MIGRATION, MARITAL FERTILITY AND MARITAL FERTILITY PREFERENCES AMONG MIGRANT WOMEN IN CHINA

A Dissertation

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ABSTRACT

This dissertation investigates the contribution of migration and urbanization to China's demographic dynamics. Migration in China from the rural to the urban areas has increased substantially over the last thirty years. And it is believed that migrants are influenced by both the rural and urban settings. Prior research in China has centered largely on the fertility transitions within the perspective of Demographic Transition Theory, and on the different fertility transition in rural and urban areas. Prior research on the fertility of migrants in China and other countries has been guided by one or more of the four hypotheses of selectivity, disruption, adaptation, and socialization. Few prior studied consider the influence of social context. I argue that context should have an independent effect on the fertility of migrants.

In this dissertation I estimate both microlevel and multilevel models to explain the fertility of migrants. I first investigate the effects of migration status on the transition from marriage to the first birth. I estimate Cox proportional hazards models using five waves of data from the 2000 to 2011 China Health and Nutrition Surveys. To better understand the influence of community contexts, I next examine the effects of urbanization levels on the fertility preferences of migrants. I estimate generalized multilevel logistic regression models using data from the 2006 China Health and Nutrition Survey.

My results clearly show that the four hypotheses are applicable for understanding the fertility of migrants in China. The results demonstrate that the transition from marriage to first birth is significantly accelerated for rural-to-urban migrants compared to urban non-migrants, and rural-to-urban migrants have a lower desire for more children than urban

non-migrants and rural non-migrants. However, I did not find any significant differences in the transition between marriage and the first birth for rural-to-urban migrants compared to rural non-migrants. Urbanization level of communities has an indirect and significant effect on a woman's intention for more children for women with children: the more urbanized a community, the more similar the fertility intentions of rural-to-urban migrants are to those of urban non-migrants.

DEDICATION

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NOMENCLATURE

ASFR	Age-Specific Fertility Rate
CFPS	China Family Panel Study
CHARLS	China Health and Retirement Longitudinal Study
CHNS	China Health and Nutrition Survey
EVA	Event History Analysis
NBSC	National Bureau of Statistics of China
TFR	Total Fertility Rate

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

Page

Page

CHAPTER I

INTRODUCTION

1.1. General Sociological and Demographic Interests

China is the most populous country in the world – accounting for approximately one fifth of the world's population. In the post-war period, the rate of population growth has been high, resulting in more than a doubling of the population in the past 60 years – from 55 million in 1950 to 134 million in 2010 (Figure I-1). China also has experienced tremendous growth in its urban population since the 1950s. Chinese Census data indicate that the total population increased from 583 million in 1953 to 1.34 billion in 2010, but the urban population grew even faster. The First National Population Census in 1953 recorded only 13.26% of the total population living in urban places, while the Sixth Census in 2010 documented approximately 50% of the total population living in urban places (NBSC 2011). Because of the relaxation of population control, as well as the increasing rural-to-urban migration, industrialization and economic growth, China's urbanization rates have been much higher than it was in the 1980s (Chan and Zhang 1999; Goldstein, Goldstein, and Gu 1991; Goldstein and Goldstein 1991). Between the First Census (1953) and the Second Census (1982), urban population increased by only 7.7%, but from the Second Census (1982) to the Sixth Census (2010), it grew by 30% (see Figure I-2). In addition, urbanization rates have been negatively associated with fertility levels in China since the 1950s (Figure I-2) and similar negative relationships have been found in the provinces (Tien 1984; Tu 2000). As urbanization continues, more and more rural residents are expected to move to urban places. Therefore, when considering the growth of China's future population, it is essential for researchers to pay attention to the role of migration in the urbanization process and the fertility transition, as well as its effects on fertility in rural and urban places.

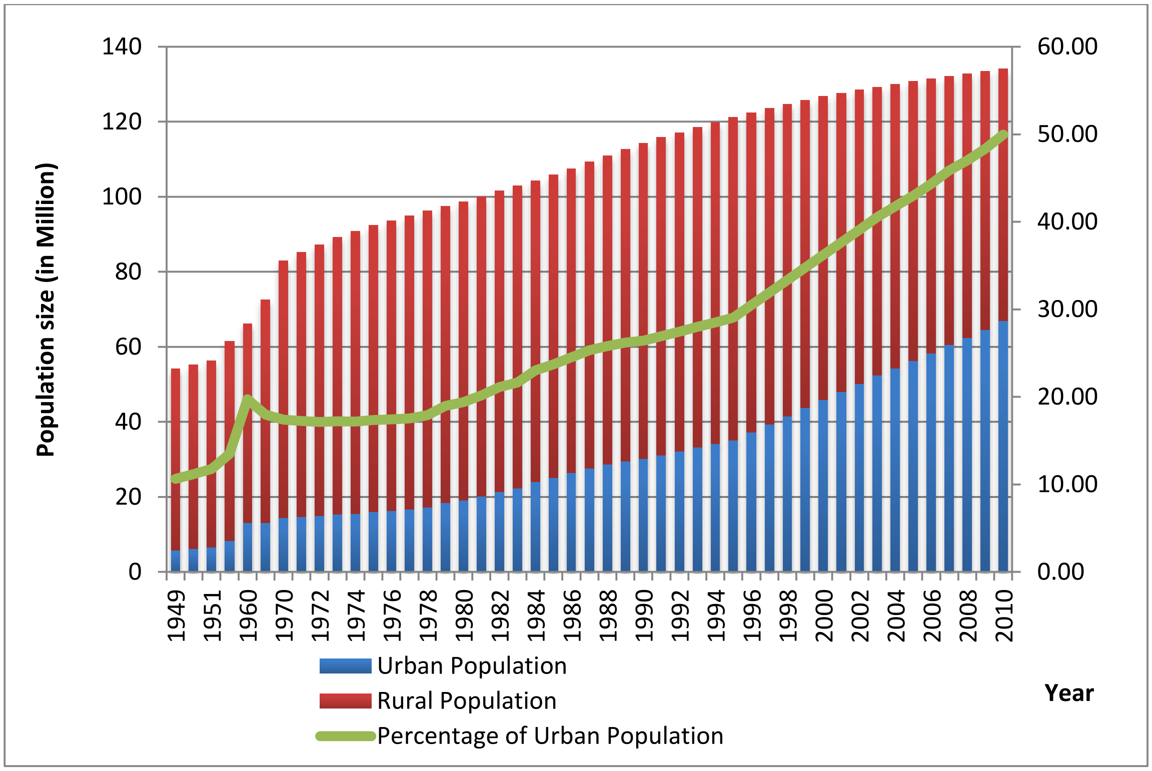

Figure I-1 Population Growth by Urban and Rural Residence, China, 1949-2010[1]

[1] Data source:
NBSC. 2014. "China Statistical Yearbook (2014)." Beijing: China Statistics Press, Retrieved 2/8, 2015 (http://www.stats.gov.cn/tjsj/ndsj/2014/indexch.htm).
The National Bureau of Statistical Council has reconstructed and standardized the urban and rural population data for all six censuses.

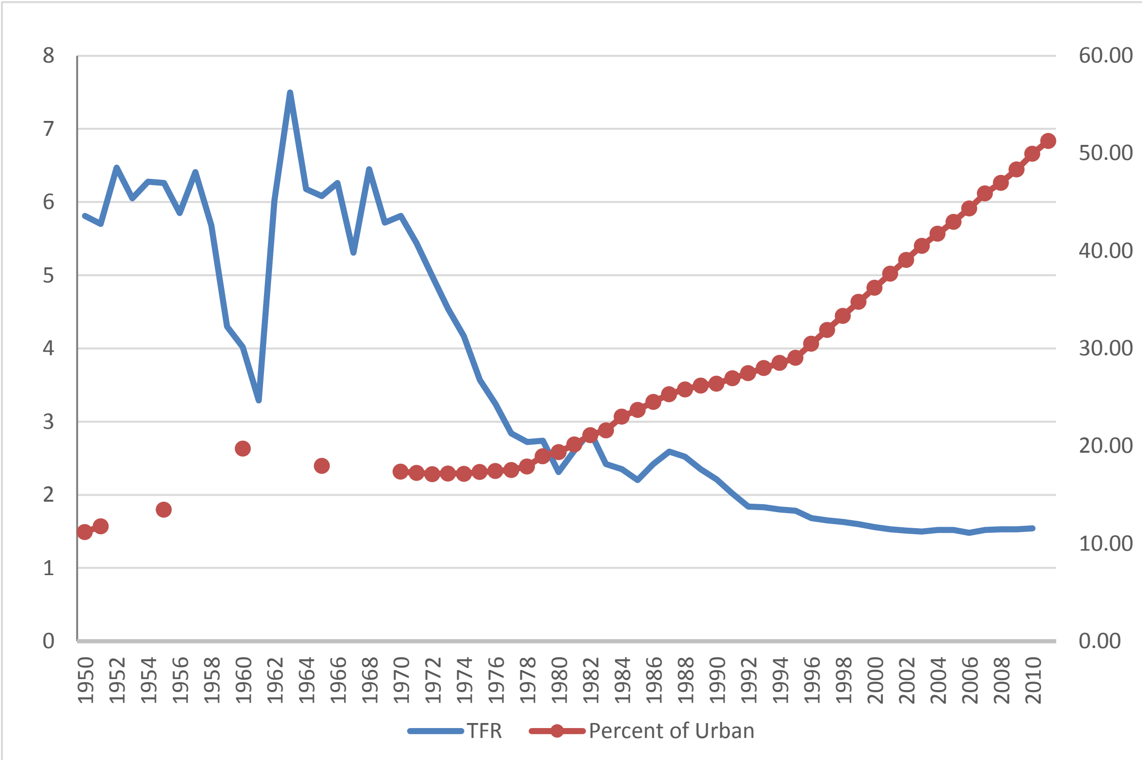

Figure I-2 Total Fertility Rates and Urbanization Rates, China, 1950-2010[2]

A continuing influx of migrants from rural places to urban places has characterized China since the 1980s. Before that time, geographical and social mobility was rare due to the restrictive *Hukou* system, which was used to control population in the commune system after the 1950s (Chan and Zhang 1999). The commune system gradually was dismantled after 1979, when China introduced the household responsibility system. Under the new system, farmers were encouraged to work for their self-interest instead of solely for their community. This economic transformation greatly improved agricultural

[2] Data sources:
TFR: US Census. International Database 2014; Urbanization rates: China Statistical Yearbook 2014 (NBSC 2014)

productivity, which led to surplus labor in rural places (Chan 1996). Conversely, in urban places experiencing economic recovery, manufacturers, service sectors and construction sites needed a substantial labor force. The employment opportunities in urban places thereby attracted free laborers from the rural areas. As policymakers realized that the surplus labor from rural areas in fact complemented urban labor needs, rural residents were then allowed to move and work in urban places without changing household registrations (Goldstein and Goldstein 1987; Goldstein 1990; Goldstein, Goldstein, and Gu 1991; Chan 2010). As a result, the size of the labor migrant population soared from 6.5 million in 1982 to 221 million in 2010 (an increase of 34 times), whereas the total population increased by 32.89% from 1.01 billion in 1982 to 1.33 billion in 2010 (Zheng and Yang 2013).

The rural-to-urban migrants, who constitute the majority of the so-called "floating population" (as *liudong renkou* in Chinese), have received voluminous attention from researchers, the social media, and policymakers. The term "floating population" means migrants who have lived in an urban destination for more than six months with household registrations (*HuKou*)[3] somewhere else (Duan and Sun 2006; Duan et al. 2008). A recent official report documented approximately 236 million people in the floating population. This means that one out of every six people in China is a "*floater*" (The Floating Population Division of National Health and Family Planning Commission 2013). In addition, western researchers have recognized the rural-urban migration in China as "the largest flow of migrant labor in human history" (Goldstein, Goldstein, and Gu 1991;

[3] The household registration (*HuKou*) entitles a citizen to permanent residence and social benefits. As a consequence, rural-to-urban migrants live and work in cities, but are not able to settle there permanently and access social benefits.

Goldstein 1990; Roberts 1997). From the 1950s to the 1990s, China experienced a remarkable and rapid fertility transition, moving from six children per woman in 1950 to below the replacement level of 2.1 children in the early 1990s (Figure I-2). Currently, the fertility rate in China is extremely low (Cai 2010; Zeng 1996; Zhao and Chen 2011). Among the provincial administrative divisions of China in 2010, all 31 divisions had a total fertility rate (TFR) of less than 2.1, 27 had TFRs below 1.5, and 6 had TFRs below 1.0 (NBSC 2012).

Debates have arisen over the driving forces for this remarkable fertility transition. China is well-known for the determined governmental efforts to reduce fertility through a restrictive birth control policy, especially the One-Child Policy that was underway by the early 1980s. In Western Europe, it took 75 years or longer to complete the fertility transition, while in China it took only 40 years (Lee and Wang 1999; Wang 2011). But researchers claim that the fertility transition in China is not unique compared to other countries undergoing demographic transition; thus, it should not be exclusively credited to the strong birth control policy. Instead, many believe that social and economic development has contributed much more than birth control policy to reducing fertility levels (Banister 1987; Cai 2010; Guo et al. 2003; Poston and Gu 1987; Riley 2004). According to Demographic Transition Theory (Notestein 1945; Davis 1945), social and economic development leads to reduced fertility and mortality and slows down population growth when a country experiences industrialization and modernization. In Western Europe, fertility transition began as a consequence of industrialization and modernization in the late eighteenth century (Davis 1945; Notestein 1945). When Western Europe’s fertility rate had dropped below the replacement level, China was still heavily dependent on agriculture under the control of the Qing Dynasty. Thus, the onset of China's fertility transition was impeded due to delayed modernization. Historical demographic data show that the fertility rate in China remained as high as six children per woman until the early 1950s (Lee and Wang 1999). Because China had a dual economic structure with a significant concentration of industrialization and modernization in urban places (Poston, Davis, and Deng 2012), the fertility level there started declining before family planning programs were introduced (Lavely and Freedman 1990; Tu 2000). As a consequence, the fertility transition in urban places actually began in the 1950s, and reached rural areas in the 1970s. Urban residents had TFRs as high as six per woman, as did rural residents in the 1950s, but rural residents had almost twice the TFRs as did urban residents by the 1980s. The rural-urban fertility differential has narrowed since 1978, but recent data indicate that rural areas still have relatively higher levels of fertility than do urban areas, even when fertility in both rural and urban areas falls below the replacement level (Guo et al. 2012; Zeng and Vaupel 1989).

With the persistent fertility differential between rural and urban areas, policymakers became concerned about the fertility of migrants. In 1990, the China Central Television Channel (also known as CCTV) created a play titled "Child-bearing Guerrillas" for a New Year's Eve Show. The story showed a rural migrant couple attempting to escape the local family planning cadres and have more children (especially a boy) by moving to the city. Many families in China watched the New Year's Eve Show and rural to urban migrants came to be known as "Child-bearing Guerrillas." The wide media coverage following the show illustrated societal concerns about migrants rebelling against family planning policies (Goldstein, White, and Goldstein 1997; You and Poston 2004; You and Poston 2006). However, researchers showed that rural-to-urban migrants do not have higher fertility levels than their rural counterparts who do not migrate. Additionally, migrants' propensity for increasing birth rates under the government's strict birth control policy is minor in the long term (Goldstein, White, and Goldstein 1997; You and Poston 2004; You and Poston 2006; Chen and Wu 2006; Liang, Yi, and Sun 2013).

Needless to say, moving from a rural location to an urban place is an important life event for migrants, with fertility being one of the most important aspects of life that may be influenced by such a move. Researchers have examined the potential impact of rural-urban migration on fertility and stipulated that exposure and adjustment to urban life affects migrants' attitudes and behaviors about fertility (Inkeles 1969; Easterlin 1975b; Freedman 1979; Goldstein 1973). Generally, large-scale migration leads to fundamental social changes and affects the lives of not only the rural, but also the urban, residents. The city acts as an agent for modernized values and norms. The German sociologist, Georg Simmel, in *The Metropolis and Mental Life,* asserted that human nature is pursuing autonomy and individuality from the overwhelming social forces of historical heritage or external culture, values, and norms (Simmel 1950). The American sociologist, Louis Wirth, argued in his work *Urbanism as a Way of Life* (Wirth 1938) that the uniqueness of urban life affects individuals. The city is the center of economic, political, and cultural activities, which generates lifestyles different from those in rural communities. In contrast to the rural community, the city has a more diverse and dense population. Urban life is based on formal rules and regulations; individual relationships thus tend to be more superficial, transitory, and segmented. Urban life also ensures a greater amount of individual variability, whereby individuals gain more liberty and freedom than they have in rural life. Nonetheless, with a more sophisticated and complex division of labor in the city, individuals must face more intense competition to achieve upward socioeconomic mobility. In other words, in the city, one gains greater autonomy over personal life, but faces more economic pressures (Wirth 1938).

Empirical studies on relationships between rural-urban migration and fertility have set forth a number of hypotheses about how migration affects fertility behavior. Sociologists and demographers have focused on the hypotheses of selectivity, disruption, adaptation, and socialization when investigating the relationship between migration and fertility. The selectivity hypothesis suggests that rural-to-urban migrants are a specific group in terms of their age, education, marriage, and occupation; thus they should have lower fertility than the overall population in a rural area. The disruption effect of migration focuses on the fact that migration itself delays marriage and childbearing. Compared to non-migrants, changing residence makes the migrant more likely to experience spousal separation and psychological stress that might delay childbearing. The disruption hypothesis thus supports the lower fertility of migrants compared to non-migrants (Goldberg 1959; Goldstein 1973; Goldstein and Goldstein 1981; Hervitz 1985). Moreover, social, cultural, and contextual factors also affect the fertility of migrants. The adaptation hypothesis assumes rural-to-urban migrants aim for upward social mobility in terms of income and social status. They adapt their fertility behaviors to the lower fertility environment in urban places. Thus, rural-to-urban migrants become more similar to urban residents in fertility behaviors and preferences. Additionally, the urban values and patterns of behavior adopted by the migrants could potentially spread back to rural places and smaller urban locations. This process, in turn, further lowers the fertility level outside the urban areas (Goldstein 1973). Nevertheless, compared to the adaptation hypothesis, the socialization hypothesis argues it may take more than one generation to assimilate to urban fertility norms. The internal values and norms socialized in a rural childhood persistently affect migrants' fertility behaviors in later life in the urban setting. Thus, rural-to-urban migrants tend to keep similar fertility levels as non-migrants in rural areas for at least one generation due to the effects of socialization (Campbell 1989; Goldstein and Goldstein 1981; Hervitz 1985; Stephen and Bean 1992).

These hypotheses of selectivity, disruption, adaptation, and socialization, along with empirical data, are helpful for understanding the fertility dynamics of migrants in other countries. But the impact on fertility of recent migration in China is uncertain when considering the influences of recent rural to urban migration since 2000. First, recent migrants tend to be younger and more likely to settle and start a family in the cities. The average age of the floating population is 28. The average time migrants with families stay in their destination is more than four years, so some researchers call them "*non-floating floaters*" (Duan et al. 2008; Duan, Zhang, and Lu 2009). Second, younger migrants are more educated and also more ambitious and anxious to obtain permanent residence in urban places than were previous migrants in the 1990s. Researchers assert that family reunion promotes happiness and a sense of belonging to the city, making migrants desiring to stay in the cities permanently (Chan 2010; Zheng and Yang 2013). Thus, they may have fewer children than they would if they stayed in rural areas (Duan et al. 2008; Duan, Zhang, and Lu 2009). However, the majority of the migrants are young and fecund (i.e., able to bear children). They are more likely to move as a family unit or to set up a family in an urban location. In this case, spousal separation as a disruption of childbearing for migrants may not exist. Third, with the increased focus of the Chinese government favoring urbanization, policymaking leans toward embracing migrants in urban places. Actually, the Chinese government has targeted a 60% urbanization rate by 2020 (Jourdan 2014). Policymakers have continuously reformed the household registration system and social welfare system to better assimilate the rural population into the urban population (Chan 2010; Riley 2004). Additionally, the government has intentionally developed medium-sized cities and towns to absorb surplus labor as a way to relieve population pressure in the large cities (Goldstein 1990). This inclusive policy may help migrants adapt to urban life with less stress than they would have faced before. Fourth, the structural socioeconomic inequalities between rural and urban areas in China deserve the attention of researchers who study the fertility of rural-to-urban migrants. The rural-to-urban fertility gap still exists with the socioeconomic, cultural, and policy differences embedded in rural and urban societies. Socialization in rural areas in China may continue to impact the fertility behaviors and values of migrants for years. Based on these statements about Chinese migration, my first objective in this dissertation is to identity the relationships between rural-to-urban migration and fertility using the most recent survey data.

Furthermore, in recent decades after the fertility transition in the 1990s, researchers have progressively concentrated on the changing fertility preferences. Earlier studies during the fertility transition in China concentrated on the effects of socioeconomic development and the government's family planning programs (Banister 1987). Recent studies have focused on changes in fertility culture implying that there is a shrinking ideal number of children and a diminishment of preference for sons (Zheng 2004; Zheng et al. 2009; Zheng 2014; Zick and Xiang 1994). The traditional norm of having more children has been undermined by the intensive family planning propaganda, as well as by rapid social and economic development. Various social surveys and studies have shown that a smaller family size is more preferred; birth control is more popular and voluntary; and even young couples who are allowed to have more than one child by current policy do not intend to have more children (Cai 2010; Peng 2011; Tu 2000; Zhao and Chen 2011; Zheng et al. 2009). Given the negative association between urbanization and fertility, as well as the uncertain impact of migration on fertility in China, there is a pressing need for us to better understand changing fertility preferences with social changes in China in recent years. Hence, the second issue I will address in my dissertation is the effect of social change of urbanization on individual fertility preferences.

The need to study the impact of migration is emphasized by its magnitude and by its significance for demographic, social, and economic conditions in China. I will first devote attention to the recent trends in rural to urban migrants because of the significant growth in their numbers over the past 40 years. Both rural and urban residents gain substantial benefits from social and economic development, but the social and economic gap between rural and urban areas still exists and may well be widening. The central government has invested more in developing industry in urban areas but less in rural areas. More infrastructure construction, such as schools, hospitals and other social institutions, is invested in urban areas than rural areas (Bian 2002; Poston, Davis, and Deng 2012; Riley 2004). Thus, the number of rural to urban migrants continues to increase (Duan et al. 2008). Besides the simple influx of rural migrants, whether these migrants will comprise a significant share of the future urban population also depends on their level of their fertility, compared to that of the urban population. In addition, rural residents have always reported higher fertility rates than urban residents (Guo et al. 2012; Zeng and Vaupel 1989). According to data on the long form of the 2010 Census, rural residents were estimated to have a TFR of 1.44, whereas urban residents exhibited a TFR of 0.98 (NBSC 2012). Such a sharp difference in fertility provides an especially interesting context for studying the fertility patterns of rural to urban migrants. Moreover, the factors resulting in higher rural fertility might exert an influence among the recent migrants even after they settle in the urban places. Since the rural-urban migration flows have contributed greatly to the progress of urbanization in China (Goldstein 1990; Jourdan 2014), the current policy is designed to help migrants settle permanently in urban places (Chan 2010). As migrants become more and more dominant in the urban population, the significance of assessing the fertility of migrants in China increases.

