015), and some studies suggest that a sexual revolution may well be underway in most cosmopolitan cities of China (Farrer 2014). Thus, the relationship between fertility and more gender equal attitudes (or higher educational attainment) in these areas might be akin to the observations in more developed societies and show a reverse trend.

Further, with rapid educational expansion, the gender gap in education has also been minimized, especially in urban China. As depicted in Figure 3-1, the sex ratio of urban residents having at least vocational college education has been around 1 for urban residents born after 1980, and there is a tendency of reversal (more highly-educated women than men) in cities. More educated women tend to hold more egalitarian gender ideology and have preferences for men with egalitarian norms, common interests, and similar career views, who are also more likely to be more educated. In the United States, shortly after the reversal of the gender gap in education, wives' education started to exceed husbands' in early 1990s (Schwartz and Han 2014). Thus, we expect to see an increase in educational hypogamy and homogamy in highly-educated groups across cohorts, which is supported by our analysis shown later. This trend, as suggested by previous studies on Western societies, might lead to a higher level of gender equity within the household, which could, in turn, lead to more stable marriages and higher progression rates to second birth. Moreover, the propaganda of gender equity during school education may not only affect women's perceptions about gender roles, but also drive the gender-role ideology of more educated men. Because of their longer exposure to gender equity propaganda and women's competence in studying, more educated men may have more egalitarian attitudes. Thus, the second stage of the 'gender revolution' that involves men (Goldscheider, Bernhardt, and Lappegård 2015) might have also been achieved for this subgroup of people.

FIGURE 3-1 ABOUT HERE

However, in less developed places, the traditional gender relations and gender gap in education persist. As shown in Figure 3-1, the gender gap in high educational attainment remains for rural residents. The sex ratio for people with vocational college or above education drops to around 1 only for the very young cohorts. This persisting gender gap in education is partly because rural places lag behind urban areas in educational expansion. It may also partly result from the fact that in the less developed rural areas, traditional patriarchal norms and discrimination against girls are still prevalent. This can also be reflected by the abnormally high sex ratio at birth (SRB, ratio of male births to female births) even in recent years. SRB is recorded around 1.16 during the period between 2010 and 2015 (UNPD 2015), much higher than the range of 1.03 to

1.07 without sex-selective interventions. Thus, the gender-role attitude in rural places is less egalitarian, and fertility intentions might also be higher for this traditional group.

Further, the dating market for highly-educated groups is much smaller in rural areas than in urban places, implying that the increase in homogamous marriage of highly-educated people might be so small that the traditional gender ideology is less likely to be affected. According to the 2010 census, for the birth cohorts between 1981 and 1985, people with education at the level of vocational college or above in rural places are only one-eighth of the number in urban areas, while the ratio is three-fourths for the total population in these cohorts. This is not only because of the slower educational expansion, but also because rural residents with high educational attainment tend to move to cities. Thus, for rural subgroups, women with more egalitarian gender ideology are more likely to feel the unfairness in the gender system within household, which is still dominated by traditional gender relations.

Based on the great heterogeneity across regions and subgroups, we propose the second hypothesis incorporating the fertility change in post-demographic transition population. That is, the relationship between egalitarian gender ideology and fertility intentions might be curvilinear:

> *H2: women with more and less egalitarian gender-role ideology tend to have higher fertility intentions than those with average gender equality attitudes.*

Data and Analytical Approach

Data

In this chapter, we pool nationally-representative samples from the Chinese General Social Surveys (CGSS) conducted in 2010, 2012 and 2013. The CGSS is a repeated cross-sectional survey initially launched in 2003 by Hong Kong University of Science and Technology and Renmin University of China. The first phase of CGSS included five waves of surveys conducted in 2003, 2004, 2005, 2006 and 2008 (Bian and Li 2012). The second phase, which started in 2010, adopted a multi-stage, stratified, random sampling design based on updated demographic and socioeconomic information. The most developed cities, including Shanghai, Beijing, Guangzhou, Shenzhen and Tianjin, are in one strata with city subdistricts (*jie dao*) as primary sampling units (PSU). All the other places are in another stratum, including both urban and rural areas, with counties (*xian*) or city districts (*qu*) as PSUs. Targeted respondents are civilian adults, ages eighteen or older. The second-phase CGSS data are ideal for this chapter because the surveys collected information on respondents' current marital status and fertility intentions, along with other sociodemographic characteristics for both respondents and their partners. Because the 2011 survey did not ask about respondents' fertility intentions or gender-role attitudes, we only use three waves of data (collected in 2010, 2012 and 2013) in our analysis.

For the descriptive part about gender-role attitudes across cohorts, educational attainment, and educational assortative marriage, we restrict the analysis to married women between ages 20 and 49. When both urban and rural samples are included, we have 7,891 observations in our analysis. For the test of the hypotheses about the relationship between gender-role attitudes and higher fertility intentions, we further restrict the analysis to women who have only one child for several reasons. First, because we focus on the intention of having two or more children (as explained later), it is more likely for women with only one child to express their intentions, compared to childless women or women with two or more children.[30] Second, all families are allowed to have at least two children after the relaxation of birth control, so analyzing the fertility intention of women who have one child can contribute more to the discussion about the impact of relaxed policies. Thus, we finally obtain an analytical sample with 4,313 observations. [31]