1.2. Personal Interests

Despite the important sociological and demographic issues in the above research, my early life experiences in rural society have inspired me to undertake doctoral research on how urbanism has changed life in China. Growing up in a small village in Hunan Province, I personally witnessed the declining fertility and increasing outmigration of young people that was taking place across most of rural China. In 2004, I left my hometown for college and moved to Beijing, one of the largest metropolitan areas in the world. Meanwhile, almost every young person in my home village, including my younger brother, went to "the South"[4] seeking job opportunities in factories after just they had graduated from junior middle school. They joined the big group of "*Nongmingong*" (rural workers), and became part of the 236 million floating migrants. Even though we left our hometown many years ago, we are still emotionally tied to the rural areas. During my last visit in 2012, I found that the previously lively village had faded in recent years due to the outmigration of young people and declining fertility. The only elementary school, which my parents and I attended many years ago, was closed due to a shortage of students. Most of the young people had left, but a few children and all the grandparents stayed behind in the village. Therefore, every time when I think of my cohort, when I think of the vanished village with low fertility, I am motivated to explore how social changes impact the livelihoods of migrants in the cities and non-migrants in rural communities.

[4] "The South" refers to Guangdong Province, which is located to the south of Hunan Province. Guangdong has the largest number of migrants working in factories.

1.3. Structure

This first chapter introduced the importance of studying migration and fertility from sociological and demographic perspectives, my research objectives, my personal motivations, and the significance study. I also provided a background for understanding rural-urban fertility change and the effects on fertility change that are due to socioeconomic and policy differences in rural and urban China. In Chapter II, I review the theoretical frameworks and empirical studies on fertility transition and urbanization, and the relationships between fertility and migration, as well as fertility preferences. In Chapter III, I discuss survey data I will use, my research questions and hypotheses. In Chapter IV and V, my data analyses and the results are presented. In Chapter VI, I summarize my findings, draw out some of the implications of my research, and discuss the limitations and future work.

CHAPTER II

LITERATURE REVIEW

In this chapter, I begin with a review of general demographic and sociological theories developed by demographers to better understand the fertility transitions in western countries and in China. These theories tend to attribute fertility transitions to the major social changes led by industrialization and modernization since the 18th Century, as well as to the cultural changes of the norms and values about childbearing. In addition, in developing countries, where there have been substantial increases in urbanization since the end of World War II, a large proportion of the rural population moves from the rural villages to the modern and industrialized urban communities. I then discuss some literature on how the urban way of life has influenced the values and behaviors of individuals, paying special attention to the fertility of migrants. Researchers have proposed a number of hypotheses explaining the association between migration and fertility with empirical studies from different countries around the world. Meanwhile, China has received considerable attention from demographers for being the country with the largest flow of rural to urban migration since the 1980s. While more and more rural residents are moving to urban places in China, demographers have conducted several studies on the fertility patterns of these migrants. I also discuss this literature in this chapter.

Moreover, as many countries have transitioned to very low fertility levels, there has been a concern about whether this transition has been accompanied by a transition in fertility preferences. I thus examine and discuss the several recent analyses of fertility preferences. I examine these previous studies with regard to the measurement of fertility preferences and with respect to the social and economic factors that are related to preferences.

2.1. General Theories Focusing on the Fertility Transition

"The nature of the social-economic changes selected to achieve the desired population size partly determines the population size that is desirable…. in the view of demographic transition, the key problems are the interrelated ones of social, economic, and political change" (Notestein 1953).

Social and economic development and political changes have been hypothesized to lead to population change by increasing or decreasing the fertility and mortality rates in human societies. These expectations are addressed in Demographic Transition Theory (DTT), which highlights the role of modernization processes in fertility and mortality decline. In the 18th century, the Industrial Revolution greatly promoted human efficiency and the survival rates of offspring, bringing down mortality rates, and then fertility rates, in Western Europe (Notestein 1945; Davis 1945; Mason 1997). According to DTT, human societies experience four stages of population growth in response to the processes of modernization: high fertility and high mortality, high fertility and declining mortality, declining fertility and low mortality, low fertility and low mortality. After moving from high mortality and fertility to low mortality and below-replacement fertility, human societies step into a post transitional era when fertility and mortality approach stability (Coale 1984).

Using an economic analysis of familial relationships, the Wealth Flow Model is different from DTT. It stipulates that childbearing patterns in societies are based on rational decisions. Fertility declines because it is economically advantageous to minimize the number of children for families even when economic growth has been slow and income level remains low (Caldwell 1976). “Wealth flows” are not only about monetary transfers, but also about the goods, services and guarantees that are associated with fertility (Caldwell 1982). In traditional societies, children are not only the resource for human power in agricultural society, but also provide services and status-honor (especially in patriarchal systems) for parents. Thus, there is always an incentive for more children in the family, which leads to a higher fertility level in the society. In modern societies, the wealth flow reverses. High fertility is no longer advantageous for families since the costs of childbearing increase substantially. As formal education become necessary, parents must invest more wealth and time in their children for better education and social mobility. As women gain more independence from household duties and participate in the labor force, the opportunity costs of childbearing also rise. In addition, fertility is influenced by the improvements in public health and medical care. The increasing survival rates for children and the advancement of contraceptive methods facilitate birth control for women (Easterlin 1975a).

However, researchers have found that the patterns and timing of the demographic transition have varied across countries in Europe. A high socioeconomic level is not necessarily a precondition of fertility decline. Adjacent counties, regardless of their socioeconomic levels seem to follow the trajectory of fertility decline in the most industrialized, literate and urban countries. Thus, modernization alone is insufficient to account for the various timing of the transitions in European countries, while the Cultural Diffusion Model better explains this situation. Researchers have highlighted the importance of cultural factors such as common customs, religious traditions, and language for the fertility decline (Coale 1984). Social interaction at the local and national channels through a common language, traditions or customs could further exchange the ideas of low fertility. Additionally, globalization, communication and education have promoted the diffusion process across countries, so fertility declines faster in some countries even when socioeconomic development has not yet been achieved (Bongaarts and Watkins 1996; Knodel and Van de Walle 1979; Watkins 1987; Watkins 1991). Compared to other models, the drawback of Cultural Diffusion Model is that researchers have few ways to measure institutional or ideational change, so the importance of culture is always inferred rather than directly examined (Hirschman 1994; Watkins 1987).

2.2. Fertility Transition in China

Previous researchers studying the fertility transition in China have debated whether the fertility transition should be credited to the government for its persistent family planning programs or to social and economic development, since the central government in China has continuously endeavored to lower fertility rates since the 1950s (Banister 1987; Lavely and Freedman 1990). The Chinese government initiated policies on population control after noting the population expansion of the baby boom found in the 1953 Census. Fertility control in China can be divided into four stages (Poston, Davis, and Deng 2012).

The first birth control campaign was initiated in 1956, but reversed in 1958 when the government called for the Great Leap Forward and introduced the commune system in rural China, both of which needed a large pool of laborers. Fertility began to decline in urban places in the mid-1960s. In 1962, China resumed the second family planning program encouraging smaller families. This second campaign continued for several years with some interruptions by the Cultural Revolution starting in 1966. In the 1970s, rural fertility began to fall in response to the *Wan Xi Shao* Program (*"later marriage, longer birth intervals and fewer children"*), which was the third family planning campaigns. Even though there was a rapid fertility decline in the 1970s due to the *Wan Xi Shao* Program, there were still concerns about the large number of births due to demographic momentum. As a result, the most restrictive and complex birth control policy, the One Child Policy, was introduced in 1979 (Greenhalgh 2008; Poston, Davis, and Deng 2012). The One Child Policy signified the fourth stage of birth control policy in China. However, labeling China's fertility policy as a "One Child Policy" is overly simplistic. Most provinces in China have policy birth rates between 1.3-1.5 children (Guo et al. 2003), which are much lower than the replacement rate of 2.1 children. Guo et al. (2003) discussed the complexities of China's One Child Policy. It differs for the rural population, urban population and minorities and by province and region. For example, the policy basically allows an urban family to have only one child, a rural family to have a second child if the first child is a daughter, and a minority family to have more than one child. Under the policy, birth rates range from 1.3-2.0 children per family with an average value of 1.47.

Researchers have argued that modernization and development have facilitated the fertility transition in China. Researchers have questioned the actual effects of the One Child Policy since the 1980s. The fertility transition had already begun in urban places in the 1960s even without the more restrictive One Child Policy, and later the *Wan Xi Shao* Program continued to decrease fertility (Lavely and Freedman 1990). In addition, socioeconomic development, urbanization and health and medical services created the necessary conditions for lower mortality and fertility (Tien 1984). The fertility transition in the 1960s or 1970s was mainly due to the family planning programs (i.e. the *Wan Xi Shao* Program), as well as to social changes (e.g. improving medical care and declining mortality levels) that made family planning possible (Banister 1987). Therefore, the accomplishment in the fertility transition cannot be and should not be exclusively credited to the administratively enforced family planning programs. Researchers have demonstrated that social and economic development lowered fertility directly or indirectly, as well as created the context for family programs to succeed (Cai 2010; Chen et al. 2009; Lavely and Freedman 1990; Poston and Gu 1987; Tien 1984; Wang 2011; Zhao and Chen 2011).

Several studies of China's fertility decline have supported the demographic transition model. The decline of fertility cannot take place without the transformations in economic, social and political organizations (i.e. improving literacy and declining agricultural dependence). Tien (1984) found that the dissemination of contraceptive information and technology relied on socioeconomic conditions. The level of urbanization, total output per head and life expectancy at birth were negatively associated with fertility rates during the fertility transition years before 1980 in China. Poston and Gu (1987) found that the effects of socioeconomic variables are strong and direct, but the effects of family planning variables rely on socioeconomic variables. Labor force participation, income, infant mortality and illiteracy rate had consistently significant effects on fertility rates in 1982 and1990 cross-sectional analyses at the county and province levels. Cai (2010) found that the fertility transition in China is a product of socioeconomic development, which is not exceptional in the global context. Additionally, Cai (2010) compared two Eastern provinces (Zhejiang and Jiangsu), which share similar social and economic characteristics, but have implemented the fertility policies differently. His results show that both provinces have achieved very low fertility with different fertility policies.

The societal transformation from agricultural to industrial has contributed to fertility decline. Traditional labor-intensive agricultural production on family farms requires more laborers, which creates the need for more children (Banister 1987). On the contrary, the costs of raising children in an industrial society are much higher than if they were in an agricultural society. Since more skills are needed in industrial societies, parents must provide appropriate educational opportunities in order for their children to succeed. Therefore, the nonagricultural family has more economic incentives to control their fertility. It is the reversal of the wealth flow in the industrial society that leads to voluntary fertility control (Banister 1987).

The improvement in women's status has also contributed to the fertility transition. A traditional gender system expects women to be attentive mothers and supportive wives. The more traditional a women's view of her role, the more children she wants (Scott and Morgan 1983). As a socialist country, the Chinese government endeavored to promote gender equality. In 1950, the first law on marriage ensured women's rights within the family; since then women have gained more rights. Their social status has been greatly promoted through economic independence and education attainment. The role of women was emphasized during the construction of the socialist economy. Women were encouraged to work outside the family. While participating in the service and manufacturing sectors, they gained greater economic independence. In addition, increased education delays the age when women get married and have children. Educated women are also more likely to have non-traditional, i.e., different ideas, and have more access to birth control methods, which ultimately contribute to fertility decline (Banister 1987).

In conclusion, previous research has shown that policy is not the key factor responsible for the very quick fertility transition in China; instead, social and economic development expedited the transition to below-replacement fertility. In general, the demographic transition model (Notestein 1945; Davis 1945; Mason 1997) works for China. Moreover, among the various social and economic development factors, labor force participation in industry (economic development) and women's status (social development) appear to be are the most influential ones driving China's fertility decline (Banister 1987; Poston 2000; Tien 1984).

2.3. Urbanization, Migration and Migrant Fertility

Research focusing on migrant fertility has become popular since the World War I era because of the great importance of urbanization as a factor in demographic and social change, and the role of migration in urbanization. Rural-to-urban migration reduces population growth rate in rural places and increases the urban rate of growth, which is a principal cause of urban growth (Dyson 2011). Rural-to-urban migration is particularly evident in developing countries in Asia and Africa where the majority resides in rural areas (Bilsborrow 1998).

The relationship between migration and fertility must take into consideration the places where migrants are found. Some researchers have compared the fertility of migrants with that of non-migrants in the place of origin, while others have compared the fertility of migrants with that of non-migrants in the place of destination. Due to methodological and analytical differences, the findings about the relationships between migration and fertility vary with regard to the different social contexts in which migration takes place (Zárate and Zárate 1975).

I will review how the urban styles of life have influenced the values and behaviors of individuals, and then how migration affected fertility directly and indirectly in both urban and rural locations.

Individuals adapt to the external social forces in urban places. The German sociologist Georg Simmel (1950) claimed that urban life frees individuals from the social forces of external culture and historical heritage, thus preserving personal autonomy and individuality (Simmel 1950). Urban life does not require the conformity expected in small towns; hence, the interpersonal relationship in the modern metropolis is dominated by the market economy, where suppliers and purchasers are allowed to negotiate freely. In addition to their having more liberty, labor force specialization in urban places distinguishes individuals (Simmel 1950). Individuals must compete with other laborers for economic gain. Such competition in the labor market influences attitudes and behaviors in one's personal lives (Simmel 1950).

Furthermore, the American sociologist Louis Wirth further developed the urbanism perspective in his work *Urbanism as a Way of Life* (Wirth 1938). In contrast to rural communities, the city is a large, dense and permanent settlement of heterogeneous individuals. It is also the controlling center of the economy, politics and culture. The intimate interpersonal interactions in small villages change to anonymous, superficial, transitory and segmental relations in urban communities (Wirth 1938). Individuals gain "freedom from the personal and emotional controls of intimate groups," but lose "the spontaneous self-expression, the morale and the sense of participation that comes with living in an integrated society" (Wirth 1938: 13). Nevertheless, previous rural experiences still influence the urban population, who were usually migrants from rural places (Wirth 1938).

Easterlin (1975) discussed the influences of urbanization on the demand and supply of children as well as the cost of birth control. Urbanization leads to lower personal preferences and demand for children. The price of food in urban areas is higher than in rural areas. Women often get higher paid work in urban areas, so both the direct and relative costs of children in urban areas are higher than in rural areas (Easterlin 1975a). Fertility control methods are more convenient in urban areas. The liberal urban environment breaks down traditional fertility attitudes, influencing the desire for children and willingness to use birth control. In this way, urbanization has negative effects on the supply side of children (Easterlin 1975a).

Sydney Goldstein studied the fertility of migrants and non-migrants using data from the 1960 Census of Thailand. He suggested that rural to urban migration is associated with a considerable reduction in fertility. It is possible that the migrants are a selective group or that migration itself affects fertility levels of migrants. The fertility level of migrants was at least 20 percent lower than that of the non-migrants. Social and demographic characteristics, such as age, length of residence in the urban place, education, occupation and access to birth control were found to mediate the lower fertility of migrants (Goldstein 1973). In addition, Goldstein (1973) was one of the first demographers who noted there was a reverse movement from metropolitans to smaller urban places or rural areas. He also stated that migrants could be the potential agents to diffuse the urban life styles into the other places. Goldstein stated the following:

"Rural-urban migration undoubtedly has been a major instrument of change, both in the part it has played to date in the industrialization and economic development of the country through attracting persons to urban places and through the potential it has for spreading urban values and patterns of behavior through the movement of significant numbers of individuals from the large metropolis back to rural places or smaller urban locations" (Goldstein 1973: P. 239).

However, aggregate level data analysis cannot be used to show that that migration is the main factor resulting in the lower fertility of the migrants. Researchers have proposed a number of hypotheses to explain the differential fertility between migrants and non-migrants in the United States and other countries. Generally, migrants from rural places are a selective group of the rural population with certain socioeconomic characteristics and lower fertility. The fertility of migrants is subjected to the disruption and adaptation effects of migration, as well as to socialization in rural places. Research seems to show more support for the selectivity and the disruption effects of migration on fertility. But the strength of adaptation varies by country. The reasons may be that the mechanisms of the impact of migration on fertility may work along with other factors (Lindstrom and Saucedo 2002). The adaptation effect is conditioned by the selective characteristics of migrants. And the disruption effect may take more than one generation to have an effect (Chattopadhyay, White, and Debpuur 2006; Hervitz 1985; Lee and Farber 1984; Lee 1992; Lee and Pol 1993; Stephen and Bean 1992). I now review each of these hypotheses in more detail.

2.3.1. The Selectivity Hypothesis

The selectivity hypothesis proposes that migrants are a selective group whose fertility levels are initially lower than those of non-migrants in the place of origin (Goldstein 1973). Migrants are typically selected by age, marital status, education, occupation and other social-demographic characteristics, all of which affect fertility directly or indirectly (Hervitz 1985). Researchers have investigated the aggregate fertility differentials between migrants and non-migrants in the place of origin by cross-classifying them by such characteristics as education and occupation of the migrants themselves (Goldstein and Goldstein 1982; Kahn 1988).

In addition, migrants tend to be more ambitious with regard to upward mobility than non-migrants. In this way, they are more likely to assimilate to the urban context

(Bacal et al. 1988; Brockerhoff and Yang 1994; Ribe H and Schultz TP 1980). In African countries, researchers found that women who leave the countryside have longer birth intervals before migration. They were more likely to use contraception than the stayers. Migrant women's fertility tends to mimic the fertility of women in the destination. This is evidence supporting the selectivity hypothesis (Brockerhoff and Yang 1994; Chattopadhyay, White, and Debpuur 2006; White, Moreno, and Guo 1995).

2.3.2. The Disruption Hypothesis

The disruption hypothesis is associated with the move itself. Spousal separation and stress are associated with moving to a new environment, thus resulting in a delay of childbearing for migrants. The physiological capacity to bear children may be impeded since nutritional conditions may be undermined when women move to cities (Goldstein 1973; Goldstein and Goldstein 1981; Goldstein and Goldstein 1982; Hervitz 1985; Massey and Mullan 1984). In addition, it is important to note that the disruptive effects may be temporary. Migrants may resume normal fertility once they establish themselves in the new location. Their fertility may even accelerate in the long term in order to compensate for the delays in childbearing (Goldstein 1973; Goldstein and Goldstein 1981; Kahn 1994; Lindstrom and Saucedo 2002).

Research in the United States has supported the hypothesis that migration disrupts the timing of fertility, resulting in lower fertility compared to that of the stayers in the place of origin. Using retrospective fertility and migration histories data of seasonal migrants between a Mexican town and the United States, Massey and Mullan (1984) found that the birth probability was lower for couples being separated by migration compared to stayers in Mexico. The disruptive effect was particularly salient among younger women aged 15-19 and 20-24 when other variables were held constant. Also, the disruptive effect was greater for legal migrants than illegal migrants. The chance of upward mobility for illegal migrants is lower than for legal migrants, so illegal migrants tend to be less motivated to reduce fertility (Massey and Mullan 1984). Lindstrom and Saucedo (2002) also found that Mexico-US migrants had lower probabilities for childbearing as well as to fewer births compared to the non-migrants in Mexico.

Researchers in African countries have showed strong disruptive effects for migrants. Chattopadhyay, White, and Debpuur (2006) found the effect of disruption was only evident in delaying the higher-order births. This implies that the effect of disruption is temporary. The new arrivals experienced much lower fertility in the first few years than did long-term residents (Brockerhoff and Eu 1993; Brockerhoff and Yang 1994; Brockerhoff 1995).

2.3.3. The Adaptation Hypothesis

Other research has showed that rural-urban migrants tend to have lower fertility compared to that of rural stayers even when the selectivity and disruption effects are controlled. This suggests that migrants may well be adapting to urban constraints and fertility norms (Lee and Farber 1984; Lee and Pol 1993). Migrants' fertility is related to a rational decision-making response to migration itself, as well as the adjustments to urban life (Goldstein 1973; Goldstein and Goldstein 1981). Moving to urban places potentially brings migrants more opportunities for education and employment, as well as the diversified values and new ways of life in the metropolis. Migrants thereby are willing to adopt new behaviors including having fewer children. For example, migrants in Africa were more likely to use modern methods of contraception, rather than relying on the tradition of postpartum abstinence of long duration (Brockerhoff and Eu 1993; Brockerhoff and Yang 1994; Brockerhoff 1995). In addition, migrants may quickly change behaviors due to economic inequality and non-economic insecurities. Migrants usually take labor-intensive jobs with low salaries, or share lower quality housing with each other. They may have to pay extra educational and other expenses for raising children. Migrants also may face social-psychological insecurities. Thereby, due to economic inequality and non-economic insecurities, rural-to-urban migrants may lower their fertility to the levels of non-migrants in urban places (Bean and Swicegood 1985; Hervitz 1985).

Migrants are hypothesized to have lower fertility than non-migrants in the rural origin, but similar fertility to the non-migrants in the urban destination, due to their adaptation to urban places. However, the results of adaptation vary by country and adaptation is often confounded by selectivity. If migrants are a selective group with lower fertility levels before migration, they may be less likely to experience significant fertility reduction. In that case, the strong selection effect may be masking the adaptation hypothesis (Brockerhoff and Yang 1994; Chattopadhyay, White, and Debpuur 2006; Hervitz 1985; Kahn 1994). In addition, Lee (1992) and Lee and Pol (1993) argued that the improved medical and health care have reduced infertility as well as child mortality in

Cameroon. So they did not find a significant fertility reduction for migrants because the fertility-depressing effect of migration was offset by the improvement in urban places.

Moreover, adaptation is frequently one of the early stages of assimilation. Assimilation is the gradual process of acculturation of fertility norms and values from generation to generation. When the fertility of immigrants converges to that of the natives, the migrants may be said to have assimilated the urban values (Stephen and Bean 1992). For example, Goldstein found in Thailand that short-time migrants (based on a 5-year standard) had considerably higher levels of fertility than non-migrants in their places of destination, but the lifetime fertility levels of migrants were not very different from the levels of the non-migrants in the places of destination (Goldstein 1973). This analysis of fertility expectations also showed that immigrants tend to adapt their fertility preferences to those of the natives. This provides strong evidence for the assimilation of fertility norms by immigrants (Kahn 1994). However, a number of researchers using immigrant data from the United States found that the fertility decline of migrants depend on the age of immigrants, the socioeconomic status and the length of familial exposure to the destination society. Research in the US found that assimilation was only evident for Southeast Asian immigrants who are better educated, but not for recent immigrants from other regions. In addition, some studies found that recent immigrants had lower fertility than natives due to adaptation, but the pattern reversed in 10 years after the immigration. It generally takes about one to two generations for migrants' fertility levels to converge with those of non-migrants in the place of destination (Hervitz 1985; Kahn 1988; Kahn 1994; Stephen and Bean 1992).

2.3.4. The Socialization Hypothesis

The norms and values surrounding fertility in rural places still affect rural-to-urban migrants even after they move to urban places. Migrants' gender role values and norms of family and marriage (including family size preference and sex preference for children) are socialized throughout their childhood experience in the rural places. Due to the socialization process in rural places, rural-urban migrants are expected to have fertility levels similar to those of the non-migrants in the rural origin areas for at least one generation (Duncan 1965; Freedman and Slesinger 1961; Goldberg 1959; Hervitz 1985).

The socialization hypothesis is well supported by findings of the urban population in the United States. Goldberg (1959), Freedman and Slesinger (1961) and Duncan (1965) analyzed the fertility rates of the urban population with a farm background in the United States. Their results provide strong evidence supporting the socialization hypothesis. Goldberg (1959) studied the fertility differentials between two-generation urbanites and farm migrants or people with a rural background. He found that people with a rural background had higher levels of fertility than did two-generation urbanites. The reason was two-fold: childhood socialization still affected the behavior of the migrants, and the migrants were concentrated in the lower social and economic positions in the city. It may take a few generations for rural-to-urban migrants to fully accept urban values and behavior (Goldberg 1959). Freedman and Slesinger (1961) found that the fertility patterns of the indigenous non-farm population and that of the farm migrants were substantially different. The fertility of farm migrants in the United States was affected by the cultural patterns at both the farm origin and at the urban destinations, depending on their pace in adapting to the new environment. In addition, during the process of urbanization, mass media and education helped the farm population integrate to urban life (Freedman and Slesinger 1961). Duncan (1965) analyzed the fertility of the urban population, examining the interaction effects of educational attainment with farm origin. He found that education decreased fertility levels for couples with farm origins (Duncan 1965).

2.4. Studies on Migrant Fertility in China

In China, the government has called for urbanization, and has particularly highlighted the role of rural-to-urban migration. Migration has been shown to be positively associated with the size of the urban population. Rural-to-urban migration has been and remains the immediate cause of urbanization (Goldstein 1990). China's rapid economic growth has created extensive rural-to-urban migration, which in turn has been a dominant source of the growth of its urbanization since 1978. Additionally, the income gap between rural and urban areas continuously encourages inter- and intra-province rural-to-urban migration (Zhang and Song 2003).

Aggregate level analyses of provincial fertility levels have shown the negative relationship between regional urbanization and fertility rates in China. Provinces with higher proportions of urban population achieved lower fertility in 1990 (Tien 1984; Tu 2000). Guo et al. (2012) found that at the national level over the past 60 years, the negative association between urbanization rates and fertility was maintained until the early 1990s, when the relationship weakened. Although urbanization rates in China have increased rapidly since then, fertility rates have plateaued at a very low level. Researchers have used a decomposition method to examine the degree to which changes in rural and urban fertility and urbanization contributed to the fertility decline after 1982. They found that urbanization was the primary factor driving fertility decline between1982 and 2008 (Guo et al. 2012). Cai (2010) found that a one percentage increase in the migration was associated with a fertility decline of 0.0007 children per woman; he argued that this occurred because migration often interrupts or delays family formation (Cai 2010). It is very likely that migration will still be the main force behind declining fertility trends in the future.

Researchers have demonstrated that migrants in general have fewer children than do non-migrants in the areas of origin because they are a selected group from the rural population. The differential fertility between migrants and non-migrants depends on how long the migrants have stayed in the area of destination. This partially supports the adaptation hypothesis (Goldstein, White, and Goldstein 1997; You and Poston 2004; You and Poston 2006).

There is a hypothesis in China called the "detachment hypothesis." The influence of migration on fertility is confounded with the influence of family planning policy in China. Researchers examined whether the floating population has tried to avoid family planning controls in their origin areas and thus left their hometowns to have more children than were allowed were they to remain in the rural areas. Social media and policymakers have exaggerated the societal concerns of the so-called "Child-bearing Guerrillas," i.e., migrants who moved to the cities in order to have more than the number of children permitted by the family planning policy in their rural areas of origin.

Goldstein, White and Goldstein (1997) assessed the effects of migration and the changing family planning policy on childbearing for all women using life-history data from a survey undertaken in Hubei Province in 1988. They found that temporary migrants who moved before 1979 had their first births significantly earlier than non-migrants. Data collected in Anhui Province found similar results (Liu and Goldstein 1996). But for temporary migrants who moved after 1979, their interval from marriage to first child was not significantly different from that of non-migrants (Goldstein, White, and Goldstein 1997). This was an obvious cohort effect. In every birth-planning policy period after 1970, women had their first births more rapidly than did women in the pre-1970 period. The one child policy might be the major cause behind women's decisions to have a first child as soon as possible (Goldstein, White, and Goldstein 1997).

Yang's studies (2000 and 2001) confirmed the detachment hypothesis with survey data collected in 1993 in Hubei Province. Only births that occurred after 1979 were studied in order to better test the detachment hypothesis. His analyses showed that temporary migrants did not differ from non-migrants in fertility before migration due to the policy constraints, but after migration, they actually had higher fertility. The migrants were more likely to have unplanned births since they were outside the supervision of local officials. They had a significantly higher probability of having a second or higher order birth than did comparable permanent migrants and non-migrants when controlling for the types of residence. Nevertheless, he still found that permanent migrants experienced no significant changes in fertility after migration (Yang 2000b; Yang 2001). The results suggest that migration creates a loophole for rural-to-urban migrants, temporarily lessening official supervision over fertility at the origin and destination places.

You and Poston (2004 and 2006) modeled the probability of having a birth in the previous 18 months by migration status and relevant factors with micro-data from the 1990 Census of China. They found that after controlling for age, education, employment and ethnicity, compared to non-migrants in urban areas, short-term floating migrants were more likely to have a baby in the past 18 months, but this was not the case for permanent migrants and long-term floating migrants. They stipulated that the process of adaptation to urban norms could explain why long-term and short-term migrants in urban areas had different magnitudes of higher fertility than the non-migrants in urban areas. The migrants may adapt the behaviors quickly, but it may take five or ten years for migrants' rates to converge with those of the non-migrants, since the assimilation requires more than one generation for full realization (You and Poston 2004; You and Poston 2006).

However, other studies using more recent data on migrants and fertility have produced different findings. Following You and Poston's research design, Chen and Wu (2006) extended the research using micro-data from the 2000 Census. They found that after controlling education, age, household registration, ethnicity and parity variables, migrants, regardless of long-term or short-term status in urban areas, have a lower probability of having a birth in the last year than urban non-migrants. Migrants in rural areas also have a lower probability of having a birth in the last year than rural non-migrants; and long-term migrants have a lower probability of having a birth in last year than short-term migrants (Chen and Wu 2006). Their study supports the importance of adaptation effects, as well as disruptive effects, but the results differ from previous studies in the comparisons between the short-term migrants and the long-term migrants with the non-migrants. Previous studies claimed that the family planning policy accounted for the higher fertility of the short-term migrants, while Chen and Wu (2006) found that short-term migrants did not have significantly higher fertility than the non-migrants. They claimed that the rapidly developing market oriented economy creates intensive and competitive working and living environments for migrants. Because migrants are likely to live in insecure and unstable urban environments, they must work hard and sacrifice their marriage and childbearing to realize upward mobility. Life in the city considerably constrains women's fertility as a tradeoff for economic advantages (Chen and Wu 2006). Hence, migrants have a lower propensity to have a child after they migrated to the urban places.

Liang, Yi and Sun's research (2013) utilized a two-class (rural and urban) analysis framework to examine the impact of migration on fertility. They compared fertility differentials by migration directions with data from the 2008 China General Social Survey. They claimed that upward migration (i.e., from rural to urban) might decrease fertility, whereas downward migration (i.e., from urban to rural) may increase it, but that the degree of fertility decline would be greater than the increase. The influence of migration on fertility rate was shown to be insignificant for permanent migrants, but significant for temporary migrants (Liang, Yi, and Sun 2013). The drawback of this research is that they used a lifetime measure of fertility (children ever born) as the dependent variable. This approach cannot test for the direct impact of migration on fertility.

2.5. Research on Fertility Preferences

In addition to fertility research, fertility preferences have become a new field of fertility research with the availability of social survey data. Fertility preferences at the societal level are very important for estimating future fertility.

I will review many of the previous studies on fertility preferences from three perspectives: (1) the measurement of fertility preferences; (2) the internal consistency and predictive validity of fertility preferences; and (3) the social and economic factors accounting for the inconsistency between preferences and outcomes.

2.5.1. The Measurement of Fertility Preferences

Social surveys include questions on fertility preferences, making it possible for researchers to explore more research topics in the field of fertility preferences. The attitudes and knowledge, in addition to the practices of childbearing have been the focus of social surveys since the 1950s. The first nationwide survey focusing on ideal family size, desired fertility, and fertility intentions was the Growth of American Families (GAF) Survey, conducted in 1955 and 1960 in the United States (Whelpton, Campbell, and Patterson 1966). Later, there was the National Fertility Survey (NFS) in 1965 and 1970, and the National Surveys of Family Growth (NSFG) which started in the 1980s and continue to this very day. Globally, the World Fertility Surveys (WFS) and the Demographic Health Surveys (DHS) have been conducted in many countries and include similar questions (Bongaarts and Lightbourne 1992; Lightbourne 1985; Lightbourne 1987a).

Fertility preferences are the feelings or desires related to having children. Considerable demographic research has used the measures of ideal family size, fertility desires or expectations, and fertility intentions as fertility preferences. Ideal family size is conceptualized as the preferred number of children in a hypothetical family setting. Social surveys often contain the question, “What do you think is the ideal number of children for a family to have?” The ideal family size typically reflects the normative family size at the societal level. Fertility desires or expectations are related to the demand for children, which is the number of children one would have if one could control childbearing. Social surveys commonly ask, “If you could choose exactly the number of children to have in your whole life, how many would that be?” Finally, fertility intentions refer to the plan to have children considering current parity, beliefs about family and fecund status. Many fertility surveys ask, “Do you intend/plan/want to have a/another child?” followed by “If yes, how many do you intend to have?” The concept of intention is an indication of a person’s readiness; it differs from ideal family size or fertility expectations; fertility intentions produce more realistic projections of future fertility (Fishbein and Ajzen 2011). Therefore, these different measures bear different conceptual meanings, although sometimes it is difficult to distinguish among them (Morgan and Hagewen 2005; Thomson 1997).

As one might expect, ideal family size, fertility expectations and fertility intentions are highly interrelated. The ideal family size and prevailing fertility norms have tended to influence women’s expectations. Women having not reached their desired family size are very likely to intend to have additional children. In turn, desired family size and fertility intention can estimate the levels of fertility, as well as gauge the changing fertility norms in a society (Yeatman, Sennott, and Culpepper 2013). Westoff and Ryder (1977) found that at the individual level, intentions work better as predictors of future fertility than any other demographic and socio-economic characteristics.

Much demographic research has focused on such dimensions of preference as ideal family size, fertility desires or expectations, and fertility intentions (Bongaarts 2001; Bongaarts 2002). The concept of “ideal family size” is an immediate determinant of fertility. The decreasing ideal family size tends to shift the demand for children in the society. The consistent low desired number of children represents social norms of having fewer children and leads to constant declines of fertility intention. Studies across countries have shown that actual fertility is highly associated with women’s “desired fertility,” because the levels of contraceptive use, contraceptive availability and family planning effort have little impact on fertility while fertility desire is controlled (Pritchett 1994). “Fertility intention” is a proximate determinant of fertility in post-transitional societies. Actually, studies of individuals have shown that the fertility intention is the most reliable predictor for subsequent fertility in different countries. In models predicting the likelihood of birth, fertility intention retains its independent power, especially when a time referent is included in the measurement of fertility intention (Berrington 2004; Foreit and Suh 1980; Kodzi, Johnson, and Casterline 2010; Mazharul Islam and Bairagi 2003; Morgan and Rackin 2010; Silva 1991; Tan and Tey 1994; Westoff and Ryder 1977).

Most importantly, fertility is still the product of social structure, even it tends to be a form of a goal-driven and intentional process. Although intentions and preferences are psychological concepts, they are based on beliefs and norms. For example, the majority of women desired 2, 3, or 4 births, which could be women's adjustment to the normative standard of 2 to 4 children in society (Ryder and Westoff 1967; Ryder and Westoff 1971). Additionally, the decision-making of childbearing is a conscious self-regulatory process considering possible consequences and the expectations of significant others. Husbands and parents may play significant roles in women's decision to have children. Moreover, whether there are effective methods of contraceptive and whether contraception is acceptable to the whole society usually determines women's ability to control fertility (Feyisetan and Casterline 2000). Bongaarts found that observed fertility levels are higher than desired family size during the early and mid-transitional societal periods, because birth control and health care were usually not available for people to avoid pregnancy and increase the survival rate of newborns. Observed fertility becomes more similar to desired family size at the end of the transition when birth control and health care are available (Bongaarts 2001; Bongaarts 2002). Therefore, childbearing is a social behavior generated by conscious and reasoned deliberations rather than an automatic action (Ajzen and Fishbein 1977; Fishbein and Ajzen 1975; Fishbein and Ajzen 2011; Klobas 2011).

2.5.2. The Predictive Validity of Fertility Preferences and the Factors

A divergence exists between preferred and actual fertility. Quesnel-Vallée and Morgan (2003) described the phenomenon of "missing the target" for women who failed to fulfill their goals of ideal family size or intended fertility. Women in the U.S. usually cite a family with two children as an ideal family, but their actual fertility is often lower (Quesnel-Vallée and Morgan 2003).

Researchers have paid attention to why women tend to overestimate their future fertility. They admit that preferences have the nature of being inherently inconsistent, because cognitive and non-intentional biases undermine the validity of fertility preferences (Ajzen 2011; Liefbroer 2011; Philipov 2011). Many longitudinal data analyses have provided evidence for the internal instability of preferences. Studies from the three national sample surveys in the United States in 1955, 1960 and 1965 showed a positive bias of expected fertility in 1965 relative to 1955 (Ryder and Westoff 1967). In addition, the practice of relying on wording to measure intentions, expectations or desires is thought to be too optimistic; respondents do not distinguish between them in surveys (Westoff and Ryder 1977). The same has been shown to be the case in global settings. In the Demographic Health Survey (DHS) in Morocco, only 36% of respondents gave the same response to fertility preferences in two consecutive surveys (Bankole and Westoff 1998). In a study in southern Ghana, 20% of the sample changed fertility preferences from one interview to the next (Kodzi, Casterline, and Aglobitse 2010). Yeatman, Sennott, and Culpepper (2013) found that women in Malawi frequently changed the ideal family size preferences across eight interviews in two years: 25% of them altered their ideal family size from the 1st to the last interview and about two thirds of them revised their preferences at least one time across the study (Yeatman, Sennott, and Culpepper 2013). A longitudinal study in Greece that was conducted between 1983 and 1997 found that 70.1% of the women were consistent in their fertility plans, 19.3% had a smaller than expected family size and 10.5% ended up with a larger than initially expected number of children (Symeonidou 2000). A study in West German also showed that approximately 50% of respondents had different desired fertility across two survey waves and the older individuals had more stable desired fertility (Heiland, Prskawetz, and Sanderson 2008).

Second, the inconsistency between preferences and outcomes may well be affected by social factors (Morgan and Bachrach 2011; Quesnel-Vallée and Morgan 2003). The external social forces work to undermine the validity of fertility preferences in several ways. Norms about the ideal age to have children matter for women. For most women, the ideal age to have children is during the 20s; after they pass the ideal age of giving birth, their fertility desires and intentions often change (Rindfuss and Bumpass 1976). In addition, fertility intentions differ by subgroups based on demographic (e.g., rural-urban residence), socioeconomic (e.g., education, wealth and employment status), ideational factors (e.g., religious beliefs), and family structure (e.g., social capital and intra-familial social interaction), as well as by gender equality (i.e. women's negotiable power with their husbands to use contraception or to stop childbearing) in different social contexts.

More importantly, fertility is not a fixed goal for women and families, but rather a set of sequential decisions (Lee 1980; Namboodiri 1972). The life course perspective adopts a dynamic model including the effects of time, social forces and life events. The events and circumstances at time t influence behaviors at time t+1, and women's fecundity is restricted by biological age. People change their fertility goals in response to life events, such as marriage, the birth or death of a child, and education and career transitions (Freedman, Coombs, and Bumpass 1965; Rindfuss and Bumpass 1976; Silva 1991; Testa and Toulemon 2006). Union formation crucially determines the intention to have a subsequent birth. Recently married women are more likely than longer married women to change the number of intended births. The first child holds particular meaning for people since it implies an irreversible transition to parenthood. Both women and men who postpone childbearing and marriage are much more likely to have fewer births than they intended at the beginning of their reproductive lives (Morgan and Rackin 2010; Symeonidou 2000). The longer women take to participate in activities like completing their education and developing a career, the more likely they will postpone childbearing and change their preferences (Rindfuss and Bumpass 1976). The difference in the ideal number of children between two time points has been shown to be positively related to initial expected number of children and actual number of children (Symeonidou 2000).

In many countries in East and South Asia, son preference is a key determinant in the consistency between fertility intentions and outcomes (Bongaarts 2001). Researchers found that in India and Bangladesh, the presence of sons affected the predictive validity of desired fertility for estimating future fertility. The number of living sons is an important variable related to contraceptive use and the intention for additional children. The more sons a woman has, the more likely she is to desire no additional children and to practice contraception to avoid having another child. Thus, it is less likely that she would have more children than desired (Gipson and Hindin 2009; Roy et al. 2008; Vlassoff 2012). However, researchers did not find the same significant effects of son preference in Taiwan and Korea (Arnold 1985; Foreit and Suh 1980; Hermalin et al. 1979).

2.6. Changing Fertility Preferences in China

In China, different surveys have asked questions on different dimensions of childbearing, i.e., the attitudes, desires, expectations and practices. Some studies asked whether respondents thought they would have (additional) children or the number of (additional) children wanted/intended, while others focused on the “ideal” or “desired” family size. Some studies assessed the time issue by specifying a time referent in the questions, such as asking for the intention of having a child within the next few years (Zheng et al. 2009; Zheng 2014).

There have been extensive discussions about the explicit meanings of fertility preferences in the literature. As Lightbourne (1987b) pointed out, the fertility preferences have distinctly different definitions. There must be explicit construct in the content of survey questions, and the various measures emphatically attempt to measure different underlying quantity (Lightbourne 1985). However, the significant impact of fertility preferences on the fertility outcomes exists regardless of the different wordings in measurement (Bankole and Westoff 1998). Despite the fact of the manifest meanings of different measures, sociological conception should to uncover the latent functions of social activities and institutions (Merton 1968). Therefore, I will have a careful examination about how the preference questions were asked in the dataset, but I will focus on the latent meaning, fertility preferences, instead of pondering excessively on the wordings of the questionnaire.

Researchers have studied fertility preferences against the background of the One Child Policy in practice. For example, the General Social Surveys in China have asked

“Once you can have a second child, will you want one, excluding the effects of one-child policy or other restrictions, including financial issues?”, or “How many children do you feel are ideal for a family?” (Bian and Li 2012). According to analyses conducted by the Chinese Family Planning Commission in 2001, respondents would have 1.78 children under the family planning policy, but 2.04 given no policy influence; over 57% of women preferred two children, 37% preferred one child, and only 5.8% of women overall wanted more than two children (Zhou 2005). In 2006, a survey conducted in Jiangsu Province showed that the average ideal family size was 1.46 children among the sample of 18,638 women of childbearing age. While more than one-fourth of those surveyed were eligible to have two children, 55% said one child is best, and most of them chose to have one child even if they were allowed to have more (Zheng 2004; Zheng et al. 2009). Nevertheless, previous studies of fertility preferences in China all relied on data collected in cross-sectional demographic surveys. They provided important information about the changes in fertility norms and values, but they are not able to capture individual-level fluctuations.

Fertility preferences differ by demographic characteristics, such as age, sex and status as an only child (Feng 2009). People in rural areas wish to have more children than urban people, due to the inequality in development between rural and urban areas in China – the average income and educational attainment in rural areas are lower than in urban areas (Chen and Deng 2007; Zhou, 2005). The average desired number of children is lower in urban areas (1.42) than in rural areas (1.77) (Ding and Hesketh 2006). Under the influence of the Chinese One Child Policy, having a job with government background negatively affects the ideal number of children (Chen and Deng 2007).

The associations between income, education, and ideal number of children are complex. Chen and Deng (2007) found that among ever-married women below the age of 52, the higher the education and income, the lower the ideal number of children. But others found the relationship to be not simply linear, but to follow a concave curve: young people with the highest income, education or social status have higher fertility desires than do others. With the increase in educational attainment, both those who want no children and those who want more children increase. In addition, when fertility drops to an extremely low level, the negative effect of income on fertility is not apparent (Li 2003). Feng (2009) claims that the complex relationship between fertility preferences and SES is partly due to differences in the concepts of fertility desire and fertility. People with higher SES are more likely to desire to maintain a replacement fertility level, given the low level of fertility in society, but they may not have an actual fertility as high as they desire (Feng 2009).

2.7. Summary

Sociologists have shed light on how urbanism and modernism change individual lives including fertility attitudes and behaviors (Inkeles 1969; Simmel 1950; Wirth 1938). Previous aggregate level studies in China demonstrated the negative effects of urbanization on fertility. The proportion of urban population and the migration rates are negatively associated with fertility levels (Cai 2010; Guo et al. 2012; Poston and Gu 1987; Tien 1984). Previous studies based on individual level data in China showed that short-term migrants have higher fertility than long-term migrants and non-migrants in urban places, but that long-term migrants do not differ from non-migrants in urban places (Goldstein, White, and Goldstein 1997; Liang, Yi, and Sun 2013; Yang 2000b; You and Poston 2004; You and Poston 2006). Researchers have explained fertility differentials between migrants and non-migrants with the mechanisms of disruption, selectivity and adaptation. In one way or another, these hypotheses may work together in explaining the fertility differentials of migrants and non-migrants.

However, most of the previous analyses are not able to fully test the selectivity, disruption and adaptation effects separately. Studies in China have focused on cumulative fertility rates or the recent experiences of women of childbearing age. The drawback of using recent fertility is that women's recent experience cannot accurately reflect the adaptation effects of migration. If the timing of migration (before or after recent fertility) is unknown, it is hard to tell the effects of adaptation and disruption. The timing of fertility often changes substantially after arrival due to the disruption effects of migration. Using cumulative fertility rates may be a good approach for testing adaptation, but its weakness is that disruption effects cannot be assessed, if it is uncertain whether childbearing takes place before or after migration.

As recent migrants are more likely to move as a family unit or set up a family directly in urban places (Duan et al. 2008; Duan, Zhang, and Lu 2009), the spousal separation may be rare. Some research showed the disruption effects of migration to be not as obvious in migrant fertility research in China, but this does not mean that there is no effect of disruption. Another way to measure fertility may be needed to better address the disruptive effect of migration on fertility. The interval from marriage to first birth can indicate the postponement of childbearing by disruptive factors including migration. It may be used as an indirect indicator for the disruption effects of migration. I use the hazard of marital fertility, in addition to the birth probability in last year or the cumulative fertility of migrants, to address the disruption effects.

Selectivity of migration is evident when migrants are defined by specific observed characteristics, such as education, occupation and income, as well as the unobserved characteristics of aspirations to migrate or family size preferences (Goldstein and Goldstein 1982; Kahn 1988; Lee and Pol 1993; Lindstrom and Saucedo 2002). But little attention has been given to unobserved characteristics such as family size preferences in China. With the large scale social and economic development now occurring in rural areas, as well as the large scale rural to urban migration, recent rural-to-urban migrants might be less selected by socioeconomic characteristics in contrast to the stayers in rural places, and they might be more likely to be a selected group with aspirations to have a small family size (Duan et al. 2008; Duan, Zhang, and Lu 2009). I plan to examine different fertility preferences between migrants and non-migrants. Analyzing fertility intentions, instead of recent or cumulative fertility, could provide better evidence for an assimilation argument (Kahn 1994). Fertility intentions indicate decision-making of childbearing, which is influenced by short-term factors, including migration. Changing intentions of childbearing often reflect the fact that migrants adapt their fertility goals. Even if fertility intentions cannot fully predict future fertility, they may still provide useful information regarding the underlying norms influencing behavior (Westoff and Ryder 1977). The fertility preferences will be examined as the major dependent variable when testing the adaptation and disruptive effects of migration.