Measurement of Gender-Role Ideology

To test the hypotheses, we use structural equation modeling with four indicators measuring women's gender-role ideology as a latent variable. By using latent variables, we can partly correct the bias caused by the measurement error in independent indicators of gender-role attitudes. The indicators are measured by Likert scales with five levels of rating - strongly disagree, to some extent disagree, neutral, to some extent agree, strongly agree.[32] The first indicator is 'men should be career-oriented (*yi shi ye wei zhong*) while women should be family oriented (*yi jia ting wei zhong*)', which can be treated as an indicator of agreement on the traditional breadwinner-housekeeper model in our analysis. The second indicator is 'men are born to have an advantage over women (*nan ren tian sheng bi nv ren qiang*)'. The third indicator is 'getting married to a better man is more

[30] Childless women might change their intentions once they enter into motherhood. For women who already have two or more children, their answer will suffer from post hoc rationalization.
[31] The total sample size is 4391. After list-wise deletion of observations with missing values on variables other than household income, the sample size is 4313. Missing on household income (about 9.6%) is dealt with using full information maximum likelihood (FIML), based on the assumption of multivariate normality. Monte Carlo integration with 500 integration points is used. The descriptive statistics are shown in Appendix Table 3-1.
[32] The Pearson correlations between all pairs of indicators are shown in Appendix Table 3-2.

important than succeeding in career (*gan de hao bu ru jia de hao*)'. The last indicator is 'female employees should leave the labor market first (*xian jie gu nv yuan gong*) during economic recessions'.

A body of literature takes the exact time or self-assessed frequency of doing housework chores or childcare as proxies for power or gender equity. Based on analysis of working women in Italy, where gender asymmetry in organization of time and family tasks persists, Mencarini and Tanturri (2004) maintain that husbands' frequent involvement in everyday childcare for the first child has significant positive effects on women's probability of having a second child. Capitalizing on data from the National Survey of Families and Households, the analysis results suggest that dual-earner couples in the United States are more likely to have a second child when wives' share of household work is less than 54 percent and more than 84 percent (Torr and Short 2004). Though division of household chores can partly reflect gender ideology; some factors might undermine this connection. On the one hand, the domestic division of labor might be a crude indicator of egalitarian gender ideology in that it is also affected by other factors, such as the availability of societal supports, the price of market solutions, and the type and quantity of household work (Gregson and Lowe 1994). According to analyses on Italian and Dutch samples, Mills et al. (2008) suggested that only when the workload is heavy would an unequal division of household labor impact women's fertility intentions. On the other hand, gender-role ideology might affect the interactive mode or decision-making rather than housework division (Hardill et al. 1997). Aiming for 'equity' also goes far beyond simple equal-opportunity concepts or equality of outcome, such as equal time spent for household chores (McDonald 2013). Husbands with gender egalitarian ideology might understand more about wives' difficulties in balancing family and work, show more respect, and compromise. Further, the relationship between housework division and fertility intentions may not be understood by examining only current behavior. Rather, we need to also anticipate decision-making based on future expected outcomes, which might be more determined by shared values or attitudes, such as gender-role ideology, if the couples discuss and agree on childbearing plans.

Thus, we propose that measuring gender-role ideology by attitude indicators rather than using housework division[33] can better enrich the empirical analysis about gender equity theory in relation to fertility and predict childbearing behaviors. In this chapter, after transforming all four indicators, higher scores (ranging from 0 to 4) represent higher levels of egalitarian gender ideology. All the indicators are treated as continuous in the measurement model.

Method

A model with multiple indicators and multiple causes (MIMIC) is estimated[34] in Mplus 7 with gender-role ideology as the latent variable (Figure 3-2). The latent variable in a MIMIC model has effect indicators and can be regressed on cause indicators (predictors). However, this approach assumes measurement invariance across the groups (Kline 2010).

FIGURE 3-2 ABOUT HERE

The predictors include educational attainment of both women and their husbands, while the interactive terms between women's and their husbands' educational levels are

[33] Due to data availability, we cannot conduct analysis by using housework division.
[34] Maximum likelihood estimation with robust standard errors is used.

not included because of consistent estimates in the structural model and trivial improvement of the model fit (see model fit statistics in Appendix Table 3-3). Education encompasses both economic and cultural aspects, and serves as an important factor in mate selection. It has also long been treated as a marker for gender ideology, specifically that higher educational attainment is associated with a more egalitarian gender-role attitude. Educational levels are classified into four groups: primary school or lower, middle school, high school and college (including vocational college, *da zhuan*) or above. Birth cohort groups with three categories (born between 1961 and 1970 as the reference group, between 1971 and 1980, between 1981 and 1993) are also included in the model because younger cohorts have more exposure to Western values and tend to be more 'modern' in terms of gender ideology. A place of residence variable (urban areas as reference category, rural areas) is included in the MIMIC model, because, according to the literature, it relates to the differences in both socioeconomic development and gender-role ideology between rural and urban China.

To test our hypotheses, we take respondents' answers to the question 'how many children do you want to have if without birth control policies?' as the dependent variable. The answers are dichotomized into two categories: none or one child, two or more children.[35] Overall, for women who have one child, about 61 percent want to have two or more children if without policy constraints. Because we have a binary outcome for the dependent variable, logistic regression model is used to test our hypotheses.

[35] Less than one percent of the respondents want to be childless, so they are categorized into one group with those who want only one child. About three percent of the respondents want to have more than two children, so they are categorized into one group with those who want two children.