CHAPTER III

RESEARCH QUESTIONS, HYPOTHESES, AND DATA

I begin this chapter by providing some social context for China's differential fertility levels and mass rural-to-urban migration. This will highlight the importance of studying migrant fertility. Then I will introduce my research questions and hypotheses. Last, I will discuss the advantages and disadvantages of the data.

The sharp differences between rural and urban fertility levels and the mass rural-to-urban migration flow have made China an excellent example for the study of migration and fertility. Rural to urban migration has been increasing since the 1980s. Policy-makers plan to reach the goal of a 60% urbanization rate by 2018 (Jourdan 2014). Demographers also project that high levels of rural-urban migration will continue in China for the next several decades (Duan and Sun 2006; Duan, Zhang, and Lu 2009). In terms of fertility differences, the total fertility rate (TFR) in rural areas in 2010 was 1.44 compared to 0.98 in urban areas (NBSC 2012). Therefore, the study of migrant fertility has critical implications for urban and national population growth in China.

The changing social and demographic profiles of recent migrants in China provide new challenges to the findings of previous studies of the association between fertility and migration. China's large scale social and economic development has greatly improved the socioeconomic status of rural residents; thus, recent migrants are not as selective as earlier migrants in terms of education, skills and income levels. In addition, recent rural-to-urban migrants are more likely to find jobs through their social networks, such as other family members, relatives and neighbors in the same village or community (Yang 2000a). Rural-to-urban migrants also have become more established as family reunification becomes the major mechanism for couples staying together in cities. Recent migrants tend to be younger and young people are more likely to meet and marry in the cities (Duan et al. 2008; The Beijing News 2014; The Floating Population Division of National Health and Family Planning Commission 2013).

However, changing social policies may well lead to different results when comparing the fertility of migrants to that of rural and urban non-migrants. Permanent residence in cities is conditioned by the *Hukou* system in China. Rural-to-urban migrants without urban *Hukous* used to consider themselves as temporary residents and were expected to migrate again or return to their hometowns. Migrants not holding the urban *Hukous* were not entitled to social benefits, including education, welfare, medical care and housing. In recent times, the government has worked to remove such barriers for migrants in order to keep them working and living in the urban places permanently (Chan 2010; Goldstein 1990; Roberts 1997). These systematic changes in residence regulations may help rural-to-urban migrants maintain a higher fertility, much like they would have had had they remained in the rural places. On the other hand, since the percentage of population residing in urban areas has increased dramatically since the 1980s, it has become even harder for rural-to-urban migrants to secure jobs in the cities. Additionally, housing prices and living expenses in the cities have soared in recent years. Therefore, although urban ways of life enable individuals to be free from traditional rural communities, rural-to-urban migrants still face more social and economic competition in order to survive in cities. These economic and non-economic pressures may well lead to a lower desire for children.

3.1. Research Questions

On the basis of the above social context, I plan to address the following research questions: How does individual migration influence marital fertility and fertility preferences? How does individual migration and the levels of urbanization in the community influence the desire for more children as well as ideal family size, when socioeconomic status and important life events are controlled? Hence, I will undertake two major analyses. The first focuses on married women's actual fertility outcomes. I will examine the time interval from marriage to first birth and the occurrence of the first birth. The second analysis concentrates on women's fertility preferences. I will examine women's intention to have a birth and the intended number of children they expect to have.

Previous studies in China have relied on aggregate analysis or individual-level analysis using data of recent fertility or complete fertility (Chen and Wu 2006; Goldstein, White, and Goldstein 1997; Yang 2000a; Yang 2000b; Yang 2001; You and Poston 2006). I will particularly focus on the timing of the first birth after marriage as well as the woman's fertility preferences. In addition, I will focus only on rural-to-urban migrants to be able to examine the effects of migration on fertility. This focus is especially relevant because (1) the majority of the floating migrants in China are moving from rural to urban areas (The Floating Population Division of National Health and Family Planning Commission 2013); and (2) I am primarily concerned about the effects of urban life on the fertility of rural-to-urban migrants.

3.2. Hypotheses

I have examined the basic literature on migrant fertility in China, as well as the results of recent longitudinal studies of fertility preference in other countries (see Chapter II). Considering the recent demographic background of rural-to-urban migration, I developed a set of hypotheses corresponding to my research questions:

(1) Rural-to-urban migrants have higher actual fertility than urban non-migrants;

(2) Rural-to-urban migrants have lower actual fertility than rural non-migrants;

(3) Rural-to-urban migrants have a lower level of fertility preference than urban non-migrants and rural non-migrants;

(4) The higher the level of urbanization in a community, the more difference in the fertility desires of migrants compared to non-migrants.

I expect that migration's effects on fertility in rural origins and in urban destinations may influence each other, so I compare the actual fertility and fertility preferences of rural-to-urban migrants and urban non-migrants, and I will then examine the differences between rural-to-urban migrants and rural non-migrants.

3.3. Data: The China Health and Nutrition Survey (CHNS)

I extracted data from the China Health and Nutrition Survey (CHNS) established by the Carolina Population Center at the University of North Carolina at Chapel Hill in conjunction with the National Institute of Nutrition and Food Safety at the Chinese Center for Disease Control and Prevention (CHNS 2014). The CHNS attracted my attention because it is the earliest nationally representative, large-scale, and longitudinal survey in

China. The first survey was conducted in 1989, with follow-ups in 1991, 1993, 1997, 2000, 2004, 2006, 2009 and 2011. As of the last survey in 2011, the CHNS had a total sample of 27,447 individuals and 5,884 households from the 12 primary sampling units (9 provinces and 3 autonomous cities) and 288 secondary sampling units (communities, including 60 urban neighborhoods, 42 towns and 126 villages) based on all previous waves (CHNS 2014; Zhang et al. 2014).

The CHNS has wide geographic coverage and selects samples from provinces that are economically and demographically diverse. Eight provinces (Liaoning, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi and Guizhou) were selected in 1989. In 1997, Heilongjiang Province was added, and in 2011, the three autonomous cities of Beijing, Shanghai, and Chongqing were added. Figure III-1 shows the geographical distribution of the provinces: Guangxi, Guizhou, and Chongqing in the southwest; Henan, Hubei, and Hunan in the central area; and Jiangsu, Shandong, and Shanghai on the eastern coast. Beijing is in the north and Heilongjiang and Liaoning are in northeastern China. These provinces cover about 47% of China’s 2010 population (Zhang et al. 2014).

More importantly, the data from the CHNS are unique for answering questions about how women’s fertility patterns adjust to migration and the impacts of social change. The survey has collected identical data from individuals, households and communities for all the rounds in the different years. The questionnaire administered to ever-married women asks a complete series of questions about marriage, family structure, birth and pregnancy history, and fertility preferences. Also, data are available on parity, the timing and gender of all births occurring between the two survey years; these are data that are essential for my research. Using this longitudinal dataset, I can track the dynamic fertility behaviors and preferences of individuals. I can capture how fertility preferences change over time because CHNS used the same standardized questionnaire for different years. For example, fertility preferences are measured by two components: whether the women intended to have more children and her intended number of children. Women with no children and who were not currently pregnant were asked: “Do you want to have a child sometime? If yes, how many?” Women with one or more children and who were not

Figure III-1 Map of Survey Areas of the China Health and Nutrition Survey

currently pregnant were asked: “If you could choose the number of children to have, would you want to have another child sometime? If yes, how many?” I use these two questions to measure fertility preferences. I will explain their usage in more detail later.

In addition to providing substantial and complete information on fertility, the survey also collected data from individuals on such basic demographic characteristics as household income and assets, economic activities, activities of daily living, diet and nutritional status, health status, and the use of health services. One’s current residence, household registration and other related determinants of fertility are also available in the CHNS. With these data, I can compare the current household registration category (rural or urban) with current residence type (rural or urban) to determine the individuals’ migration status. In addition, I can investigate the impacts of such variables as wives’ and husbands’ socioeconomic background and family structure, education, income, the number of siblings, and geographic proximity to natal kin. However, one drawback of the survey is that it did not collect information on when the migration took place. Since it is unknown how long respondents have been in the current location, it is impossible to distinguish whether the migration is temporary or permanent. It is also impossible to judge whether the fertility occurred before or after the migration. I address these methodological details later.

In terms of the coverage of population in China, the CHNS is not a totally random sample of all the population in China. Because the team was unable to obtain census data for the sampling frame from the State Statistical Office in the 1980s, they have selected a few diverse provinces (Popkin 2000). In addition, information on sample weights is not available for either the cross-sectional or the longitudinal datasets from the CHNS, nor can researchers adjust the sampling procedures in the data analysis. Alternatively, researchers are advised to control the measures of the urbanization index and adjust standard errors and variances of their estimates by clustering at the community level (Popkin 2000).

However, even without a sampling frame based on census data during the 1980s, the research team put forth their best effort to create a dataset being representative of rural, urban and suburban populations in China (Popkin et al. 2010; Zhang et al. 2014). They implemented a multistage, random and clustering sampling method. At the first sampling stage, they selected several provinces as the primary sampling units. At the second stage, they selected one large city and one small city (usually the provincial capital and a lower income city), along with four counties from each province. The four counties were also stratified by income: one high-income, one low-income and two middle-income. At the third stage, two urban and two suburban communities were randomly selected from each city; one urban community and three rural villages were randomly chosen from each county. At the fourth stage, 20 households from each community or village were randomly selected for participation (Zhang et al. 2014). In addition, previous studies using data from the CHNS have demonstrated that the social and demographic characteristics of samples in CHNS are comparable to the average levels nationally (Chen, Short, and Entwisle 2000; Entwisle and Chen 2002; Short et al. 2002).

Another issue is that the follow-up rates and response rates are complex in the CHNS, because it is a very long-term survey. Approximately 60% of the samples in the CHNS in 2011 can be compared to the primary sample in 1989; around 80–88% across all surveys can be attributed to the previous round of data collection (Zhang et al. 2014).

Participants may be lost in one round of the survey, but appear in a later year. The sampling attrition was caused by several factors: people missed at random, schoolchildren went to boarding school or went to college and universities, some adults migrated, or a major natural crisis (such as flooding) occurred (Popkin et al. 2010). However, the research team and the provincial collaborators took many actions to remedy the attrition problem in the follow-up surveys. For example, they added a new province, Heilongjiang in 1997 in order to replace the loss of samples due to extensive flooding in Jilin Province in 1997, as well as for political and administrative reasons (Popkin et al. 2010). All new households formed by individuals within the sample households in 1989 have been re-visited starting in 1993. New households and communities from nearby places were added to replace the samples lost after 1997 (Zhang et al. 2014).

Overall, the CHNS is by far the largest and longest longitudinal survey in China and it is publicly available for researchers globally. It captures an enormous degree of heterogeneity in social, economic, health and demographic changes over time among the provinces, and provides representative data for rural and urban populations in China (Zhang et al. 2014). It is an excellent source for undertaking research that addresses how wide-ranging social and economic changes affect individuals, households and communities in China. Especially for my research, the longitudinal design provides stronger evidence for the influence of migration than would a cross-sectional survey design.

For my research, I drew samples from the CHNS for the five waves from 2000 to 2011. Since all the longitudinal data are organized in separate data files that can be linked by unique IDs, I merged the datasets from different survey years using the IDs. My final sample contained 13,126 observations from 5,849 unique women. The observations were almost evenly distributed from each year. Over half (56%) of the 5,849 subjects were surveyed at least twice (see Table 3.1 and Table III-2 below for details).

I turn in the next chapter to the results of my extensive analyses of migration and marital fertility.

Table III-1 CHNS Samples of Women Aged from 15 to 52 by Waves, 2000-2011

Wave	Frequency	Percentage
2000	2,611	19.89
2004	2,642	20.13
2006	2,499	19.04
2009	2,380	18.13
2011	2,994	22.81
Total	13,126	100

Table III-2 Subjects' Number of Times Surveyed, 2000-2011

Times	Frequency	Percentage
1	2,558	43.73
2	1,185	20.26
3	842	14.40
4	648	11.08
5	616	10.53
Total	5,849	

CHAPTER IV

EFFECTS OF MIGRATION ON MARITAL FERTILITY

In this chapter, I analyze the marital fertility of internal migrants. The objectives are twofold: to identify the relationship between migration and fertility, and to assess the mediating mechanisms by which migration and fertility are related. I first describe levels of fertility by migration status. I examine age-specific fertility rates and cumulative fertility in an aggregate level analysis. Then, I analyze the effects of migration on marital fertility using life-history data from the CHNS, presenting both univariate and multivariate analyses. For a fuller picture of survival by migration status, I use non-parametric method to graph the survival data, and then I estimate semi-parametric models to further examine the effects of explanatory variables. In addition, I first compare the actual fertility of rural-urban migrant women with that of urban non-migrants, and then compare them with rural non-migrants.

4.1. Aggregate Analysis: Recent Fertility by Migration Status

Initially, I examine the cumulative fertility of different groups using age-specific fertility rates (ASFRs) and the total fertility rate (TFR). The ASFRs are computed by dividing the number of births in the last year by the number of women in five-year age groups between age 15 and 45 (in units per thousand), and the total fertility rates are computed by summing the ASFRs and multiplying by 5. I obtain the exact birthdates of all children ever born to the women via the women's birth and pregnancy histories, and I compare them with the survey dates in the consolidated datasets. If a woman has a child with a birthdate within 12 months of the survey date, she is identified as having a recent birth.

Table IV-1 shows the distribution of recent births by age group and migration status. Rural-to-urban migrants have the highest cumulative fertility with a TFR of 1.94, followed by rural non-migrants with a TFR of 1.91, and then urban non-migrants with a TFR of 1.03. The TFRs give us a rough portrayal of the relationship between migration and fertility. To illustrate, if the past year's fertility rates are attributed to the women, and they survive through their reproductive lives from age 15 to 45, the rural-to-urban migrants, on average, are likely to have a completed fertility of up to 0.03 children more than rural non-migrants, and 0.91 more children than urban non-migrants.

Figure IV-1 presents the ASFRs for the three migration groups based on aggregate level data. Table IV-1 shows the frequency distribution of women who had a birth in the previous year. Clearly, rural non-migrants have a higher risk of births than do urban non-migrants and rural-to-urban migrants at young ages (under 20). This pattern of lower fertility of rural-to-urban migrants is likely attributed to the selectivity of migration. From ages 20 to 24, rural-to-urban migrants have higher rates of fertility than do urban non-migrants and rural non-migrants. This phenomenon is not consistent with the disruptive hypothesis, which expects that migrants would have lower fertility compared to non-migrants. This is very likely due to the fact that recent migrants are likely to build families in the place of destination and women may be more likely to migrate for issues of family reunion, or to the fact that socialization in rural areas still affects fertility behavior. Between ages 25 and 35, rural to urban migrants have a slightly lower level of fertility than do urban non-migrants, but still have slightly higher fertility than rural non-migrants. This indicates support for the adaptation and selectivity hypotheses. Surprisingly, rural-to-urban migrants increase their fertility rates at up to age 35 or higher. Again, this may due to the idea of family reunion. Migrants who work in urban places from a young age are likely to settle there, and they would have the ability to invite their rural wives to join them. They might accelerate childbearing later in order to reach their higher desired fertility, since this may not have been realistic when they were just starting to work as migrants. Therefore, concerning migrant fertility at the aggregate level, I found evidence for the selectivity, the adaptation, and the socialization hypotheses, but not for the disruption hypothesis. Next, I will further explore these four hypotheses with my analyses of individual level data.

Table IV-1 Number of Women Having a Birth in the Past Year by Migration Status CHNS, 2000-2011

		Urban Non-migrants			**Rural-to-urban**			**Rural Non-migrants**		
Age group		No	Yes	Total	No	Yes	Total	No	Yes	Total
15-19	N	33	0	33	6	0	6	83	7	90
	%	100	0	100	100	0	100	92.22	7.78	100
20-24	N	88	8	96	32	12	44	374	104	478
	%	91.67	8.33	100	72.73	27.27	100	78.24	21.76	100
25-29	N	286	33	319	68	7	75	738	60	798
	%	89.66	10.34	100	90.67	9.33	100	92.48	7.52	100
30-35	N	506	10	516	90	1	91	1,139	11	1,150
	%	98.06	1.94	100	98.9	1.1	100	99.04	0.96	100
35-39	N	716	0	716	97	1	98	1,551	3	1,554
	%	100	0	100	98.98	1.02	100	99.81	0.19	100
40-45	N	828	0	828	119	0	119	1,760	0	1,760
	%	100	0	100	100	0	100	100	0	100
	Total	2,457	51	2,508	412	21	433	5,645	185	5,830
	%	97.97	2.03	100	95.15	4.85	100	96.83	3.17	100

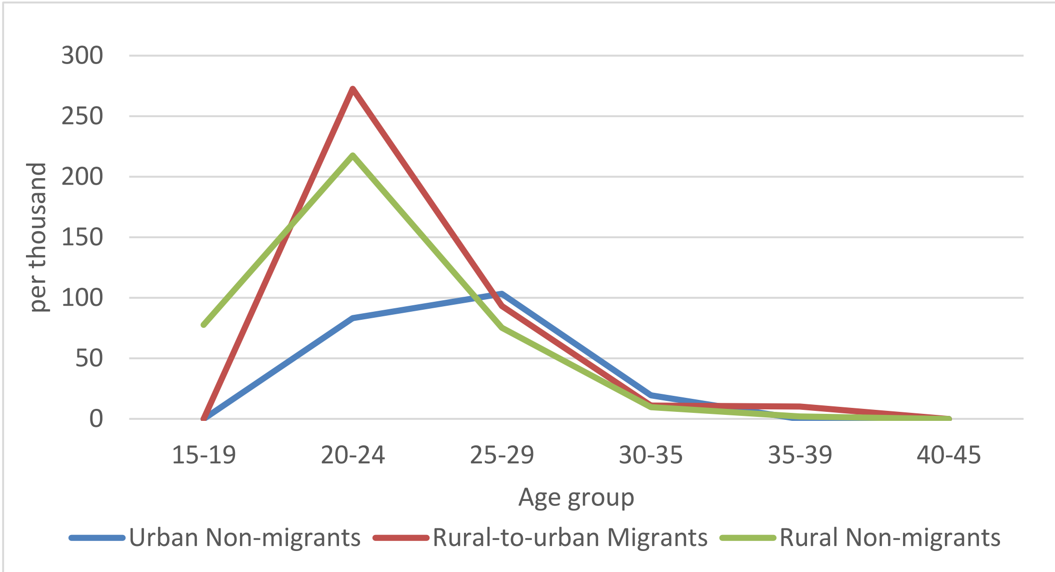

Figure IV-1 ASFRs by Migration Status of Women Aged 15-45

4.2. The Effects of Migration on Fertility: Micro-analyses

In this section, I conduct an event history analysis of the effects of migration on the timing of the first birth after marriage. I first introduce the methods, dataset, statistical models, the operationalization of variables, and then I present the results separately for the different groups. This enables me to compare the results for rural-to-urban migrants with urban non-migrants, as well as with rural non-migrants.

4.2.1. Data and Methods

4.2.1.1 Event History Analysis and the Dataset

An event history analysis (EVA) or survival analysis is a method for modeling cumulative risk and duration until a certain event occurs. In social science research, the terms event history analysis or duration analysis or hazard analysis are used more often than survival analysis. For example, in analyses of family and fertility, one would focus on the duration of a marriage and the risk of divorce, or the transition from marriage to 1st birth, or how long people live, and so on. Sometimes the event can happen several times, for example, marriage, divorce, and giving birth, but sometimes the event is not reversible, such as death. The term survival analysis is mostly used in biomedical applications where the event is not repeatable, such as death. As just mentioned, an EVA is also referred to sometimes as a hazard analysis. A hazard rate is interpreted as an unobserved measure indicating both the occurrence and the timing of the event under investigation.

Two crucial pieces of information, a risk period and the risk itself, are needed in EVA data. The risk period is the amount of time when the subjects are at risk of an event. The distinction between a risk and a non-risk period may be implicit. In reality, the risk period needs to be defined based on the research focus. For example, a woman is at risk of having a birth once she has menarche, but if the focus of study is the transition from marriage to the first birth, the risk period should start on the marriage date. In addition, there are usually two ways to obtain information about the time before the occurrence and whether or not the event occurs within a certain time frame. The first way is with data from longitudinal surveys, in which respondents provide answers repeatedly about the occurrence of some events, for example, marriage, births, getting a job, losing a job, or death. The second way is through retrospective surveys, which ask the respondents once about whether and when certain events took place.

The CHNS surveys asked women if they had a birth since their participation in the last interview and recorded detailed information about their childbearing experiences; these are the data I use in the EVAs. A drawback of the CHNS is that since data are recorded at the time of the survey, changes in the explanatory variables between interviews are not recorded completely. All values are assumed to remain the same as what they were on the interview date. In addition, I selected women who appeared in at least two surveys, or if they were new subjects, who appeared in the last survey in 2011. If a woman did not have a birth since the previous interview date (if she participated in at least two surveys), or on the interview for the 2011 survey (if she appears only as a subject in 2011), or if she reached age 45, the woman is right-censored, which I will illustrate later.

I only focus on marital conceptions, though there are three types of sequences leading to a first birth: (1) marital conception: marriage-conception-first birth; (2) premarital conception: conception-marriage-first birth; and (3) premarital birth: conception-birth-marriage (Wang and Yang 1996). Marital conception is the most prevalent type in China. The occurrence of premarital conception is not socially acceptable, and premarital births are rare in China (Wang and Yang 1996). Additionally, I define exposure to the risk of having a first birth starting from 9 months after the marriage date and ending at the date of the first birth. If a birth occurs before 9 months after the marriage, this might be due to reporting errors (Chen 2005); or, it might indicate that there is premarital conception. However, marriage is still considered as the pre-condition for having sexual intercourse and births. This is led by the relatively conservative sexual culture in China. Chastity (especially female chastity) is considered an important value in traditional Chinese culture (Higgins et al. 2002; Pan 1994; Wang and Yang 1996). Recent studies showed even though cohabiting and premarital sexual involvement has become more acceptable among the younger generation, premarital conceptions are still far from normative. Moreover, births out of wedlock are not protected by current laws (Pan 1994; Xu et al. 2007). Therefore, I use the nine-month limit when defining the risk period.

The CHNS has a complex data structure of samples. Figure IV-2 shows some examples of observations by subjects from the CHNS. Woman A appeared in the 2000, 2004, and 2006 surveys. She got married before her first interview date in 2000, and had a birth sometime between her second and third interviews. Woman B also appeared in the 2000, 2004, and 2006 surveys. She got married before her first interview date in 2000, and she did not have a birth by the end of her third interview. Woman C appeared in two surveys-2004 and 2006. She married before 2004 and had a birth between 2004 and 2006. Woman D participated in only one survey in 2006. She married between 2004 and 2006, but disappeared after the interview in 2006. Woman E married before the first interview in 2000, but did not have a birth by the last interview in 2011. Woman F first appeared in the survey 2000 when she was already married, but she did not participate in the surveys of 2004 and 2006, and she reappeared in the 2009 survey with one birth reported. They are the examples of the different ways women will appear in the surveys, and how some of these might cause some typical statistical issues in EVA. Next, I illustrate how semiparametric models of EVA handle such types of data.