Other individual attributes are also controlled in the analysis, including women's age and *hukou* status (agricultural *hukou*, reference group is other *hukou* types) of both women and their husbands. The sex of the first child (a son, reference group is having a daughter) is also included in the model because of the potential son preference that another child might be more wanted if the first child is a girl. Women's working status (not working for paid work as the reference group) is also included and the logarithm of household income during the year before the survey is used as a proxy for economic condition. We also include whether living together with mother or mother in-law, and whether living together with father or father in-law into the model, to control for the potential childcare support provided by other family members. After including community-level measures (average community level household income and years of education), we also include dummy variables for survey year (year 2010 as the reference year) and economic macro-regions (east region as the reference group, middle region and west region). Models are specified with clustering at city subdistricts (*jie dao*) and villages (*xiang/zhen*)[36] to correct the standard errors.

Results

Educational Expansion and Assortative Marriage

Figure 3-3 depicts the increase of married women's educational attainment across birth cohorts. For urban residents, the proportion of women receiving college education grows from about 18 percent for 1961-1970 cohort group to about 40 percent for 1981-

[36] As explained, to account for the heterogeneity in the most developed cities, the PSU for the most developed cities (city subdistricts) differ from other places (counties or city districts). However, because city subdistricts (*jie dao*) and villages (*xiang/zhen*) belong to the same administrative level in China, we treat them as the clustering variable. In administrative system in China, one county (*xian*) can have several villages (*xiang/zhen*).

1993 cohort group,[37] while the proportions of all the other groups drop. For rural people, the biggest increase is in the proportion of women with middle school education with a rapid decrease in proportion of women with least education. Previous studies indicate that education encompasses both value and economic aspects. As summarized in Table 3-1, for both urban sample and rural samples, there is a clear educational gradient that women with higher educational attainment tend to have higher level of egalitarian gender ideology across all the indicators. The gradient is sharper for rural women, probably because highly-educated women are more selected in rural area with much smaller proportion than in urban area. If we compare values of the indicators by women's husbands' educational attainment, the gradient still remains. That is, women with more educated husbands tend to have more egalitarian gender-role ideology.

FIGURE 3-3 ABOUT HERE

TABLE 3-1 ABOUT HERE

The evolving demographic realities also affect assortative marriage, especially for urban residents. As illustrated in Figure 3-4 for married women, in urban areas, the proportion of homogamy in the most educated group grew from 13 percent in the 1961-1970 cohorts to more than 30 percent in 1981-1993 cohorts. Given that some highly-educated people will get married at older ages, the proportion of homogamy among the most educated group might still increase for the youngest cohort group. Instead, the proportion of hypergamous marriage dropped from around 30 percent to less than 20 percent. For the rural sample, the biggest increase is homogamy among those with middle

[37] The proportion of receiving college education for this cohort group should be higher because later cohorts might not have finished their college when the survey was conducted.

school education, while the proportions of both homogamy among the least educated and hypergamous marriage dropped.[38]

FIGURE 3-4 ABOUT HERE

Gender-Role Ideology and Fertility Intentions

As discussed, the changing demographic realities in the gender gap in education and assortative mating have important implications for gender-role ideology and family outcomes.

For women who have one child, we further test the classical demographic transition hypothesis (Hypothesis 1) versus the hypothesis incorporating post-demographic transition (Hypothesis 2) regarding the relationship between the level of egalitarian gender ideology and higher fertility intentions. We first fit the MIMIC model with gender ideology as the latent variable. The predictors include the educational attainment of both wife and husband, women's birth cohort groups, and rural/urban difference. As shown in Table 3-2, higher educational attainment is associated with more egalitarian gender-role ideology. Younger birth cohort group tends to have more modern gender-role attitudes. The variable of rural area is not statistically significant because it is highly correlated with the educational attainment of women and their husband.[39] Fit statistics suggest that this model fits the data well (Table 3-3). Specifically, both the lower and upper bounds of 90% confidence interval for RMSEA is less than 0.05 and

[38] Mean values of indicators for different assortative mating patterns are also shown in Appendix Table 3-4. For homogamous marriage, the gradient is clear that more educated ones tend to hold more egalitarian gender-role ideology. The mean values of educational hypogamy fall between middle school homogamous marriage and high school homogamous marriage, while the mean values of hypergamous marriage are only higher than homogamous marriage with primary school or lower.
[39] If we exclude the variables of educational attainment, the estimate of variable of rural area is -0.480 and is significant at 0.001 level (S.E.=0.049).

both approximate fit indexes (GFI and CFI) are favorable. The result for SRMR is 0.014, indicating acceptable overall model fit.[40]

TABLE 3-2 ABOUT HERE

TABLE 3-3 ABOUT HERE

We further add the structural part of the logistic regression predicting higher fertility intentions.[41] To test our hypotheses, we compare the results between the models without (Model I) and with (Model II) the quadratic term of latent variable (gender-role ideology).[42] As summarized in Table 3-4, gender-role ideology has no statistically significant effect on women's fertility intentions in Model I. However, the quadratic term of the latent variable in Model II is significant at 0.05 level. Thus, there is some, though not very strong, evidence for a curvilinear relationship between the level of egalitarian gender ideology and higher fertility intentions. Specifically, the lowest level of fertility intention is achieved when the value of latent variable is around 0.531. Thus, for the 35 percent[43] of the observations with higher levels of egalitarian gender ideology, there is a positive association between fertility intentions and egalitarian gender ideology. For the other 65 percent of the observations, the association between fertility intentions and egalitarian gender ideology is negative. Both models indicate that the fertility intention for a second child is higher with higher household income, which is legitimate because

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[40] The chi-square test statistic rejects the MIMIC model, but it is sensitive to samples larger than 200, as in our study, and will tend to reject the model even when the fit is adequate.

[41] Current model assumes that the gender-role ideology fully mediates the effects the impacts of the predictors in MIMIC model. We also include the predictors in the MIMIC model in the logistic model. However, only the dummy variables of least education of women and most education of men are significant, with the variable of household income being no longer significant. The BIC suggests that current model (BIC=27201) is much better than the logistic model with predictors (BIC=27251).

[42] The quadratic term is generated by using XWITH command in Mplus.

[43] We generate and check the distribution of the predicted latent variable (gender-role ideology) from the MIMIC model. About 35% (1,493 observations) have estimates of the predicted latent variable bigger than 0.531. The mean value of the predicted latent variable is around 0.265.

families with more economic resources are more likely to afford to a second child. Living with mother or mother in-law have only marginal positive effects on women's fertility intention.

TABLE 3-4 ABOUT HERE

We then conduct analysis on rural and urban samples, respectively (Table 3-5). The negative impact of egalitarian gender-role ideology for the rural sample supports our speculation in the literature review. That is, in less developed areas, women with more egalitarian gender ideology are more likely to feel the unfairness in the gender system within household and show lower fertility intentions. For the urban sample, there is no significant monotonic or curvilinear relationship found between gender-role ideology and fertility intentions, however, the estimate of the effect of egalitarian gender-role ideology is positive. No significant non-linear relationship is found for either model.

TABLE 3-5 ABOUT HERE

In sum, the model tests support our second hypothesis that suggests a U-shape relationship between egalitarian gender ideology and fertility intentions versus the first classical demographic transition hypothesis depicting a negative relationship. However, for the rural subgroup, the negative relationship is more prevalent.

Conclusion and Discussion

Previous studies suggest that the evolution of the marriage institution in China is distinct from that of Western societies (Yeung and Hu 2016). This chapter further points to the modern-traditional mosaic that contributes to the curvilinear relationship between different levels of egalitarian gender ideology and fertility intentions among Chinese women. Specifically, based on the Chinese context, we use data from a nationally-representative survey to test the classical demographic transition hypothesis versus the hypothesis developed from gender equity theory about fertility. We find some evidence of a U-shape relationship between the level of egalitarian gender equity and women's fertility intentions for a second child in contemporary China, which has been buffeted by tremendous social changes. That is, women with more and less egalitarian gender ideology tend to have higher fertility intentions than those with average gender equality attitudes.

This non-linear relationship lies in the profound social changes and economic transitions ongoing in contemporary China. Specifically, the once prevalent egalitarian gender ideology has been in a clash with the deteriorating positions of women in the labor market. After the founding of People's Republic of China in 1949, the Communist ideology regarding gender equality was once zealously promoted. In accordance with Marx and Engels' doctrine that women's emancipation is contingent on their participation in social production, Chinese women were encouraged by the state to join the labor market (Croll 1983). Moreover, the considerable increase in female educational attainment (Lavely et al. 1990) enhances women's economic status, and Chinese girls' educational opportunities were found to be more responsive than boys' to better household economic circumstances (Hannum 2005). The ethos of egalitarianism have been further interiorized by the state propaganda permeated with the image of the 'Iron Girls' (Honig 2000). However, the recent erosion of women's economic position relative to men's points to the fact that women's position in the labor market has deteriorated (Zhang et al. 2004; Wang 2005; Li and Li 2008). Women's perceptions of discrimination also rise after market reforms (Parish and Busse 2000). These shifts occurred at different rates for different segments of the population, behooving us to try to examine its implications for Chinese' women's fertility intentions.

Facing a continuously changing milieu, girls continue to rival or outperform boys in educational performance and engagement (Hannum, Kong, and Zhang 2009). This trend brings China, especially urban areas, in line with the global trend of the reversal in gender gap in education. This changing demographic reality induces the adaption of the assortative marriage that the traditional hypergamy drops in tandem with a growth in proportion of homogamous couples. In urban China, there is a remarkable increase of homogamous marriage among the highly-educated group, paving the way for the second stage in 'gender revolution'. The legacies from the once prevalent egalitarian gender ideology has also brought highly-educated men into the 'gender revolution'. Thus, for these subgroups, the gender equity within household might reach to a higher level, reducing wives' strain between the role of a caring parent and that of a job-holder. However, for the rest of the population, women's perception of unfairness in the gender system rises with more gender equal attitudes because their partners' gender ideology has not yet transmitted to an egalitarian one.

As emphasized by McDonald (2013), '(women's) perceptions of unfairness arise because individually oriented institutions such as education and market opportunities open up new opportunities for women…Having no or few children is a reaction on the part of women to perceived unfairness in the gender system of the cultural context in which they live'. Our analysis suggests a curvilinear relationship between egalitarian gender ideology and fertility intentions in China. This might result from different life-course experiences and perceptions of unfairness for different subgroups of people in the context of a mosaic temporality, where the socialist heritage, the resurgence of Confucianism, both of the socialist version and capitalist version of modernity interact (Ji 2017). In the era of universal two-child policy, our results also have policy implications for future fertility trends in China. As pointed out in other studies (Attané 2016b), the lack of state policies supporting families and women's deteriorated positions in the labor market, rather than the state birth controls, might exert growing influence on Chinese fertility decisions. With the socioeconomic development underway, childbearing decisions of people with lower socioeconomic status (also with less egalitarian gender ideology), who now have high fertility intentions, will be increasingly affected by motherhood penalties as women are more educated and join modern economic production. Women's perception of unfairness might negatively affect their childbearing behavior if without transitions to egalitarian gender ideology within household. Thus, the gender equity should be promoted in related public policies, such as labor market regulations minimizing gender discriminations and parental leave policies balancing childcaring responsibility between men and women (M. Zhao 2016).