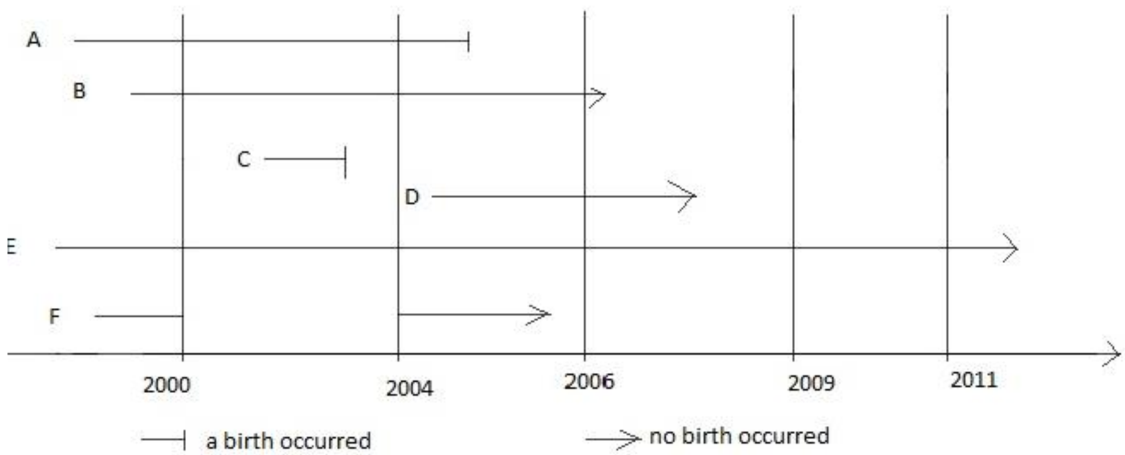

Figure IV-2 Examples of Observations in the CHNS

It is important to address the problem of censoring, which occurs often in such analyses. Censoring means an observation has incomplete information. It is usually caused by unobserved occurrence, delayed entry, and gaps during data collection. They represent statistical issues of right-censoring, left-truncation and interval-truncation, which the semiparametric models of EVA can handle. First, right-censoring happens when the subject participates in the study for a time, but the event occurs sometime after the end of the study period, so the survival time is unknown. Right-censoring possibly occurs because the subject is lost to follow-up for unknown reasons or we do not observe the subject long enough for the event to occur. The known information is that the subject survives through the analysis time t_i. That is, until the time for the last observation, the event has not yet occurred. Nevertheless, right-censoring is easily dealt with by semiparametric models with the assumption that “any censoring occurs randomly and is unrelated to the reason for failure" (Cleves et al. 2010). In addition, left-truncation (delayed entry) happens when the subject is not observed for a while after it has experienced the risk, but then is enrolled in the study and comes under observation. The subject can still be added to the data, but we need to treat the subsequent survival time as conditional on having already survived for some period. The issue is that had the person given birth before taking the survey, we would never have known about her, so she needs to be treated as having survived for a certain time. This statistical issue can also be handled by semiparametric models (Cleves et al. 2010; StataCorp 2014). At last, interval-truncation (gaps) is caused by a subject who disappears for a while but then reappears in a follow-up study, for instance, Woman F (see above). This problem can also be handled, as such: "One simply omits the subject from all individual binary outcome analyses during the truncation period because the subject could not possibly have failed at those times" (Cleves et al. 2010). Moreover, before performing survival analysis, it is essential to declare the data structure in the computer's memory. I use the command "stset" in Stata to specify key variables and their roles in a survival-time analysis. Once the data structure is declared, the specific structure needed for estimating EVA models has been prepared (Cleves et al. 2010; StataCorp 2014).

EVA is more appropriate than logistic regression and OLS (ordinary least squares) regression for analyzing the risk and duration from marriage to first birth, which is the major focus of this dissertation. The EVA can provide unbiased estimates for expected duration by incorporating censored observations. This stands in comparison to logistic regression, which also deals with a binary outcome, such as risk. Logistic regression treats all right-censoring subjects as no occurrence, but whether there is a birth or not is unknown. In logistic regression, many of the right-censoring samples can be simply discarded, which is also not appropriate. In terms of survival time that is interval, OLS regression can deal with the interval outcome. But simply assigning the maximum length of time for right-censoring observations would bias the estimates of time upward. The more critical problem with using OLS to model survival time is that the distribution of residuals of time is likely to violate the normality assumption, if one assigns the maximum length of duration for censoring objects (Cleves et al. 2010). Therefore, EVA is preferred over logistic regression and OLS regression in analyzing survival time.

4.2.1.2 The Cox Proportional Hazards Model

The Cox proportional hazards model assumes that hazard rates are a log-linear function of parameters for the effects of covariates: $h\left(t|x_j\right) = h_0(t)\exp(\beta_0 + x_j\beta_x)$. The term $h_0(t)$ is the baseline hazard function representing the dimension of time dependence. The term β_x represents the effects of covariates. In the Cox Proportional Hazards Model, the baseline hazard function is allowed to differ by group, but the coefficients β_x are constrained to be the same for different groups. "Proportional" means that for any two individuals at any point in time, their ratio of hazards is a constant. The Cox models assume that the hazard for any one individual is proportional to the hazard for any other individual. If the assumption of proportionality is violated in the case that the covariate interacts with time, Allison and others note that this too can be addressed, via a stratified model. The estimation can be done by including the time-varying explanatory variables in the model, or by dividing the sample into strata (Allison 2013; Cleves et al. 2010). It is still a satisfactory approximation for testing the effects of the covariates. In addition, the Cox Model is semiparametric - the function $h_0(t)$ is the same for all subjects. “The models make no assumption about the shape of the hazard overtime – it could be constant, increasing, decreasing, increasing and then decreasing, decreasing and then increasing, or anything else you can imagine” (Cleves et al. 2010: P. 129). Thus, there is no need to specify the form of time. In summary, because of the capacity of handling stratified models and the independence of time function, “the proportional hazards model is extraordinarily general and nonrestrictive” (Allison 2013: P.38). The Cox Proportional Hazards Model is advantageous if the researcher is only interested in the magnitude and effects of covariates and if the shape of time dependence is unknown.

I use the exact birthdates of all children ever born to the women and the marriage dates from the CHNS to construct the survival data from marriage to the 1st birth. I use characteristics of women and family structure as my independent variables to assess the predictive effects of selectivity, disruption, adaptation and socialization on the occurrence of the first birth after marriage. I estimate a series of models in order to further examine the various hypotheses proposed in the literature. The following specific hypotheses will be tested:

(1) Rural-to-urban migrants have a higher likelihood of having a child after marriage at a given time than do urban non-migrants;

(2) Rural-to-urban migrants have a lower likelihood of having a child after marriage at a given time than do rural non-migrants.

Differences in the timing of fertility between rural-to-urban migrants and urban non-migrants are reduced when the relevant covariates that measure selectivity, disruption and socialization are controlled.

I begin with a simple model examining only the effects of migration status, controlling for wave and cohort. The results outline possible differences between migrants and non-migrants; these results provide preliminary evidence about whether migration shapes the transition from marriage to first birth. In addition, the adaptation hypothesis and socialization hypothesis can be examined in this model. If there is no difference in the timing between rural-to-urban migrants and urban non-migrants, this would indicate that rural-to-urban migrants are adapting to the fertility behaviors of urban residents. If rural-to-urban migrants show a higher likelihood of having a birth, this would indicates that the socialization hypothesis works. According to the recent literature on migration and fertility in China, the childhood settlement and socialization in rural places still influence migrants in the short term (Yang 2000a; Yang 2001; You and Poston 2004). Thus, I hypothesize that rural-to-urban migrants have a higher likelihood of having a child after marriage compared to urban non-migrants.

Accordingly, I estimated multivariate equations by controlling for the relevant independent variables. These are mainly background variables to control for the demographic and socioeconomic selectivity of migrants. Later, I included the variables of co-residence status with husband and the extended family to control for the disruptive effects of migration. And finally, I added the variables of whether the woman or her husband have siblings to control for socialization effects.

My analyses were based heavily on the previous literature that I reviewed earlier in Chapter II, especially the selectivity, disruption and socialization hypotheses that lay out the mechanisms of how migration shapes fertility behavior. I expect that adding the relevant control variables will reduce differences in the timing of fertility between rural-to-urban migrants and urban non-migrants.

The full model can be written in the following equation:

$h(t) = h_0(t)\exp(\sum \beta_j Mig_j + \sum \beta_k x_k + \sum \beta_l x_l + \sum \beta_m x_m + \sum \beta_w Wave_w + \sum \beta_c Cohort_c)$, where $h(t)$ is the dependent variable. It is the hazard of the first birth in a given year t after marriage. The Cox model has no intercept because it subsumes the intercept under the baseline hazard $h_0(t)$. The Mig_j represents the major independent variable - migration status, while x_k, x_l, and x_m represent the covariates related to selectivity, disruption, and socialization factors of migration. They will be added into the models in steps. In addition, for all the models, a categorical variable, $Wave_w$ is added to indicate the year of interview to control for any behavioral or other variations between the years of 2000 and 2011. I also add a categorical variable, $Cohort_c$, which is measured by the decade when the woman was born, to control for cohort effects. In the multivariate analysis, each categorical variable is recoded into a dummy variable to estimate its effects.

The coefficients, β_x, of the Cox models can be interpreted in an additive way. It is the change in the log of the hazard for a 1-unit change in the corresponding covariate. However, the the log of the hazard is not easily understood. Therefore I exponentiated the hazard coefficients into hazard ratios, $\exp(\beta_x)$. These have a more direct and understandable interpretation of the change in the hazard for a 1-unit change in the corresponding covariate. The hazard ratio is very useful for understanding the effects of covariates in a comparative way.

Since there are multiple records in the data for some women, it is unreasonable to assume that the observations are independent. All we know is that observations might be correlated and the failure times might be correlated, due to the possible dependence among the observations. The multiple records may inflate the number of the independent observations artificially, and thus, downwardly bias the standard errors in standard regression models. Therefore, it is necessary to adjust the standard errors of the estimated parameters in the Cox models (Lin and Wei 1989). In Stata, this can be done by specifying the option “vce”, a method to produce “correct” standard errors even if the observations are correlated (StataCorp 2013).

4.2.1.3 Operationalization of Explanatory Variables

Next, I explain in more detail the operationalization of the independent variables that enable me to test the four hypotheses about how migration affects fertility.

Migration Status

Migration Status is the major independent variable. This variable is generated by the current household registration category (rural or urban) compared to current residence type. I first checked the interview location of the person being interviewed and I used it as an approximation of current residence. Then I checked the type of the respondent’s household registration. Thus, a rural-to-urban migrant is an individual living in an urban site at the time of survey but maintaining a rural *Hukou* (household registration). This approach enables me to identify a migrant, which in China is an individual who has resided at the current place for six months without a local household registration (*hukou*) (Duan et al. 2008; Liang and Ma 2004). The place of registration and the duration of stay in the place of destination are two key pieces of information. There have been some changes regarding the duration of stay in the place of destination since the 1980s, but the requirement for household registration has not changed. The duration of stay is not available with the CHNS data, so I operationalized migration in a relaxed form: migrants are people who reside outside their place of local household registration (*Hukou*), regardless of their duration of stay.

Selectivity

I use educational attainment, income and age at first marriage to measure the selectivity of migration hypothesis. The woman's level of education is operationalized as the highest level of education she has obtained. It is a categorical variable with four groups: primary school or less, middle school, high school, and college or higher. Primary school or less is the reference group in the regression model. The total household income per capita adjusted to the CPI (Consumer Price Index) in 2011 is used to measure the woman's family's economic resources. I transformed logarithmically so to take into account outliers. Age at first marriage is used to control the demographic effect on women's fertility.

Disruption

I use the co-residence status with husband, mother and mother-in-law to indicate the geographic proximity to family, allowing me to test the disruption hypothesis. Women were asked whether their husband was living at home. In addition, information about the geographic proximity of grandparents' residence is used to measure the extended family living arrangement. These are dummy variables. If the woman's mother/mother-in-law is living in the same household, adjacent to the household, or the same neighborhood/village, it equals 1 and is labeled as co-residence. If not, it is equal to 0.

Previous studies have used a spousal separation variable, which has an obvious disruptive impact on fertility (Kahn 1994; Lindstrom and Saucedo 2002). I am addressing this in a slightly different way, via separation from the extended family. This strategy has not previously been used in prior studies. Existing literature has shown that the extended family living arrangement has been dominant in China, but migration and urbanization significantly decrease the amount of co-residence between older parents and adult children (Zeng and Wang 2003), whereas nuclear household forms have become very popular among migrant families since the 1990s (Bian, Logan, and Bian 1998; Duan et al. 2008). The extended family living arrangement not only indicates the shared economic costs of children, but also provides more resources for childcare. Additionally, co-residence with mother or mother-in-law is hypothesized to increase the likelihood of early childbearing for newly married couples. In China, the mother or mother-in-law usually are very proactive in providing maternal childcare (Chen, Short, and Entwisle 2000; Chen 2005). The nearby residence of the extended family tends to increase the grandparents' involvement in childcare. Meanwhile, the extended family could also pressure young couples to have children sooner after marriage in order to continue the family line, especially with respect to sons (Chen 2006).

Socialization

Prior studies have indirectly tested the socialization hypothesis. The effects of socialization have been measured through the fertility differences between rural-to-urban migrants and urban non-migrants, or the different fertility experiences of the different generations of migrants (Duncan 1965; Freedman and Slesinger 1961; Goldberg 1959; Hervitz 1985). They have not used specific indicators to measure the socialization effects. In turn, I use the existence of siblings for the woman or her husband to measure the effects of socialization. Four dummy variables are included in the regression models to test the effects of socialization. They are: whether the woman has sisters, whether she has brothers, whether her husband has sisters, and whether her husband has brothers.

I expect the status of siblings to affect the fertility of subsequent generation owing to the mechanism of the socialization happening in the family of orientation. Marital fertility and size of the family of orientation are correlated with each other. Previous research showed people born to larger families are likely to have more children, and the cross-sibling influences are relatively strong for the first birth though weak for the second birth. Researchers have interpreted these findings with the inheritance of fecundity and a traditional continuity in family-building habits, which shows evidence for the socialization mechanism (Axinn, Clarkberg, and Thornton 1994; Barber 2000; Lyngstad and Prskawetz

2010; Murphy and Wang 2001; Murphy and Knudsen 2002; Murphy 1999). Therefore, sibling status is a proper indicator for testing the socialization hypothesis.

4.2.1.4 Diagnostics and Post-estimation Evaluation

In my analysis I will first use Kaplan-Meier Survival Curves to describe the survival-time data. The Kaplan-Meier Survival Curve shows the probability of surviving the hazard of having a first birth after marriage. It is plotted by the survivor function. Suppose at the beginning of time period t, there are n_t observations that have not failed (i.e. not yet had a child) and that are not censored, and then, during the time period t, d_t failures (i.e. births) occur in the observations. The Kaplan-Meier estimator of surviving beyond time t is the product of the survival probabilities in t and the preceding periods:

$$S(t) = \prod_{j=t_0}^{t} \{(n_j - d_j)/n_j\}$$

The main assumption of the Cox Proportional Hazards Model is "proportional hazards." I verify whether the model satisfies the assumption of proportionality by calculating and analyzing Schoenfeld residuals for all the covariates. The Schoenfeld residual is the difference between the covariate value for the failed observation (in this dissertation, a failed observation is one in which the woman has had a birth) and the weighted average of the covariate values (weighted according to the estimated relative hazard from a Cox model) over all those subjects who are at risk of failure (i.e., having a birth). The "stphtest" command in Stata performs the formal tests of Schoenfeld residuals. The method retrieves the residuals, fits a smooth function of time to them, and then tests whether there is a relationship (Cleves et al. 2010: P. 206). If the Chi-square tests have p-values larger than 0.05, it means that the researcher cannot reject the proportionality assumption.

The Cox-Snell residuals will be used to evaluate model fit. The model fit can be verified graphically. A graph of the Nelson-Aalen cumulative function against the Cox-Snell residuals will be used to check model fit. The Nelson-Aalen cumulative function will be estimated with the Cox-Snell residuals as the time variable and the original censoring variable. If a model fits the data well, the true Nelson-Aalen cumulative hazard function conditional on the covariate vector has an exponential distribution with a hazard rate of 1 (Cleves et al. 2010: P. 219). The cumulative hazard of the Cox-Snell residuals should be a straight 45 degree line in the diagram. If the Nelson-Aalen hazard function follows the 45 degree line in the diagram, it indicates that the model fits the data well. Having specified and discussed these various methodological issues, I turn now to the results of my analyses.

4.2.2. Results of Models for Rural-To-Urban Migrants Compared to Urban Non-Migrants

4.2.2.1 Descriptive Statistics

The subjects in my dissertation analysis are ever-married women under age 52 at the time of survey. I set up the risk period of having a first birth as starting from nine months after marriage. In the dataset of rural-to-urban migrants and urban non-migrants, there are 315 observations representing 245 subjects I “stset” the data allowing me to estimate the survival models. Among the 245 subjects, 60.4% (148 women) reported having a first birth. The total analysis time at risk and under observation is 5315 months. The mean survival time of not having a birth is 21.7 months. The median survival time is 19.8 months. The longest observed duration from marriage to first birth is 294.5 months, but it is important to note that these data include right-censored women.

The Kaplan-Meier Survival Graph presents the probability of women not having a birth over the observed duration after marriage (see Figure IV-3). It shows that more than 50% of women had their first birth within two years of marriage, and more than 90% of women had their first birth within seven years of marriage. The K-M graph also suggests that it is very likely that a woman will remain childless if she does not have a birth within seven years of marriage.

Table IV-2 shows the descriptive statistics of all the independent variables for the 315 woman observations. It should be noted that some variables have missing values for subjects in some years. I then filled in the missing data of migration status, education, income, and co-residence with husband, mother and mother-in-law are filled with the values from the follow-up interview. Age at marriage, having sisters or brothers, and the husband having sisters or brothers are filled with baseline values if they are missing. For the time-varying variables, it should be noted that the distribution of average values shown in Table IV-2 is actually based on all observations of subjects across time. For instance, approximately 26.35% of all the observations in urban places are rural-to-urban migrants, while the rest are urban non-migrants. More than one third of the women (about 38%) have an educational level of high school, while about 31% have an educational level of college or above. Of the respondents, 58 reported different values for income across surveys, and the average log household income per capita is 9.25 (adjusted to the CPI in 2011). Almost 95% of them are living with husbands. Approximately 20% of them have mothers living nearby, but 61% of them have mothers-in-law living close nearby. For the constant variables, the distribution represents the average values for all subjects. The average age at marriage is 24.5 for all subjects. Approximately 44% of the women were born in the 1980s, and 47% in the 1970s. Approximately 51% of all the subjects have sisters, 59% of them have brothers, 46% of all subjects' husbands have sisters, and 47% of all subjects' husbands have brothers.

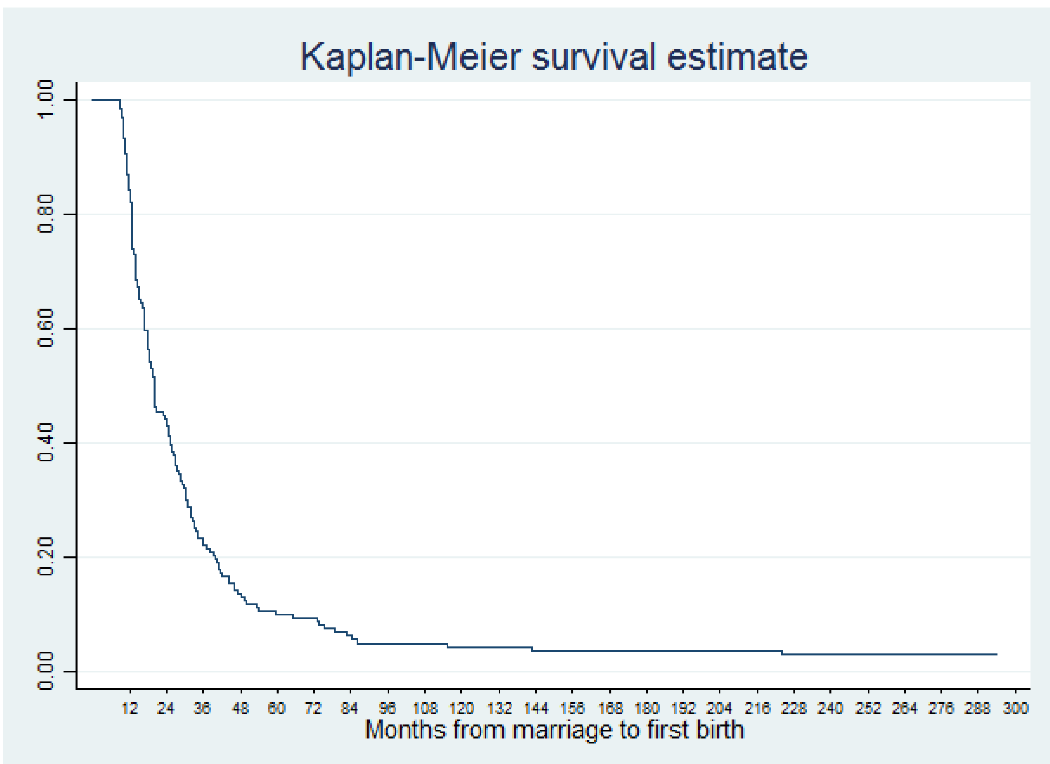

Figure IV-3 Kaplan-Meier Survival Estimate, Transition from Marriage to First Birth, for Rural-to-urban Migrants and Urban Non-migrants

Table IV-2 Descriptive Statistics for Rural-to-urban Migrants and Urban Non-migrants with First Birth

Variable	Obs.	Varying Subjects	Mean/ Proportion	Std. Dev.	Min	Max
Migration Status		8				
Urban non-migrants (ref)						
Rural-to-urban migrants	315		0.2635	0.4412	0	1
Education attainment		13				
Primary school or less (ref)						
Middle school	315		0.2413	0.4285	0	1
High school or vocational school	315		0.3810	0.4864	0	1
College and above	315		0.3175	0.4662	0	1
Income		58				
Log household income per capita adjusted to the CPI 2011	313		9.2598	1.0748	3.624	11.957
Age at marriage	315	0	24.4857	2.7268	16	35
Co-residence with husband		5				
No (ref)						
Yes	314		0.9459	0.2267	0	1
Co-residence with mother		9				
No (ref)						
Yes	287		0.2021	0.4023	0	1
Co-residence with mother-in-law		8				
No (ref)						
Yes	294		0.6122	0.4881	0	1
Having sisters		4				
No (ref)						
Yes	314		0.5127	0.5006	0	1
Having brothers		10				
No (ref)						
Yes	314		0.5860	0.4933	0	1
Husband having sisters		11				
No (ref)						
Yes	313		0.4598	0.4991	0	1
Husband having brothers		9				
No (ref)						
Yes	311		0.4772	0.4980	0	1
Cohort		0				
1960s (ref)						
1970s	314		0.4682	0.4998	0	1
1980s	314		0.4427	0.4975	0	1
Wave		59				
2000 (ref)						
2004	315		0.2159	0.4121	0	1
2006	315		0.1048	0.3067	0	1
2009	315		0.1460	0.3537	0	1
2011	315		0.4063	0.4919	0	1

4.2.2.2 Univariate Analysis

I first conducted a univariate analysis of the survival time data before proceeding to the multivariate analyses. Table IV-3 summarizes the survival time data by migration status. Rural-to-urban migrants have incidence rates twice as high as urban non-migrants. In addition, the survival time for urban non-migrants is longer on average than that for rural-to-urban migrants.