There are several limitations of this chapter. First, we do not have information about actual behaviors related to gender equity, such as division of household chores and the market solutions adopted to reduce the role incompatibility, to compare the results with previous studies. Second, our analyses do not incorporate women's perceptions about gender inequality in the private sphere and in public spheres, which might better connect to the gender equity theory of fertility (McDonald 2013).

Tables and Figures

Table 3-1 Mean values of women's gender-role ideology indicators across subgroups

Urban sample	Indicator 1	Indicator 2	Indicator 3	Indicator 4
Women's educational level				
Primary school or lower	1.13	1.64	1.54	2.73
Middle school	1.53	2.13	1.86	3.10
High school	1.86	2.42	2.03	3.24
College or above	2.15	2.58	2.12	3.37
Husbands' educational level				
Primary school or lower	1.25	1.78	1.64	2.83
Middle school	1.48	2.06	1.81	3.04
High school	1.82	2.35	1.98	3.21
College or above	2.05	2.53	2.10	3.32
Rural sample				
Women's educational level				
Primary school or lower	0.96	1.57	1.53	2.70
Middle school	1.39	2.06	1.78	2.97
High school	1.91	2.57	2.16	3.21
College or above	2.29	2.84	2.50	3.29
Husbands' educational level				
Primary school or lower	1.06	1.64	1.54	2.74
Middle school	1.26	1.90	1.72	2.89
High school	1.36	2.11	1.90	2.95
College or above	2.13	2.85	2.25	3.26

Note: All indicators are measured by Likert scale ranging from 0 to 4. All the scales have been transformed, such that higher scores indicate higher level of egalitarian gender ideology.
Indicator 1: men should be career-oriented while women should be family oriented.
Indicator 2: men are born to have an advantage over women.
Indicator 3: getting married to a better man is more important than succeeding in career.
Indicator 4: female employees should leave the labor market first during economic recessions.

Table 3-2 Factor loadings and structural coefficients in MIMIC model

	Estimate	S.E.
Factor loadings on gender-role ideology (the intercept is fixed at 0 and the residual variance is fixed at 1)		
Indicator 1	0.732***	0.020
Indicator 2	0.815***	0.022
Indicator 3	0.541***	0.022
Indicator 4	0.352***	0.017
Structural coefficients		
Educational level of women (ref: middle school)		
Primary school or lower	-0.559***	0.064
High school	0.298***	0.059
College or above	0.481***	0.084
Educational level of husbands (ref: middle school)		
Primary school or lower	-0.114+	0.067
High school	0.170**	0.055
College or above	0.140+	0.073
Birth cohort groups (ref: 1961-1970)		
1971-1980	0.157***	0.045
1981-1993	0.200***	0.052
Rural area (ref: urban area)	-0.050	0.053
Number of observations	4313	

Note: Standard errors are estimated by clustering at city subdistricts (*jie dao*) and villages (*xiang/zhen*); $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3-3 Results of fit statistics for MIMIC model

Fit statistics	Result
Chi-square	126.231
Degrees of freedom	29
P-Value	0.000
RMSEA (90% CI)	0.028 (0.023 – 0.033)
CFI	0.963
TLI	0.947
SRMR	0.014

Table 3-4 Factor loadings and structural coefficients

	Model I	Model II
Gender-role ideology (the intercept is fixed at 0 and the residual variance is fixed at 1)		
Indicator 1	0.732***	0.732***
Indicator 2	0.815***	0.815***
Indicator 3	0.542***	0.541***
Indicator 4	0.352***	0.352***
Structural coefficients		
Educational level of women (ref: middle school)		
Primary school or lower	-0.557***	-0.559***
High school	0.300***	0.298***
College or above	0.482***	0.481***
Educational level of husband (ref: middle school)		
Primary school or lower	-0.112+	-0.111
High school	0.171*	0.173*
College or above	0.141+	0.143+
Birth cohort groups (ref: 1961-1970)		
1971-1980	0.159**	0.160**
1981-1993	0.202***	0.202***
Rural area (ref: urban area)	-0.048	-0.050
Coefficients of logistic regression of intention for two or more children (ref: preferring one child or being childless)		
Gender-role ideology	-0.036	-0.068
Gender-role ideology^2		0.064*
Age	-0.006	-0.007
Agricultural *hukou* (ref: other *hukou* types)	0.151	0.151
Agricultural *hukou* of husband (ref: other *hukou* types)	-0.059	-0.062
Working (ref: not working)	0.066	0.067
Having a son (ref: having a daughter)	0.014	0.014
Logarithm of household income (centered)	0.124**	0.121**
Co-resident with mother or mother in-law	0.177+	0.180+
Co-resident with father or father in-law	-0.033	-0.031
Community-level characteristics		
Years of education	0.019	0.022
Logarithm of household income	-0.087	-0.085
Year (ref: 2010)		
2012	0.209*	0.217*
2013	0.031	0.039
Region (ref: East)		
Middle	-0.233*	-0.233*
West	-0.049	-0.060
Number of free parameters	39	40
Loglikelihood	-33437	-33435
Number of observations	4313	4313

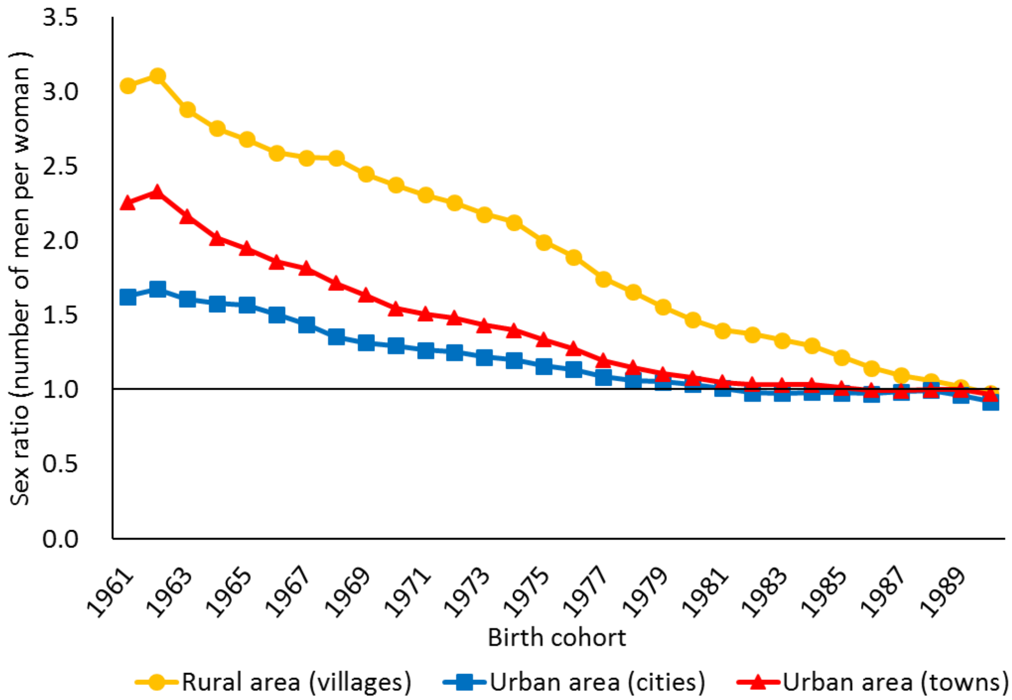
Note: Missing data on household income are dealt with using full information maximum likelihood (FIML). Standard errors are estimated by clustering at city subdistricts (*jie dao*) and villages (*xiang/zhen*). + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3-5 Factor loadings and structural coefficients for rural and urban samples

	Rural sample	Urban sample
Gender-role ideology (the intercept is fixed at 0 and the residual variance is fixed at 1)		
Indicator 1	0.666***	0.733***
Indicator 2	0.811***	0.835***
Indicator 3	0.602***	0.536***
Indicator 4	0.357***	0.335***
Structural coefficients		
Educational level of women (ref: middle school)		
Primary school or lower	-0.468***	-0.594***
High school	0.561***	0.245***
College or above	0.495*	0.455***
Educational level of husband (ref: middle school)		
Primary school or lower	-0.103	-0.104
High school	0.224+	0.148*
College or above	0.440	0.123
Birth cohort groups (ref: 1961-1970)		
1971-1980	0.241**	0.138**
1981-1993	0.397***	0.111+
Coefficients of logistic regression of intention for two or more children (ref: preferring one child or being childless)		
Gender-role ideology	-0.179*	0.011
Age	-0.002	-0.010
Agricultural *hukou* (ref: other *hukou* types)	-0.349	0.222+
Agricultural *hukou* of husband (ref: other *hukou* types)	0.065	-0.109
Working (ref: not working)	-0.083	0.091
Having a son (ref: having a daughter)	0.058	0.007
Logarithm of household income (centered)	0.072	0.140*
Co-resident with mother or mother in-law	-0.105	0.294*
Co-resident with father or father in-law	0.187	-0.127
Community-level characteristics		
Years of education	-0.022	0.021
Logarithm of household income	-0.170	0.066
Year (ref: 2010)		
2012	0.211	0.162
2013	0.278	-0.101
Region (ref: East)		
Middle	-0.945***	0.088
West	-0.389*	-0.011
Number of free parameters	38	38
Loglikelihood	-8961	-24236
Number of observations	1170	3143