I then examined Kaplan-Meier Survival Curves for the rural-to-urban migrants and the urban non-migrants (see Figure IV-4). The K-M curve shows that urban non-migrants have a less dramatic survivor curve. Specifically, 80% of both rural-to-urban migrants and urban non-migrants have the first birth within 18 months after marriage. However, rural-to-urban migrants have a higher probability of having the first birth after 18 months of marriage than do urban non-migrants. In addition, regarding the proportionality test, one can see from the graph that the survival functions for each group are not perfectly parallel; they differ and actually separate, except at the very beginning. However, as I show later, the formal tests of the proportional-hazards assumption using the Schoenfeld residuals indicate that the assumption is not violated (see Table IV-6).

I then tested the equality of hazard functions to decide if it was necessary to move to more complex models. The null hypothesis is that survival functions are the same for the different migration groups. The log-rank test of equality for the migration status treat has a p-value of 0.0099 (Table IV-4), thus the null hypothesis should be rejected. Therefore, I proceeded to the multivariate analysis to further explore if rural-to-urban migrants and urban non-migrants differ significantly in the timing of the first birth after marriage.

Table IV-3 Summary Statistics of Survival Time for Rural-to-urban Migrants and Urban Non-migrants

Migration Status	time at risk	incidence rate	no. of subjects	Survival time		
				25%	50%	75%
Urban non-migrants	4237.07	0.02	188	13.60	20.83	40.07
Rural-to-urban migrants	1077.93	0.04	65	12.73	18.13	25.93
Total	**5315**	**0.03**	**245**	**12.93**	**19.80**	**33.57**

Table IV-4 Log-rank test for Rural-to-urban Migrants and Urban Non-migrants

Migration Status	Events observed	Events expected
Urban non-migrants	103	115.66
Rural-to-urban migrants	45	32.34
Total	148	148.00
	chi2(1) = 6.65	**Pr>chi2 = 0.0099**

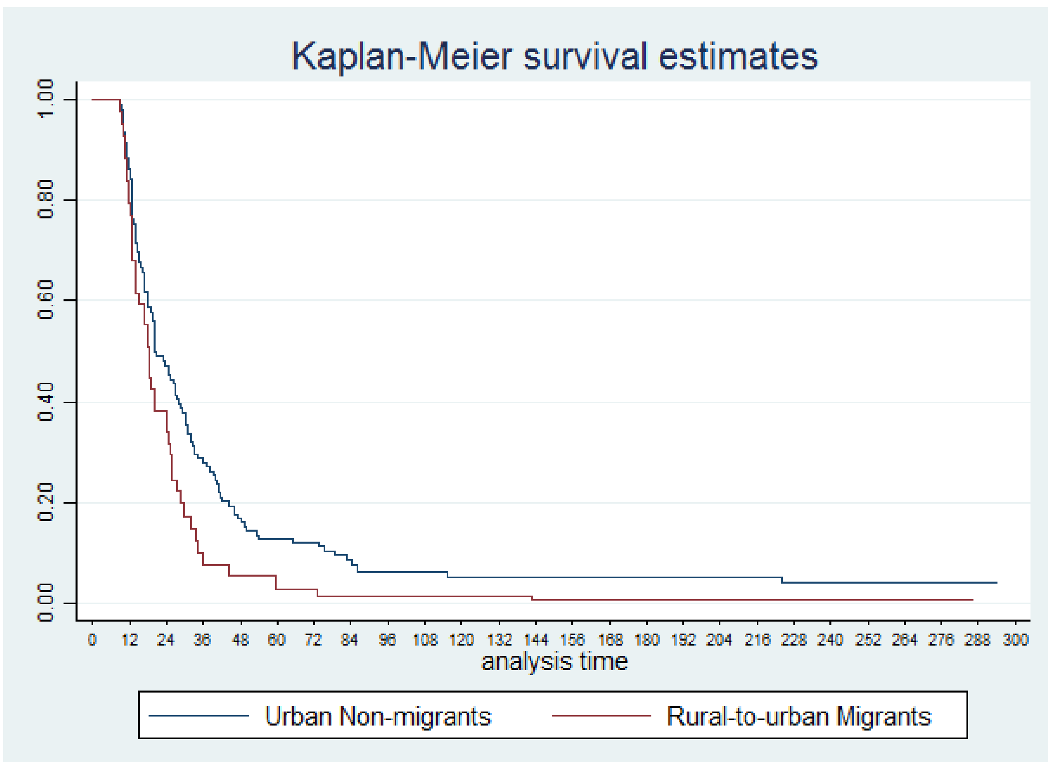

Figure IV-4 Kaplan-Meier Survival Estimate by Groups, Transition from Marriage to First Birth, for the Rural-to-urban Migrants and Urban Non-migrants

4.2.2.3 Results of Cox Proportional Hazards Models

Next, in order to investigate the effects of migration, I estimated a series of Cox Proportional Hazards Models to predict the hazard of having a first birth. I present the results of the multivariate analysis in Table IV-5. The coefficients were transformed to hazard ratios for easy interpretation, as I discussed earlier. A hazard ratio higher than one (1) means that there is a positive relationship between the covariate and the hazard of having a first birth after marriage; if the hazard ratio is less than 1, the relationship between the covariate and the hazard is negative.

I begin with only one covariate, migration status. Model 1 examines the major effect of migration on the hazard of having a first birth. Rural-to-urban migrants have a coefficient of 1.693, meaning that the hazard of having a first birth in a given month after marriage for rural-to-urban migrants is 1.693 times that for urban non-migrants. In other words, for rural-to-urban migrants, the hazard of having a birth is 69.3% higher than for urban non-migrants at a given month after marriage. This is a significant relationship, with a p-value much lower than 0.05.

Next, in order to gauge the effects of socioeconomic and demographic selectivity of migration, I estimated a second model with the covariates of educational attainment, income and age at marriage, in addition to migration status. The results are shown in Model 2. However, none of the socioeconomic and demographic covariates have significant hazard ratios. The rural-to-urban migrant hazard ratio decreases slightly in magnitude, from 1.693 to 1.671, but it is still significant. This means that the selectivity of migration helps reduce the disparity between rural-to-urban migrants and urban non-migrants in terms of the hazard of having a first birth at a given month, but the change is not significant. The results of Model 2 indicate that the effect of selectivity of migration is minor; this finding is in contrast to the findings in the literature.

Model 3 investigates the effects of disruption on the hazard of having a first birth. I add into the model the covariates measuring co-residential patterns with husband, mother and mother-in-law. As mentioned in the previous section, the living arrangements of mother and mother-in-law are measured by geographic proximity. Co-residence means that the woman's mother/mother-in-law is living in the same household, adjacent to the household, or in the same neighborhood/village. Only the variable of co-residence with mother-in-law in reference to not living with mother-in-law significantly increases the hazard of having a first birth. Women who live nearby their mothers-in-law have a hazard of having a birth 90% higher than women who do not, holding the other covariates constant. However, including the covariates of disruption strengthens the effect of migration status. The results of Model 3 indicate that the disruption of migration does not explain the fertility gap between rural-to-urban migrants and urban non-migrants.

Model 4 examines the variables measuring respondents' family size. Variables concerning whether the woman or her husband have siblings are included in the model. These allow me to test the socialization hypothesis. It turns out that if a woman's husband has brothers, she is more likely to have a first birth after marriage at a given time. A woman whose husband has a brother has a hazard of having a first birth after marriage

9.7% higher than a woman whose husband does not have a brother; however the significance level is 0.1. In addition, this effect reduces the difference in the hazard of having a first birth after marriage between rural-to-urban migrants and urban non-migrants. The results of Model 4 suggest that structure of the woman's husband's family affects the timing of her first birth after marriage.

Finally, I estimated the Cox regression model with all the covariates. The significance of the effect of migration status is maintained in this full model (Model 5). Except for the migration status variable, co-residence status with the mother-in-law is the only control variable that is still significant. It should be noted that the number of observations is reduced if the co-residence status variables are included in the model due to non-response to these questions in the survey. Overall, holding the other covariates constant, my model demonstrates that rural-to-urban migrants do have hazards of having a first birth 91.5% higher than urban non-migrants at a given month after marriage, while having the mother-in-law living nearby can double the hazard of having the first birth born after marriage.

I then tested the Proportional-Hazards assumption by analyzing Schoenfeld residuals for all covariates. If a covariate's Chi-square test has a p-value greater than 0.05, it means that the proportionality assumption for that covariate is not violated. All the covariates have p-values higher than 0.05, as with the global test (see Table IV-6). As a result, there is no need for me to worry about the violation of proportional assumption for Cox models. Finally, I evaluated the model fit by graphing the Nelson-Aalen cumulative hazard function and the Cox-Snell residuals (Figure IV-5). The hazard function follows the

45 degree line very closely except at very large values of time. This suggests that the full model of survival time from marriage to first birth fits the data quite well.

Table IV-5 Hazard Ratio Estimates for Survival Time of First Birth Models for Rural-to-urban Migrants and Urban Non-migrants

	Model 1	Model 2	Model 3	Model 4	Model 5
Migration Status					
Urban non-migrants (ref)					
Rural-to-urban migrants	1.693**	1.671**	1.804**	1.675**	1.915**
	(0.002)	(0.014)	(0.005)	(0.004)	(0.009)
Education attainment					
Primary school or less (ref)					
Middle school		0.965			0.973
		(0.913)			(0.953)
High school or vocational school		0.819			0.895
		(0.560)			(0.821)
College and above		1.200			1.309
		(0.641)			(0.617)
Income					
Log household income per capita		0.863			0.870
(adjusted to the CPI 2011)		(0.105)			(0.225)
Age at marriage		0.991			1.018
		(0.843)			(0.727)
Co-residence with husband					
No (ref)					
Yes			0.486		0.617
			(0.118)		(0.281)
Co-residence with mother					
No (ref)					
Yes			0.967		1.040
			(0.894)		(0.884)
Co-residence with mother-in-law					
No (ref)					
Yes			1.902**		2.019**
			(0.003)		(0.002)

(Table IV-5 Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
Having sisters					
No (ref)					
Yes				0.910	1.039
				(0.568)	(0.840)
Having brothers					
No (ref)					
Yes				0.942	0.089
				(0.740)	(0.358)
Husband having sisters					
No (ref)					
Yes				1.248	1.136
				(0.778)	(0.520)
Husband having brothers					
No (ref)					
Yes				1.097*	1.155
				(0.087)	(0.485)
Cohort					
1960s (ref)					
1970s	0.641**	0.593**	0.672	0.687	0.825
	(0.017)	(0.032)	(0.100)	(0.107)	(0.574)
1980s	0.691	0.597	0.848	0.733	1.120
	(0.213)	(0.273)	(0.629)	(0.398)	(0.859)
Wave					
2000(ref)					
2004	0.483**	0.545**	0.451**	0.445**	0.443**
	(0.001)	(0.009)	(0.002)	(0.001)	(0.008)
2006	0.511**	0.570*	0.511**	0.491**	0.492*
	(0.023)	(0.069)	(0.047)	(0.020)	(0.060)
2009	0.362**	0.410**	0.275**	0.351**	0.249**
	(0.003)	(0.035)	(0.005)	(0.004)	(0.010)
2011	0.372***	0.444**	0.327**	0.379**	0.302**
	(0.001)	(0.046)	(0.002)	(0.003)	(0.017)
Observations	314	312	270	310	265
Wald Chi-squared	77.67***	82.70***	70.77***	74.52***	78.42***

Exponentiated coefficients in the first row; p-values in parentheses
* p<0.10
** p<0.05
*** p<0.001

Table IV-6 Test of Proportional-Hazards Assumption for Rural-to-urban Migrants and Urban Non-migrants

Variable	Rho	Chi Square	Prob>chi2
Migration Status			
Urban non-migrants (ref)			
Rural-to-urban migrants	0.05612	0.38	0.5357
Education attainment			
Primary school or less (ref)			
Middle school	0.12638	2.42	0.12
High school or vocational school	0.07808	0.93	0.3338
College and above	0.09173	1.19	0.2748
Income			
Log household income per capita adjusted to the CPI 2011	-0.11526	2.07	0.1497
Age at marriage	0.07248	0.64	0.422
Co-residence with husband			
No (ref)			
Yes	0.06037	0.59	0.4421
Co-residence with mother			
No (ref)			
Yes	0.03185	0.14	0.7086
Co-residence with mother-in-law			
No (ref)			
Yes	-0.06064	0.5	0.4781
Having brothers			
No (ref)			
Yes	-0.05097	0.45	0.503
Having sisters			
No (ref)			
Yes	0.08449	1	0.3162
Husband having brothers			
No (ref)			
Yes	-0.00642	0.01	0.9415
Husband having sisters			
No (ref)			
Yes	0.0305	0.14	0.7092
Cohort			
1960s (ref)			
1970s	0.04138	0.18	0.6708
1980s	0.02996	0.17	0.6832

(Table IV-6 Continued)

Variable	Rho	Chi Square	Prob>chi2
Wave			
2000(ref)			
2004	0.06429	0.62	0.4303
2006	-0.03536	0.15	0.7033
2009	-0.04794	0.53	0.4651
2011	-0.02163	0.09	0.7686
Global Test		11.14	0.9189

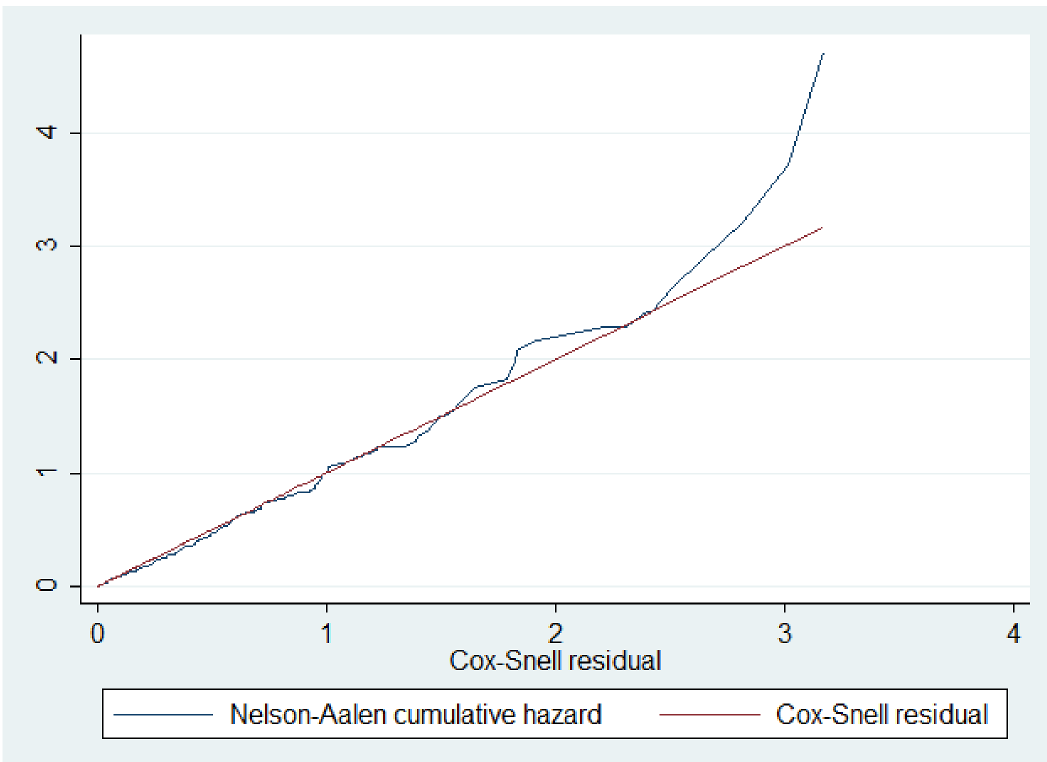

Figure IV-5 Cumulative Hazards of Cox-Snell Residuals for Rural-to-Urban Migrants and Urban Non-migrants

4.2.3. Results of Models for Rural-To-Urban Migrants Compared to Rural Non-Migrants

I now change the focus of my analysis to comparisons of the duration between marriage and first birth for rural-to-urban migrants and rural non-migrants. I have 430 observations representing 345 subjects remaining after I "stset" the data; moreover, 253 births were observed. Approximately 73.3% of the women reported having a first birth. The total analysis time at risk and under observation is 6549 months. The mean survival time for not having a birth is 19 months. The median survival time is 13.7 months. The longest observed duration from marriage to first birth is 286.7 months.

Figure IV-6 presents the Kaplan-Meier Survival Graph showing the probability of women not having a birth month by month since nine months after the marriage. Almost 80% of women had their first birth within three years after marriage. Almost 95% of women had their first birth within nine years of marriage.

Table IV-7 presents the summary statistics for rural non-migrants and rural-to-urban migrants. Approximately 19.3% of all the observations are rural-to-urban migrants, while the rest are rural non-migrants. The majority (approximately 58%) have middle school as their highest educational attainment. The average age at marriage is 22.8 for all the subjects. Approximately 43% of the women were born in the 1980s (see Table IV-7).

Before proceeding to the multivariate analysis, I first examined the Kaplan-Meier Survival Curves for both rural-to-urban migrants and rural non-migrants (see Figure IV-7). The K-M Survival Curves show that rural non-migrants and rural-to-urban migrants have pretty much the same survival rates within 15 months of marriage. However, rural-to-urban migrants have a lower probability of having a birth between 14-24 months of marriage than do rural non-migrants, but this situation reverses after 24 months. Overall, the differences in the survivor curves are not that obvious (see Figure IV-7).

Summary statistics of survival time by migration status are presented in Table IV-8. Rural-to-urban migrants have similar incidence survival rates as rural non-migrants, as I just showed in Figure IV-7. In addition, the log-rank test of equality for the migration status treatment has a p-value of 0.9422 (Table IV-9). I cannot reject the null hypothesis of survival functions being the same for the different migration groups with a p-value greater than 0.05. As a result, I confirm again that rural-to-urban migrants and rural non-migrants do not differ in the timing of having a first birth after marriage. Therefore, it is not necessary to proceed with more complicated models, since the results of the univariate analysis do not suggest any significant differences between rural-to-urban migrants and rural non-migrants in the timing of having a first birth after marriage.

Table IV-7 Descriptive Statistics for Rural-to-urban Migrants and Rural Non-migrants with the First Birth

Variable	Obs.	Varying Subjects	Mean/ Proportion	Std. Dev.	Min	Max
Migration Status		0				
Rural non-migrants (ref)						
Rural-to-urban migrants	430		0.1930	0.3951	0	1
Education attainment		11				
Primary school or less (ref)						
Middle school	424		0.5778	0.4945	0	1
High school or vocational school	424		0.1722	0.3780	0	1
College and above	424		0.0236	0.1519	0	1

(Table IV-7 Continued)

Variable	Obs.	Varying Subjects	Mean/ Proportion	Std. Dev.	Min	Max
Income		68				
Log household income per capita adjusted to the CPI 2011	419		8.4820	1.1238	3.8112	11.9569
Age at marriage	430	0	22.8209	2.8083	16	35
Co-residence with husband		10				
No (ref)						
Yes	427		0.8314	0.3749	0	1
Co-residence with mother		17				
No (ref)						
Yes	400		0.1850	0.3888	0	1
Co-residence with mother-in-law		5				
No (ref)						
Yes	391		0.8926	0.3100	0	1
Having brothers		0				
No (ref)						
Yes	423		0.8038	0.3976	0	1
Having sisters		0				
No (ref)						
Yes	423		0.6123	0.4878	0	1
Husband having brothers		0				
No (ref)						
Yes	421		0.6651	0.4725	0	1
Husband having sisters		0				
No (ref)						
Yes	423		0.5910	0.4922	0	1
Cohort		0				
1960s (ref)						
1970s	428		0.4182	0.4938	0	1
1980s	428		0.5257	0.4999	0	1
1990s	428		0.0304	0.1718	0	1
Wave						
2000 (ref)		71				
2004	430		0.2349	0.4244	0	1
2006	430		0.1442	0.3517	0	1
2009	430		0.1628	0.3696	0	1
2011	430		0.2860	0.4524	0	1

Table IV-8 Summary Statistics of Survival Time for Rural-to-urban Migrants and Rural Non-migrants

Migration Status	time at risk	incidence rate	no. of subjects	Survival time		
				25%	50%	75%
Rural non-migrants	5471.00	0.038	280	12.33	16.10	24.47
Rural-to-urban migrants	1077.93	0.041	65	12.73	18.13	25.93
Total	6548.93	0.038	345	12.33	16.73	25.10

Table IV-9 Log-rank test for Rural-to-urban Migrants and Rural Non-migrants

Migration Status	Events observed	Events expected
Rural non-migrants	208	207.56
Rural-to-urban migrants	45	45.44
Total	253	253
	chi2(1) = 0.01	Pr>chi2 = 0.9422

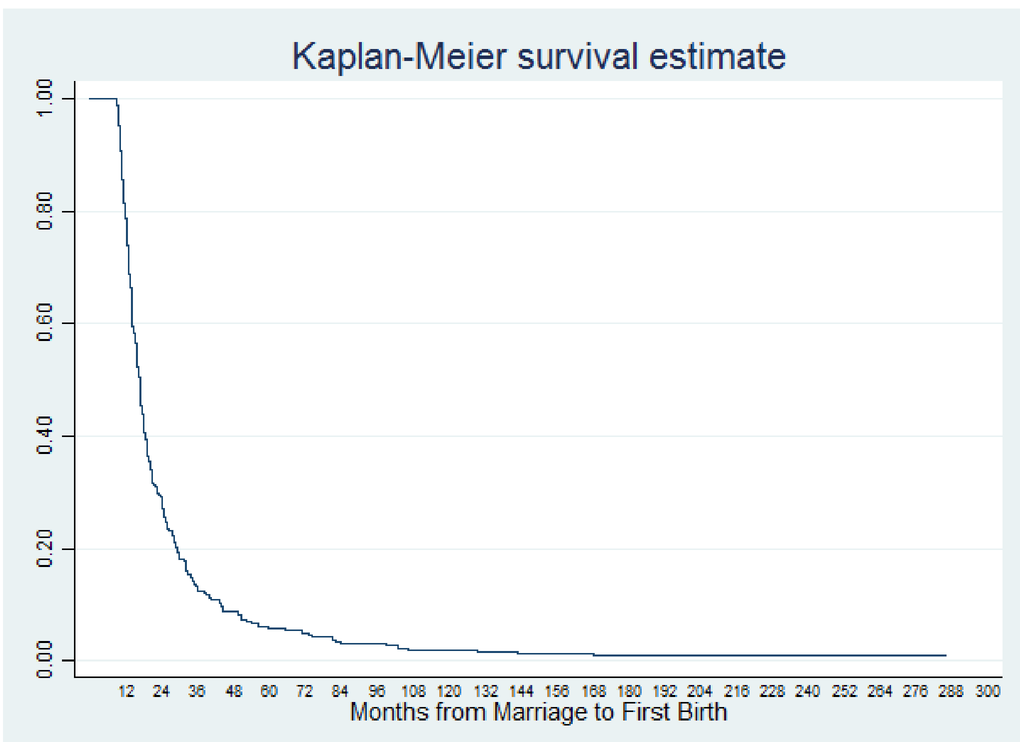

Figure IV-6 Kaplan-Meier Survival Estimate, Transition from Marriage to First Birth, for Rural-to-urban Migrants and Rural Non-migrants with First Birth