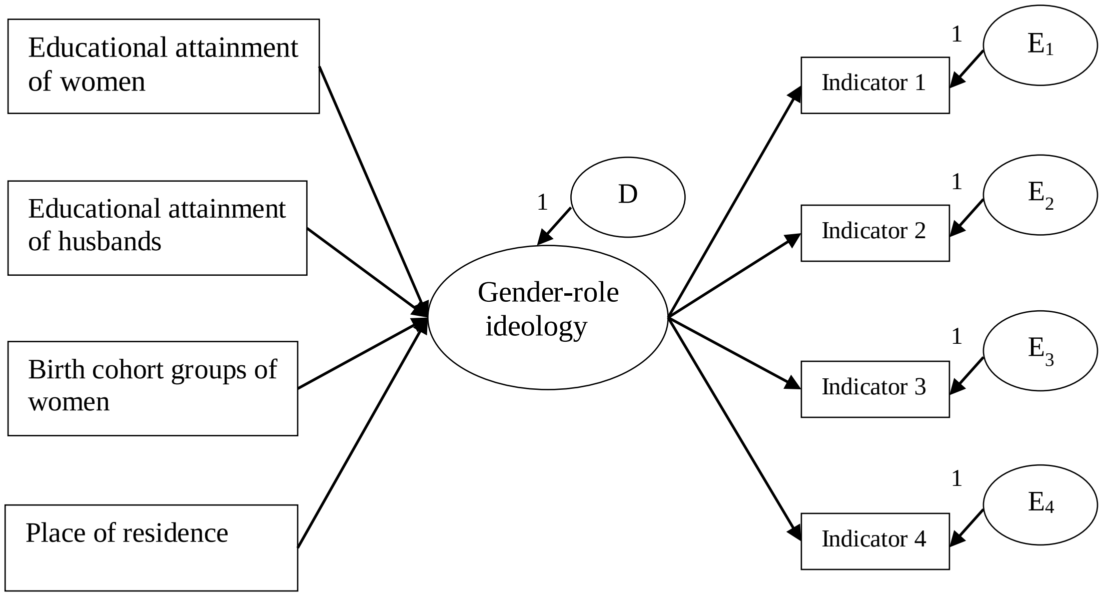
Note: Missing data on household income are dealt with using full information maximum likelihood (FIML). Standard errors are estimated by clustering at city subdistricts (*jie dao*) and villages (*xiang/zhen*). $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 3-1 Sex ratio for people with vocational college or above education by birth cohort between 1961 and 1990



Source: Tabulation on the 2010 Population Census of the People's Republic of China.

Figure 3-2 Path diagram of MIMIC model with gender-role ideology as the latent variable



Note: For simplicity, correlations between the independent variables are not shown.
Indicator 1: men should be career-oriented while women should be family oriented.
Indicator 2: men are born to have an advantage over women.
Indicator 3: getting married to a better man is more important than succeeding in career.
Indicator 4: female employees should leave the labor market first during economic recessions.

Figure 3-3 Educational distribution of women

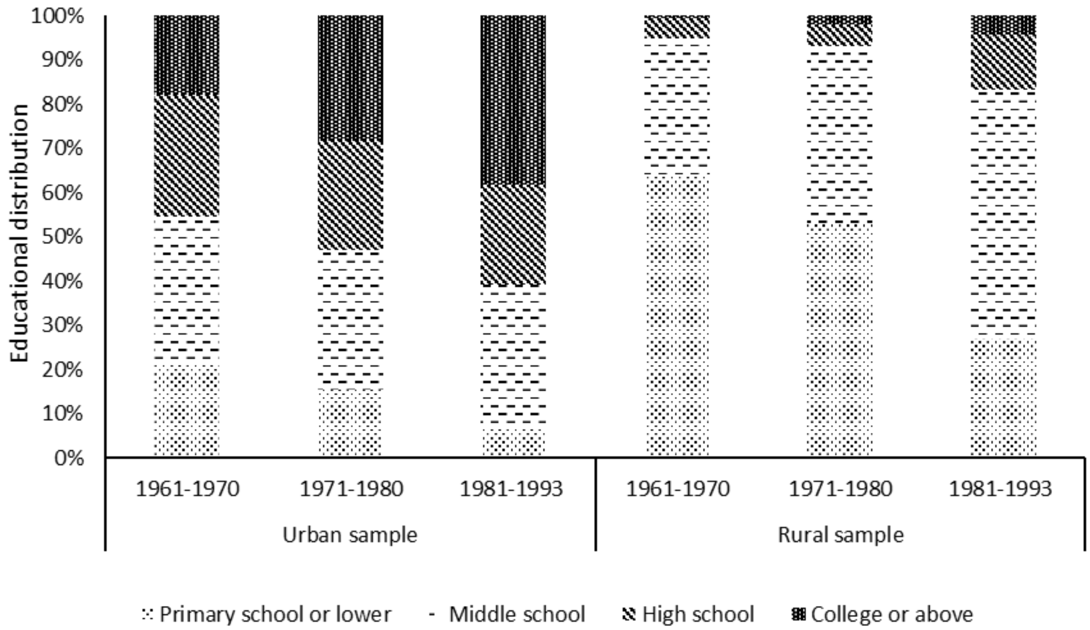
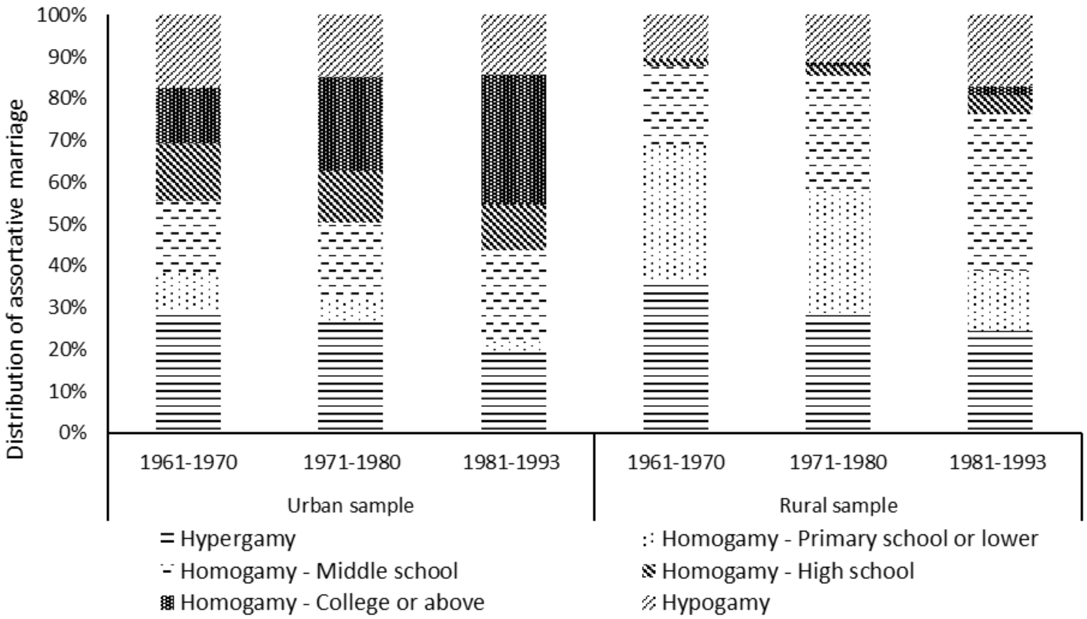