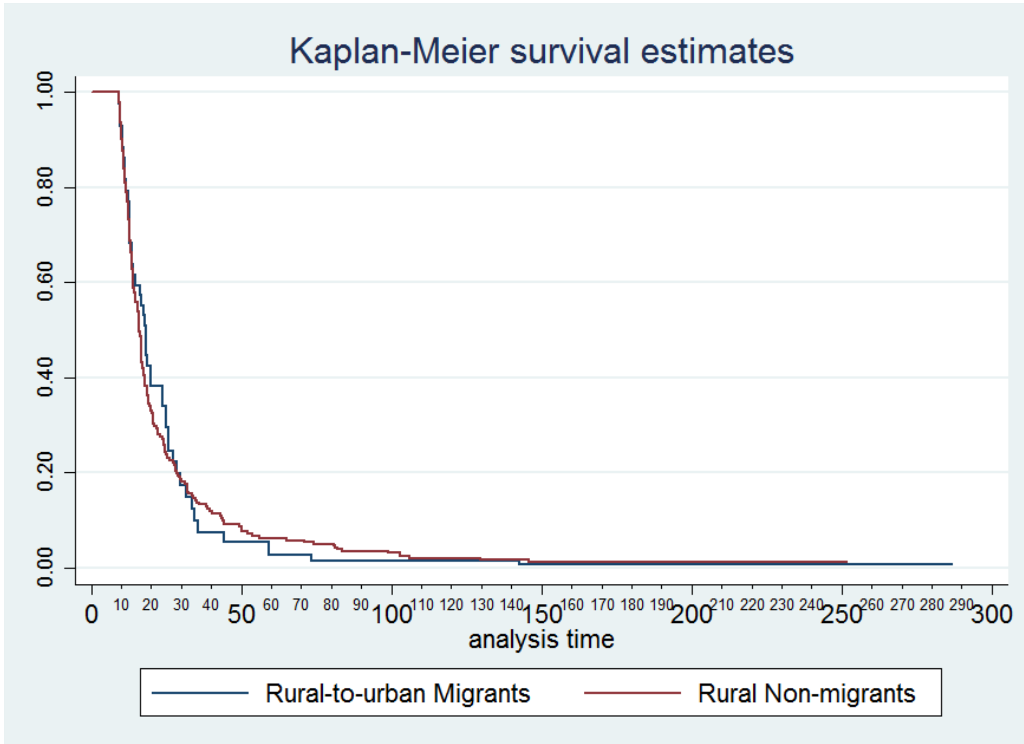

Figure IV-7 Kaplan-Meier Survival Estimate by Group, Transition from Marriage to First Birth, for Rural-to-urban Migrants and Rural Non-migrants

4.3. Conclusions

From the aggregate level analyses, I found that rural-to-urban migrants have a TFR 0.03 higher than rural non-migrants, and 0.91 higher than urban non-migrants. Rural non-migrants clearly have a higher risk of births than do urban non-migrants and rural-to-urban migrants in the early stages of reproductive life. There is some evidence in my models the hypothesis of selectivity of migration. However, rural-to-urban migrants have higher rates of fertility than do urban non-migrants, and a little higher fertility than rural non-migrants for the age group of 20 to 24, and for the oldest age group of 35 or higher. This finding is possibly due to some influence of socialization in rural places, or the facts that recent migrants are likely to build families and women are more likely to migrate for purposed of family reunion and unification. In the middle stage of reproductive life, between ages 25 to 34, rural-to-urban migrants have a slightly lower level of fertility than urban non-migrants, but slightly higher fertility than rural non-migrants. This perhaps indicates some adaptation and selectivity effects. Therefore, I have found some different degrees of evidence for the selectivity, adaptation, and socialization hypotheses, but not for the disruption hypothesis.

In my event history models presented above, I obtained mixed results when comparing rural-to-urban migrants with urban non-migrants and when comparing rural-to-urban migrants with rural non-migrants. My comparisons of the actual fertility of rural-to-urban migrants and non-migrants enable me to conclude that rural-to-urban migrants and urban non-migrants have significantly different fertility levels, while rural-to-urban migrants and rural non-migrants do not differ in their fertility.

First, I confirmed that rural-to-urban migrants have a higher likelihood of having a child after marriage at a given time than urban non-migrants. In the Cox models I estimated, the fertility gaps between rural-to-urban migrants and urban non-migrants remain statistically significant even when relevant covariates are controlled. If the fertility level of rural-to-urban migrants is higher than that of urban non-migrants, this would be evidence that socialization in rural places still affects fertility in urban places. It is very possible that even though women have migrated out of the rural places, they may still be affected by traditional norms.

Second, the fertility gaps between rural-to-urban migrants and urban non-migrants narrow when the covariates measuring selectivity are added. The selectivity hypothesis is thus confirmed. The hazard of having the first birth after marriage of rural-to-urban migrants versus urban non-migrants decreases once the social and demographic characteristics are controlled. This result indicates that the effects of migration on fertility appear to work through the mechanism of selectivity. Nevertheless, there is no evidence for the adaptation and disruption hypotheses. However, the effects of adaptation and disruption might be masked in the short-term after marriage.

However, my data did not show any difference in fertility between the rural-to-urban migrants and the rural non-migrants. Rural-to-urban migrants apparently do not delay their childbearing compared to rural non-migrants. This may mean that there is attenuating selectivity of migrants in rural places in terms of fertility behavior.

In summary, based on an individual level event history analysis of the transition from marriage to first birth, and on an aggregate level analysis of age specific fertility rates and total fertility rates as well, I am able to draw the following conclusions: (1) the socialization hypothesis has been confirmed: my findings show that rural-to-urban migrants have significantly higher levels of fertility than urban non-migrants; (2) the selectivity hypothesis is supported in my analyses: my aggregated date analysis show that rural-to-urban migrants have lower birth rates at age under 20; my event history analysis results show that the fertility gap between rural-to-urban migrants and urban non-migrants is reduced when the socioeconomic and demographic covariates are controlled in the multivariate analysis; and (3) the mediating mechanisms suggested by the disruption and adaptation hypotheses do not appear to be evident in my data analysis, which leads me to proceed further data analysis of fertility preferences between migrants and non-migrants in Chapter V.

In the next chapter, I will report the results of my analyses of the effects of migration status and urbanization level on fertility preferences. My analysis of fertility preferences should provide us with a better understanding of the association of migration and fertility. The next chapter will address questions of whether rural-to-urban migrants are a selective group of rural residents with preferences for smaller family size, whether rural-to-urban migrants mimic the fertility preferences of urban non-migrants, and whether the association of migration and fertility depends on the community's urbanization level.

CHAPTER V

EFFECTS OF URBANIZATION AND MIGRATION ON FERTILITY INTENTIONS

In this chapter, I focus on the effects of migration status and level of urbanization on fertility preferences. I undertake a series of multilevel analyses to incorporate independent variables from different levels of analysis. With data from the 2006 China Health and Nutrition Survey (CHNS), I expect to find that rural-to-urban migrants will have a higher level of fertility preferences than urban non-migrants and a lower level of fertility preference than rural non-migrants. Additionally, I expect to see that urbanization has direct and indirect effects on fertility preferences. To test these hypotheses, I first compare rural-to-urban migrants to urban non-migrants, and then I compare rural-to-urban migrants with rural non-migrants. These two comparative analyses will use the same dependent and independent variables. After investigating the degree of variance at the community level (level-2), I will present and interpret the results of my multilevel models.

I begin this chapter with my research questions and hypotheses, and then address the theory and techniques of multilevel modeling. Then, I introduce the dataset and models. Next, I explore the effects of migration and urbanization on fertility intentions. Last, I summarize my findings.

5.1. Hypotheses

The general hypothesis I will test in this chapter is that migration and urbanization will reduce the levels of fertility preferences. I address two research questions. The first question is: what is the association between migration status and an individual's fertility preferences? The second question is: how does urbanization affect individual fertility preferences, especially those of migrants compared to non-migrants? Migration status will be used as the major individual-level variable, and the urbanization index of the community will be used as the major contextual variable.

According to the selectivity hypothesis of migration, rural-to-urban migrants are likely to have preferences for a smaller family, whereas rural non-migrants are likely to prefer larger families. Additionally, due to the economic and noneconomic pressures that rural-to-urban migrants face in urban places after completing their migration, they are likely to adapt their fertility goals and change their fertility attitudes (Goldstein and Goldstein 1982; Kahn 1994; Lee and Pol 1993; Lindstrom and Saucedo 2002). Moreover, previous research has found that the fertility differentials between migrants and non-migrants vary by the levels of regional economic development (Hervitz 1985). Therefore, it is necessary to incorporate the contextual variables for judging how migration impacts on fertility. I will elaborate on the general hypothesis and develop the following specific hypotheses:

1) Rural-to-urban migrants have a lower level of fertility preferences than urban non-migrants and rural non-migrants.
2) Urbanization levels of the community negatively influence individual fertility preferences.
3) In more urbanized communities, the difference in fertility preferences between rural-to-urban migrants and urban non-migrants is higher, and the difference in

fertility preferences between rural-to-urban migrants and rural non-migrants is lower.

In order to incorporate independent variables from different levels, I will conduct multilevel analyses of fertility preferences using data from the 2006 CHNS. Now I will discuss the data and methods more specifically.

5.2. Data and Methods

5.2.1. Multilevel Analysis: Theory and Applications in Sociology and Demography

We know as sociologists that individual behaviors and ideas are affected by social contexts. The assumption of an impact of social context on individual outcomes builds on Marx's work on political economy, Durkheim's studies on the impact of community on anomia and suicide, Weber's research on how religious communities shape economic behavior, and Merton's work on communities, relative deprivation, and social comparisons. The basic sociological premise of these works is that behavior is shaped by the social structure, which creates the conditions, sets behavioral constraints and imposes normative standards on individuals (DiPrete and Forristal 1994). In turn, social contexts can affect individual outcomes directly, or influence the relationships between individual outcomes and individual level factors.

In addition, the multilevel analysis needs to be discussed methodologically. It is not a simple matter to be addressed. There are methodological problems when considering the hierarchical structure by which data on individuals are collected. In the probability sampling frame, individuals are selected from the groups to which they belong. For example, groups may be found in communities and schools. Higher level groups or entities, such as communities and schools, are nested within even higher levels of units, such as cities or school districts. Research conducted at one single level is often inadequate unless the other levels are considered. In the social sciences there have been two main approaches for incorporating data from two levels into an analysis, and both are problematic.

One way to analyze different levels of data is by disaggregating all group (i.e., level-2) characteristics down to the individuals (i.e., level-1). The central statistical issue of multilevel data is that the variances at the micro-level consist of between-group variance and within-group variance. If data are disaggregated, all individuals within the same group receive the same values. If doing so, the sample to sample variation (standard errors) at the individual level will be reduced. Since modeling contextual variables at a lower level leads to smaller standard errors, the parameters estimated by ordinal regression models will often tend to be spuriously significant. Researchers would then reject the null hypothesis far more easily than they would with the correct standard errors (Hox 2010). Researchers thus could draw wrong conclusions from the spuriously significant parameters.

A second way to use data from more than one level is to aggregate the level-1 data up to the next level, and then conduct the analysis at the aggregate level. This approach is problematic because such aggregation will often result in a loss of extensive individual variation. And there is a commonly conceptual problem, which is also known as the ecological fallacy (Robinson 1950). That is, one cannot draw conclusions about the influence of context on individuals from associations at the group level. As a result, aggregated analysis cannot help explain the mechanisms of changes at the individual level.

While disaggregating data and aggregating data are often inappropriate approaches, statistically correct multilevel modeling decomposes the variance components into within-group and between-group categories, and produces more reliable estimates than does single level regression modeling. In addition, multilevel modeling not only explores the direct effects of the contextual variables on the outcome, but also explores the indirect effects of the contextual variables on the statistical slopes of the micro-level variables on the outcome (Hox 2010). Therefore, analyzing multilevel data at different conceptual levels with multilevel models is most appropriate if done correctly.

In demography, multilevel modeling, as an appropriate method, has been popularly applied to research on the impact of social context on individual-level outcomes. For example, multilevel modeling has been used to test the demographic transition theory (Hirschman and Guest 1990). Multilevel models were used in the study of connection between socioeconomic status and fertility by Entwisle and Mason, who examined the effects of social and economic development and family planning programs at the national level. They demonstrated that social and economic development and family planning not only affect the average number of children ever born to women at the country level, but also the direction and magnitude of the effects of socioeconomic status on individual fertility (Entwisle and Mason 1985). Later, Hirschman and Guest (1990) used multilevel models to study provincial characteristics, e.g., women's status, the role of children, and infant mortality, on current fertility in four Southeast Asian countries. The provincial level variables showed modest but significant effects on individual fertility; women's status was the most influential factor related to fertility. I have been inspired by these and other previous multilevel analyses of determinants of fertility, as well as by theoretical explanations of migrant fertility, I plan thus to examine the effect of urbanization at the community level on individual fertility preferences.

In particular, multilevel analysis is suitable for my research for two reasons. My research assumption is that the social settings in urban places will likely impose direct and indirect influences on rural-to-urban migrants' fertility ideas. This has been indicated by urbanism theory, as well as by the various assimilation hypothesis (Inkeles 1969; Easterlin 1975b; Freedman 1979; Goldstein 1973). In addition, the CHNS used a multi-stage sampling procedure to select its samples. Individuals were randomly selected from the 288 communities across China (Zhang et al. 2014). This produced a hierarchical data structure that can be properly handled with multilevel modeling.

Next, I introduce the dataset and models I will use for the analysis of the effects of migration and urbanization on fertility preferences. Then, I will present the results.

5.2.2. Dataset and Variables

I use the CHNS cross-sectional data for the year of 2006 to conduct the multilevel analysis of fertility intentions. I have data for 2,636 women surveyed in 218 communities. Since I have already introduced the sampling procedures of the CHNS in Chapter 3.3, in this section I will explain how the CHNS measures fertility preferences, which is my dependent variable. Especially, I pay attention to the specific questions measuring individual fertility preferences and community urbanization levels in the CHNS.

All women under age 52 (married, widowed, or divorced) were asked about fertility preferences. Here is the section from the original questionnaire dealing with fertility preferences:

**** Ask Questions 1-2 for women who are currently pregnant.***

1. If you could choose the number of children to have, would you want to have another child, in addition to the child you are expecting? *_ S63a*

0 no (skip to the next section)
1 yes, whether this child is a girl or a boy
2 yes, but only if this child is a girl
3 yes, but only if this child is a boy

2. If you could choose the number of children to have, how many more children would you want to have, in addition to the child you are expecting? *_ S64a*

**** Ask Questions 3-4 for women who have no children and are not currently pregnant.***

3. Do you want to have a child sometime? *_ S72a*

0 no (skip to the next section)
1 Yes

4. If you could choose the number of children to have, how many children would you want to have? *_ S73a*

**** Ask Questions 5-6 for women who have one or more children and are not currently pregnant.***

5. If you could choose the number of children to have, would you want to have another child sometime? *_ S69a*

0 no (skip to the next section)
1 Yes

6. If you could choose the number of children to have, how many more children would you want to have? *_ S70a*

As we may see from the above excerpt, the sample is divided into three groups of women: women who are currently pregnant, women who are not currently pregnant and have no children, and women who are not currently pregnant and have children. There are small differences between the questions in the survey depending on whether a woman is currently pregnant or not. A woman who is not currently pregnant, whether she has had children or not, is asked two questions about fertility preferences: (1) whether she intends to have a child, and (2) if so, how many children she prefers to have. Based on the way the questions were asked, the question about whether a woman wants to have a child or additional children is the variable that provides the data dealing with “fertility intentions.” The terms “ideal number of children” or “ideal family size” will be used interchangeably to refer to the question of intended number of children. This intended number is to some degree ideal, because more than 75% of women surveyed are in the middle or later years of childbearing. They are hence unlikely to have more children. In addition, multilevel analysis will focus on fertility intentions, because the intended number of children has a very small variation (ranging only from 0 to 4). The sample size is also small since very few women intend to have more children once they have had children. The small variance and sample size do not permit multivariate analysis, so I did not move to a multilevel analysis of the intended number of children.

A woman who is currently pregnant is asked different questions conditional on the potential sex of the current pregnancy. Since only 2.16% of all women were pregnant in the dataset, I decided to focus only on the women who were not currently pregnant. Moreover, the childbearing experience may completely shift women’s fertility attitudes by two ways. The number of children a woman already has may well reduce her intention to have an additional children if she has achieved the ideal family size or fulfilled the social norms of having children (Freedman, Coombs, and Bumpass 1965). On the other hand, the transition to parenthood may encourage women to have more children if they have already experienced childbearing (Hayford 2009; Heiland, Prskawetz, and Sanderson 2008). Therefore, I separately analyze the samples of women who have had children and women who have not had children in terms of their fertility intentions.

My major interest at the contextual level is with the influence of the urban settings on the fertility preferences of rural-to-urban migrants. The CHNS contains 12 different community-level variables (namely, population density, economic activity, traditional markets, modern markets, transportation infrastructure, sanitation, communications, housing, education, diversity, health infrastructure, and social services) that may be used to measure the degree of urbanization in the community. In contrast, conventional practices usually employ only absolute thresholds of population size and population density to classify an urban place. Moreover, population and population density data are not updated frequently at the community level, but the 12 urbanization indicators were collected yearly. Thus, the urbanization level can be presented across different years (shown in Figure V-1). In actuality, more rural places than urban places turned out to have increasing urbanization indexes from 2000 to 2011 (Zhang et al. 2014). Thus, the urbanization index is a unique and advantageous measure over the conventional measure of urbanization.

The detailed summary statistics of these measures are presented in Table V-1. In the 2006 CHNS, data were collected for 218 communities, including 73 urban communities and 145 rural communities from the 2006 CHNS. As expected, the rural communities have much lower index scores than the urban communities. In addition, the CHNS team calculated a composite score so to better capture all the various dimensions in a single index. "*It provides in-depth measurement over time and place of the changes in*

China in 12 dimensions of community social and economic systems and physical infrastructure as related to health and nutritional status and welfare. We use this measure to show the dynamics in China spatially and temporally …" (Zhang et al. 2014: P. 15).

In addition, there is substantial variation in the urbanization index across the places. For example, the value of the urbanization index ranges from 27.18 to 101.06 across the 218 surveyed communities, with a mean value of 64.44 and a standard deviation of 20.46.

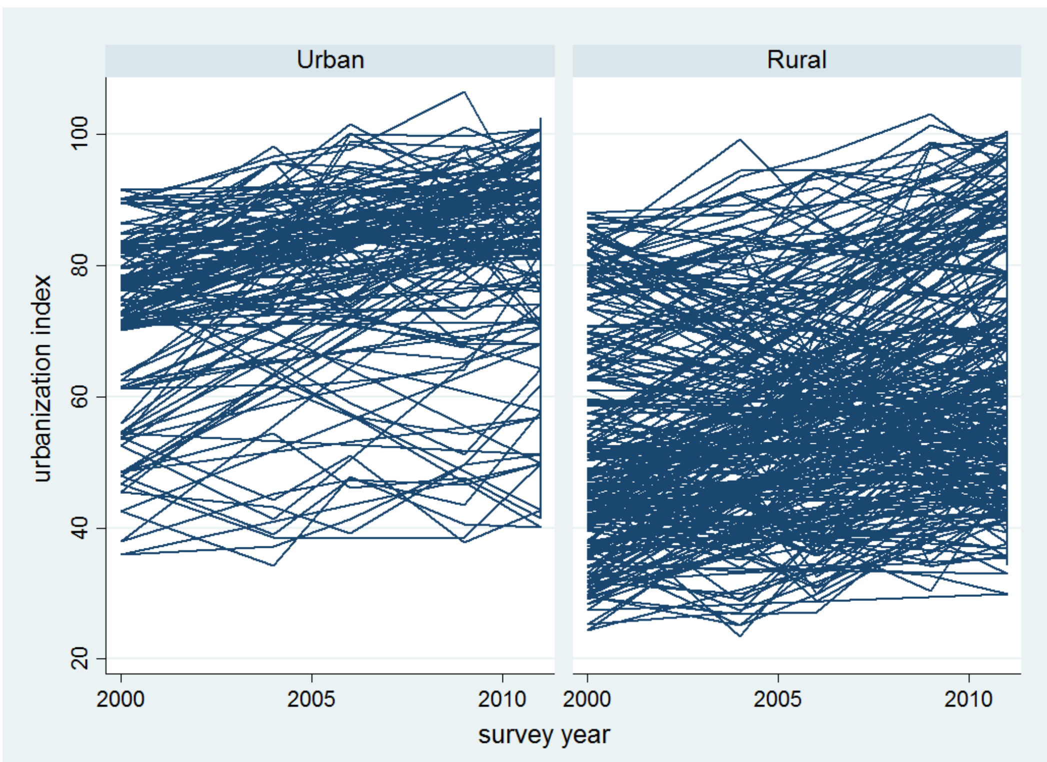

Figure V-1 Urbanization Index for Rural and Urban Areas by Time

Table V-1 Summary Statistics of Community Characteristics, 2006

	Urban Communities				Rural Communities				All			
Variables	mean	sd	min	max	mean	sd	min	max	mean	sd	min	max
Urbanization index (composite index)	79.82	15.92	38.41	101.6	56.7	18	27.18	96.72	64.44	20.46	27.18	101.6
Communications component score	6.97	1.12	4.4	9.28	5.73	1.39	2.57	8.9	6.15	1.43	2.57	9.28
Community population density category	6.48	1.57	0.5	10	5.66	1.35	2	9.5	5.94	1.47	0.5	10
Diversity score	6.03	1.2	4	9	4.76	1.1	2.5	9	5.18	1.28	2.5	9
Economic component score	7.98	2.99	0.8	10	5.8	2.9	0	10	6.53	3.1	0	10
Quality of health score	6.49	2.51	1.6	10	4.3	1.98	0.8	10	5.03	2.4	0.8	10
Housing component score	8.65	1.66	3.75	10	6.15	2.16	0.97	10	6.99	2.33	0.97	10
Market component score	7.23	2.88	0	10	3.67	3.81	0	10	4.86	3.9	0	10
Social services score	4.81	3.18	1.25	10	2.39	2.06	0	10	3.2	2.74	0	10
Transportation component score	6.58	2.29	1.67	10	5.44	2.63	0	10	5.82	2.57	0	10
Community education category	4.33	1.63	1.46	8.3	2.98	1.22	0.88	7.28	3.43	1.51	0.88	8.3
Modern markets component score	5.82	2.66	0	10	3.98	2.86	0	10	4.6	2.92	0	10
Sanitation score	8.45	2.41	0.5	10	5.85	2.82	0.3	10	6.72	2.95	0.3	10
N	145				73				218			

Notes: see Zhang et al. 2014 for in-depth descriptions of the variables and their computation

5.2.3. Hierarchical Generalized Linear Models

Generally, multilevel regression models are multilevel versions of standard regression models, assuming the dependent variable to be continuous, error terms to have a normal distribution, and the associations between the dependent variable and independent variables to be linear. However, the dependent variable in which I am interested is the intention to have a birth, and it is equal to either 1 or 0. Since the distribution is binominal, the level-1 variance is heteroscedastic. Such a model thus does not meet the assumptions of standard regression methods (Hox 2010; Li 2005; Raudenbush and Bryk 2002). Hence, I use Hierarchical Generalized Linear Models (HGLM).