Figure 3-4 Distribution of assortative marriage



Note: Hypergamy: marriage in which the wife is less educated than her husband
Homogamy: marriage in which two spouses have the same education level
Hypogamy: marriage in which the wife is more educated than her husband

Appendix

Appendix Table 3-1 Descriptive statistics of analytical sample

	Women with one child
Fertility intention (%)	
Preferring one child or being childless	38.95
Two or more children	61.05
Indicators of gender-role ideology (numeric values from 0 to 4)	
Indicator 1	1.72
Indicator 2	2.26
Indicator 3	1.93
Indicator 4	3.14
Educational level (%)	
Primary school or lower	16.55
Middle school	35.96
High school	23.28
College or above	24.21
Educational level of husband (%)	
Primary school or lower	12.36
Middle school	35.64
High school	25.53
College or above	26.48
Birth cohort (%)	
1961-1970	33.76
1971-1980	40.90
1981-1993	25.34
Living places (%)	
Urban area	72.87
Rural area	27.13
Age (mean)	36.96
Hukou status (%)	
Agricultural	44.82
Other *hukou* types	55.18
Hukou status of husband (%)	
Agricultural	42.31
Other *hukou* types	57.69
Working status of women (%)	
Working	72.85
Not working	27.15

Sex of first child (%)	
Daughter	41.39
Son	58.61
Household income (median/mean)	40000/64368
Co-resident with mother or mother in-law	
Yes	20.03
No	79.97
Co-resident with father or father in-law	
Yes	15.53
No	84.47
Community-level characteristics	
Years of education (mean)	10.03
Household income (median/mean)	45580/61299
Year (%)	
2010	36.68
2012	32.60
2013	30.72
Region (%)	
East	49.32
Middle	31.32
West	19.36
Number of observations	4,313

Note: About 9.6% of the observations have missing data on household income, thus the mean and median of household income are summarized based on reported values.

Appendix Table 3-2 Pearson correlations between all pairs of indicators

	Indicator 1	Indicator 2	Indicator 3	Indicator 4
Indicator 1	1.000			
Indicator 2	0.475	1.000		
Indicator 3	0.321	0.354	1.000	
Indicator 4	0.219	0.318	0.237	1.000

Note: The internal consistency reliability can be measured by coefficient alpha, which is also called Cronbach's alpha, by using the formula $\alpha_c = \frac{n\overline{r_{ij}}}{1+(n-1)\overline{r_{ij}}}$ where n is the number of indicators and $\overline{r_{ij}}$ is the average Pearson correlation between all pairs of indicators. Thus, the Cronbach's alpha for these four indicators is 0.654, which is adequate for analyses (Kline 2010).

Appendix Table 3-3 Results of fit statistics for MIMIC model in Table 3-2 with interactive terms of educational levels

Fit statistics	Result
Chi-square	162.001
Degrees of freedom	56
P-Value	0.000
RMSEA (90% CI)	0.021 (0.017 – 0.025)
CFI	0.964
TLI	0.949
SRMR	0.010

Note: BIC from this model is larger than that of the model reported in Table 3-2, suggesting worse model fit**.**

Appendix Table 3-4 Mean values of women's gender-role ideology indicators by assortative mating patterns

Urban sample	**Indicator 1**	**Indicator 2**	**Indicator 3**	**Indicator 4**
Educational hypogamy	1.84	2.38	2.02	3.22
Educational homogamy				
Primary school or lower	1.07	1.55	1.47	2.69
Middle school	1.48	2.08	1.85	3.08
High school	1.90	2.45	2.01	3.27
College or above	2.14	2.56	2.10	3.36
Educational hypergamy	1.54	2.10	1.84	3.03
Rural sample				
Educational hypogamy	1.54	2.14	1.84	3.05
Educational homogamy				
Primary school or lower	0.95	1.53	1.49	2.65
Middle school	1.41	2.05	1.78	2.94
High school	2.01	2.84	2.26	3.29
College or above	2.54	3.14	2.39	3.50
Educational hypergamy	1.07	1.74	1.66	2.83

Note: Same with Table 3-1.

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