The HGLM permits the use of standard regression procedures with link functions for non-normally distributed data. The link function of dichotomous outcomes is η_{ij} $=\log[\phi_{ij}/(1 - \phi_{ij})]$ (Hox 2010; Raudenbush and Bryk 2002). In the so-called logit function, ϕ_{ij} is the probability of the event occurring; $\phi_{ij}/(1 - \phi_{ij})$ is the ratio of the probability of the event occurring versus not occurring. For example, in my research, the event is that a woman says she intends to have a child. The logit has a nonlinear relationship with the probability of the event occurring, since it is the logarithm of the odds of the event occurring. Additionally, the independent variables have linear effects on the logit, and a standard logistic distribution is similar to a normal distribution with a mean of 0 and a variance of $\frac{\pi^2}{3}$, or about 3.29. Such assumptions permit the use of standard regression procedures (Long and Freese 2006).

Moreover, the logit can be perceived as a latent variable (y^*). That is, there is an unobserved dependent variable measuring the likelihood of the event occurring, or the extent to which a woman intends to have a child. Alternatively, because y^* is unobserved, the variance of y^* is typically fixed at 1 (Long and Freese 2006).

Mathematically, the generalized multilevel logistic regression can be expressed as follows:

$$\eta ij \;= \beta_{00} + \beta_{\mathrm{i0}} X_{ij} + \gamma_{\mathrm{0j}} Z_{ij} + \gamma_{\mathrm{ij}} X_{ij} \times Z_j + u_{\mathrm{i}j} X_{ij} + u_{0j}$$

The term, η_{ij} is the dependent variable for person i in context j.

β_{i0} denotes the coefficients of individual-level variables, indicating the fixed effects of person-level variables;

γ_{0j} denotes the coefficients of contextual level variables; indicating the fixed effects of contextual level variables;

γ_{ij} denotes cross-level effects;

$u_{\mathrm{i}j}$ denotes the random term of person-level variables;

u_{0j} denotes the contextual level variance.

The above generalized model specification does not include an error term at the individual level. This is because it has been constrained to 3.29 (Hox 2010; Long and Freese 2006).

The intra-class correlation is often used to determine whether it is appropriate to undertake a multi-level analysis. As mentioned earlier, one of the advantages of multilevel modeling is that it can divide the total variance the dependent variable into within-group and between-group components. Dividing the between-group variance by the total variance produces the intra-class correlation, a measure reflecting the proportion of the variance that is between-group, that is, at level-2. The formula is: $\rho = \frac{u^2}{e^2+u^2}$. For the multilevel logistic regression, the level-1 variance term is constrained to 3.29. Hence the intra-class correlation is computed by this formula: $\rho = \frac{u^2}{\frac{\pi^2}{3}+u^2} = \frac{u^2}{3.29+u^2}$ (Hox 2010; Li 2005; Raudenbush and Bryk 2002).

The effect of an explanatory variable on a dichotomous dependent variable can be interpreted in three ways. First, it can be interpreted by the logit coefficient. The logit coefficient for a variable may be interpreted as the amount of change in the logit associated with a one unit change in the independent variable. The second way is to use odds ratios. Since the link function has converted the dichotomous outcome into a natural logarithm of the odds (logit), the odds can be computed directly by taking the antilog (that is, e to the power) of the logit coefficient. The odds ratios can be interpreted as the multiplicative change in the odds with a one unit change in the independent variable. Third, the effect can also be interpreted using percent change in the odds ratio; here one subtracts the odds ratio from 1 and multiplies the difference by 100. The direction of the effect of the variable depends on the sign of the logit coefficient, that is, a positive logit coefficient suggests a positive effect. The range of the logit coefficient extends from negative infinity to positive infinity. In terms of the odds ratio, an odds ratio greater than 1 means a positive effect, while an odds ratio less than 1 means a negative effect (odds ratios range from 0 to 1).

In addition, the parameters of multilevel generalized linear models are estimated using maximum likelihood methods. That is, the estimation proceeds iteratively, starting with approximate values that are improved in the next iteration until convergence is reached (Hox 2010; Raudenbush and Bryk 2002). Moreover, HGLM produces estimates for both the "unit-specific" and "population-average" models. *"The unit-specific models predict the outcome of individuals and groups conditional on all random effects included in the model. The interpretation of such models is equivalent to the interpretation of effects in standard multilevel regression models"* (Hox 2010: P. 139). The regression coefficients are interpreted as the predicted change in the outcome variable associated with a one unit change in the corresponding explanatory variable. If the research focus is on how individual and group level variables affect the samples observed in each group, then the "unit-specific" models should be used. But if the research focus is explaining the influence on the entire population, "population-average" models should be used (Raudenbush and Bryk 2002). Hox (2010) claims that "unit-specific" models are appropriate in scientific research, while "population-average" models are proper in social policy research. Therefore, according to my research, I prefer to use "unit-specific" models to interpret the effects of community urbanization level and individual childbearing experiences on the fertility intentions of women surveyed by the 2006 CHNS.

5.2.4. Analytic Strategy and Models

I employ a three-step multilevel modeling strategy. First, I conducted a ANOVA analysis to ascertain whether there was a significant amount of variation in the dependent variable at the community level (level-2). In the second step, only the major level-1 independent variable, migration status and the various control variables are used in the regression equation. This step allows me to determine whether there is a significant effect of migration status on fertility intentions controlling for other level-1 variables. In the third step, the level-2 variable, urbanization and an interaction term of urbanization with migration status, are added to the model. This step checks whether urbanization has a direct effect on fertility intentions and an indirect effect on the association between migration status and fertility intentions.

In particular, I only focus on variables related to my research interests; I control for age and the sex composition of prior children because these are significantly related to fertility. But I do not control for socioeconomic variables. Migration status is the major independent variable at level-1; it is a dummy variable. Depending on the analysis, the reference group is urban non-migrants or rural non-migrants. Age is measured by years and has been centered in all models. Other studies in China confirmed that whether having one son is the key determinant to fertility behaviors (Bongaarts 2013; Murphy, Tao, and Lu 2011; Poston 2002; Zheng 2004). There are three categories of the sex composition of prior children: (1) at least one son and one daughter; (2) only sons; (3) only daughters. In the models, sex composition is operationalized as three dummy variables. *SONS* means the category of women having only sons, *DAUS* indicates the category of women having only daughters, and the reference group of sex composition is at least one son and one daughter. The level-2 variable, urbanization index, has also been centered.

Additionally, as mentioned earlier, childbearing experience is assumed to significantly shape fertility attitudes. The survey asks women who have children and women who have no children separate questions about their fertility preferences.

Therefore, I will estimate separate models for women who have children and for women who have no children.

For the sample of women who have children, I will fit a full logit model predicting fertility intentions by migration status, age and sex composition of prior children, with a random intercept by community, a fixed slope of community urbanization level, and a cross-level term of migration and urbanization. Age and sex composition of prior children are the control variables at level-1. The models for each of the 3 steps are:

Step 1: $\eta_{ij} = \gamma_{00} + u_{0j}$

Step 2: $\eta_{ij} = \gamma_{00} + \gamma_{10}*AGE_{ij} + \gamma_{20}*SONS_{ij} + \gamma_{30}*DAUS_{ij} + \gamma_{40}*MIGS_{ij} + u_{0j}$

Step 3: $\eta_{ij} = \gamma_{00} + \gamma_{01}*INDEX_j + \gamma_{10}*AGE_{ij} + \gamma_{20}*SONS_{ij} + \gamma_{30}*DAUS_{ij} + \gamma_{40}*MIGS_{ij} + \gamma_{41}*INDEX_j*MIGS_{ij} + u_{0j}$

For the sample of women who do not have children, I will fit a full logit model similar to the previous models, but I will only control age at level-1 (because these women, by definition, do not have any prior children). The models for each of the 3 steps for this second group of women are:

Step 1: $\eta_{ij} = \gamma_{00} + u_{0j}$

Step 2: $\eta_{ij} = \gamma_{00} + \gamma_{10}*\mathrm{AGE}_{ij} + \gamma_{20}*\mathrm{MIGS}_{ij} + u_{0j}$

Step 3: $\eta_{ij} = \gamma_{00} + \gamma_{01}*\mathrm{INDEX}_j + \gamma_{10}*\mathrm{AGE}_{ij} + \gamma_{20}*\mathrm{MIGS}_{ij} + \gamma_{21}*\mathrm{INDEX}_j*\mathrm{MIGS}_{ij} + u_{0j}$

The link function of a multilevel logistic regression is $\eta_{ij} = \log[\phi_{ij}/(1 - \phi_{ij})]$; η_{ij} is the logit of the dichotomous dependent variable; ϕ_{ij} is the probability that person i in community j would want another child. In addition, the fixed effects are denoted as γ_{i0} for the level-1 variables, and γ_{0i} for the level-2 variable; γ_{00} is the grand mean, and u_{0j} is the variance component of the dependent variable at level-2.

I will present my results in two parts. The first part compares rural-to-urban migrants to urban non-migrants, and the second compares rural-to-urban migrants to rural non-migrants.

5.3. Results

5.3.1. Fertility Intentions: Rural-to-Urban Migrants Versus Urban Non-Migrants

In this section, I compare the fertility intentions of rural-to-urban migrants with those of urban non-migrants. I focus on the effects of migration status and urbanization level on fertility intentions. As mentioned earlier, the effect of an explanatory variable on fertility intentions can be interpreted by a logit coefficient or by an odds ratio. Odds ratios are merely the exponentiated values of the logit coefficients. I present the descriptive statistics in Table V-2.The results of the models for women who have children are presented in Table V-3, and the results of the models for women who have no children are shown in Table V-4.

Before proceeding to multilevel analysis, I first conducted ANOVA tests. The ANOVA tests for both groups of women show that there is a significant amount of variation in the dependent variable, women's fertility intentions, at the community level, i.e., level-2. Thus, I proceeded to a multilevel analysis.

Table V-2 presents the descriptive statistics of the level-1 and level-2 variables in my sample of rural-to-urban migrants and urban non-migrants. With respect to fertility preferences, the proportion of women who want to have a child is 0.12, regardless of whether they do or do not yet have children. The intended number of children is between 0 and 2. The mean age of women in the sample is 39.7 with the youngest age being 21 and the oldest 51. As for the sex composition of prior children, approximately 21% of women who have children currently have at least one son and one daughter, 41% have only sons, and 38% have only daughters. Approximately 35 % of the women in the sample are rural-to-urban migrants, and 65% are urban non-migrants. As for the level-2 data, 73 communities are retained in the sample. Their mean value of the urbanization index is 79.82, and its values range from 38.41 to 101.6.

I then estimate the fixed effects of the level-1 explanatory variables. The results are shown under Model 2 in Table V-3. The logit coefficient of migration status is negative and significant, γ_{40}= -1.425. The exponentiated value of the logit coefficient is 0.241. This means that after controlling for age and the sex composition of prior children, the odds of rural-to-urban migrants wanting another child versus not wanting one are 0.241 those of urban non-migrants, that is, they are less. In other words, when we consider women with the same age and sex composition of prior children, the odds of rural-to-urban migrants wanting to have another child are 76% less than those of urban non-migrants. Moreover, a woman's fertility intention varies substantially across communities. The standard deviation of the intercept (u_0) at level-2 is 1.17, which is equivalent to a correlation of 29.41 in the latent propensities to wanting an additional child of comparable women in the same community. The formula for the correlation is $\rho = \frac{1.17^2}{\frac{\pi^2}{3}+1.17^2}$=0.2941.

I then add to the model a random intercept and a fixed slope reflecting community urbanization level (that has been centered at the grand mean), as well as a cross-level interaction term of urbanization and migration (Model 3 in Table V-3). This shows that the odds of wanting to have an additional child for a rural-to-urban migrant woman are lower than urban non-migrants at the same age within a community of the same average urbanization level; however, the coefficient is not significant. The cross-level term of migration status and urbanization index is 0.088 and it is significant. This suggests that the difference in fertility intentions between rural-to-urban migrant women and urban non-migrant women decreases with increases in urbanization. The odds ratio can be computed by the following formula: exp(-0.178+0.088)=0 .9139. That is, rural-to-urban migrants tend to have the odds of wanting to have another child about 9% lower than urban non-migrants do for every one point increase in the urbanization index. For a better illustration, let me use the maximum and minimum values of the urbanization index as examples. For instance, if a rural-to-urban migrant is living in the community with the highest urbanization index value (which is 101.6), the odds of wanting to have another child for her is .00010686 and this is extremely low; in contrast, if she is living in the community with the lowest urbanization index value (which is 38.41), the odds of wanting to have another child is .03152735. This illustrates that women's fertility intentions decrease as the urbanization index increases.

Prior to controlling for urbanization, rural-to-urban migrants have 76% lower propensity of wanting to have another child compared to urban non-migrants. However, the direct effect of urbanization index is not significant, as indicated by γ_{01}. Additionally, the intra-class coefficient is still high and significant. This suggests that the fertility intentions of a woman with children tend to vary by the urbanization contexts of the community where a woman lives.

It is noteworthy that in the model of women who have children, the coefficient of migration status changes from significant to non-significant when the urbanization index is added to the model; in addition, the coefficient of the urbanization index is not significant. These results lead to the conclusion that migration status and the urbanization index may not have significant effects on fertility intentions. The non-significant effects are very likely due to the reduced numbers of level-1 records and level-2 groups. When the sample size is small, the estimate of standard errors is biased and only the very large effects are statistically significant for multilevel modeling (Maas and Hox 2005). However, the signs of the coefficients still indicate that there are negative effects of migration and urbanization.

The results for the models for women without children are somewhat different from the results for the models for women who have children (see the results in Table V-4). The coefficients of migration status and the urbanization are not significant, but age is significant. Additionally, the intra-class coefficient is low but still significant. There seem to be a small amount of variation in fertility intentions across the communities.

Table V-2 Descriptive Statistics of Level-1 and Level-2 Variables (Rural-to-Urban Migrants versus Urban Non-Migrants)

Variables	N	Mean or proportion	Sd	Min	Max
Level 1					
Fertility preferences					
Women with children					
Want a child	459	0.12	0.32	0	1
Intended number of children	35	1.17	0.57	0	2
Women without children					
Want another child	261	0.12	0.32	0	1
Intended number of children	54	1.11	0.57	0	2
Age	812	39.7	7.42	21	51
sex composition of prior children					
At least one son and one daughter (ref.)	742	0.21	0.41	0	1
Only sons, no daughter	742	0.41	0.49	0	1
Only Daughters, no son	742	0.38	0.49	0	1
Migration Status					
Urban non-migrants (ref.)	812	0.65	0.48	0	1
Rural-to-urban migrants	812	0.35	0.48	0	1
Level 2					
Urbanization index	73	79.82	15.92	38.41	101.6

Table V-3 Models for Fertility Intentions of Women Who Have Children (Rural-to-Urban Migrants versus Urban Non-Migrants)

Model 1: ANOVA				Model 2: Fixed Effects			Model 3: Random Effects		
Fixed Effects	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**
INTRCPT									
γ_{00}	-2.097 ***	0.28	0.123	-2.644 ***	0.696	0.071	-2.653 ***	0.792	0.070
INDEX									
γ_{01}							0.009	0.035	1.009
AGE									
γ_{10}				-0.063 **	0.029	0.939	-0.068 **	0.029	0.934
SONS									
γ_{20}				1.014	0.675	2.757	1.005	0.689	2.731
DAUS									
γ_{30}				0.712	0.694	2.038	0.648	0.698	1.911

(Table V-3 Continued)

Model 1: ANOVA				Model 2: Fixed Effects			Model 3: Random Effects		
Fixed Effects	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**
(Table V-3 Continued)									
MIGS									
γ_{40}				-1.425 **	0.654	0.241	-0.178	0.610	0.872
INDEX*MIGS									
γ_{41}							0.088 **	0.044	1.092
Random Effects									
u_0	1.121 ***			1.17 **			1.124 **		
ρ	27.64%			29.41%			27.74%		
χ^2	75.87			70.21			63.715		

* p<0.10, ** p<0.05, *** p<0.001

Table V-4 Models for Fertility Intentions of Women Who Have No Children (Rural-to-Urban Migrants versus Urban Non-Migrants)

Model 1: ANOVA				Model 2: Fixed Effects			Model 3: Random Effects		
Fixed effects	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**
INTRCPT									
γ_{00}	-1.996 ***	0.156	0.136	-2.421 ***	0.241	0.089	-2.640 ***	0.312	0.071
INDEX									
γ_{01}							0.038	0.024	1.038
AGE									
γ_{10}				-0.152 ***	0.020	0.858	-0.152 ***	0.020	0.856
MIGS									
γ_{30}				-0.169	0.321	0.844	0.108	0.450	1.115
INDEX*MIGS									
γ_{31}							-0.031	0.030	0.967
Random Effects									
u_0	0.433 **			0.289 ***			0.318 ***		
ρ	5.40%			2.47%			2.98%		
χ^2	91.079			107.52			107.08		

* p<0.10, ** p<0.05, *** p<0.001

5.3.2. Fertility Intentions: Rural-to-Urban Migrants versus Rural Non-Migrants

This section compares the fertility intentions of rural-to-urban migrants to that of rural non-migrants.

The ANOVA tests indicated that in the sample of women with children, the amount of variance at the community level was significant at the 0.05 level, but in the sample of women without children yet, the p-value for the test was 0.051. The latter was not significant at the 0.05 level, but at the 0.10 level. Since I was interested in the effects of migration status on fertility intentions for rural-to-urban migrants and rural non-migrants, although it was not justified statistically, I decided to proceed to multilevel analysis for both samples for the sake of making this analysis be comparable to the previous section of rural-to-urban migrants with urban non-migrants.

The descriptive statistics for the samples of rural-to-urban migrants and rural non-migrants are presented in Table V-5. As for fertility preferences, 9% of women who already have children want an additional child; 11% of women who do not have a child yet want to have a child. The intended number of children ranges from 0 to 4. The mean age of women in the sample is 39.28 with the youngest age being 19 and the oldest 51. With respect to the sex composition of prior children, approximately 43% of women who have children currently have at least one son and one daughter, 37% have only sons, and 21% have only daughters. Approximately 17% of women in the sample are rural-to-urban migrants, 83% being rural non-migrants. For the level-2 data, there are 159 communities retained in the sample with a mean value of 56.44 on the urbanization index.

The results (see Model 2 and 3 in Table V-6) show that migration status has a negative effect on fertility intentions for women with children. The logit coefficient for migration status is -2.148, equal to an odds ratio of 0.116, when age, sex of prior children and urbanization index are controlled. Rural-to-urban migrants tend to have about 88.4% lower odds of wanting another child than rural non-migrants do. Additionally, the direct effect of the level-2 variable, urbanization index, is not significant, but the cross-level coefficient of migration status and urbanization index is significant and it is 0.107. This suggests that the difference between rural-to-urban migrant women and rural non-migrant women decreases when the urbanization index increases. That is, rural-to-urban migrants have the odds of wanting another child about 87% lower than rural non-migrants do if the urbanization index increases by one point. Additionally, the variance component at the community level shows that fertility intentions do not vary across communities significantly.

Next, I examine the samples of women who do not have children yet about their fertility intentions, with only migration status and age as explanatory variables at level-1 and urbanization level at level-2 in the models (see Table V-7). However, the coefficients of migration status and the level of urbanization are not significant when age is controlled. Additionally, the intra-class coefficient is not significant, which does not provide evidence for variations across communities.

Table V-5 Descriptive Statistics of Level-1 and Level-2 Variables
(Rural-to-Urban Migrants versus Rural Non-Migrants)

Variables	N	Mean / proportion	Sd	Min	Max
Level 1					
Fertility preferences					
Women with children					
Want a child	644	0.09	0.29	0	1
Intended number of children	61	1.11	0.52	0	3
Women without children					
Want another child	892	0.11	0.32	0	1
Intended number of children	98	1.23	0.61	0	4
Age	1651	39.28	7.69	19	51
sex composition of prior children					
At least one son and one daughter (ref.)	1526	0.43	0.49	0	1
Only sons, no daughter	1526	0.37	0.48	0	1
Only Daughters, no son	1526	0.21	0.41	0	1
Migration Status					
Rural non-migrants (ref.)	1651	0.83	0.38	0	1
Rural-to-urban migrants	1651	0.17	0.38	0	1
Level 2					
Urbanization index	159	56.44	9.66	27.18	100.15

Table V-6 Models for Fertility Intentions of Women Who Have Children
(Rural-to-Urban Migrants versus Rural Non-Migrants)

Model 1: ANOVA				Model 2: Fixed Effects			Model 3: Random Effects		
Fixed Effects	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**
INTRCPT									
γ_{00}	-2.308 ***	0.173	0.099	-4.073 ***	0.599	0.017	-4.028 ***	0.623	0.017
INDEX									
γ_{01}							0.007	0.015	1.007
AGE									
γ_{10}				-0.124 ***	0.022	0.883	-0.126 ***	0.022	0.881
SONS									
γ_{20}				1.669 ***	0.617	5.309	1.676 ***	0.622	5.341
DAUS									
γ_{30}				1.975 ***	0.689	7.204	1.937 ***	0.695	6.939

(Table V-6 Continued)

Model 1: ANOVA				Model 2: Fixed Effects			Model 3: Random Effects		
Fixed Effects	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**
(Table V-6 Continued)									
MIGS									
γ_{40}				-1.027	0.733	0.358	-2.148 **	0.850	0.116
INDEX*MIGS									
γ_{41}							0.107 ***	0.035	1.113
Random Effects									
u_0	0.838 **			0.696			0.668		
ρ	17.48%			12.83%			11.94%		
χ^2	120.613			102.180			95.317		

* p<0.10, ** p<0.05, *** p<0.001

Table V-7 Models for Fertility Intentions of Women Who Have No Children (Rural-to-Urban Migrants versus Rural Non-Migrants)

Model 1: ANOVA				Model 2: Fixed Effects			Model 3: Random Effects		
Fixed effects	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**	**Coef.**	**Se.**	**Odds Ratio**
INTRCPT									
γ_{00}	-2.124 ***	0.126	0.119	-2.805 ***	0.181	0.060	-2.766 ***	0.207	0.062
INDEX									
γ_{01}							0.009	0.010	1.009
AGE									
γ_{10}				-0.172 ***	0.016	0.842	-0.172 ***	0.016	0.841
MIGS									
γ_{30}				0.101	0.315	1.106	-0.005	0.397	0.994
INDEX*MIGS									
γ_{31}							-0.003	0.020	0.997
Random Effects									
u_0	0.632 *			0.721			0.747		
ρ	10.83%			13.64%			14.52%		
χ^2	160.668			148.790			148.001		

* p<0.10, ** p<0.05, *** p<0.001

5.4. Conclusions

This chapter has focused on the effects of migration status and urbanization levels on fertility preferences. Data from the 2006 CHNS were used to estimate the models. I did not undertake an analysis of intended number of children because there most women respond similarly to the question of intended children, such that the variable has little if any variation. Thus, I only examined fertility intentions as the dependent variable.

The results demonstrate that women without children have different fertility intentions according to age only, while women with children have substantially different fertility intentions, conditional on their migration status, age and the influence of urbanization. I have four major findings corresponding to the hypotheses that I have developed at the beginning of this chapter. First, rural-to-urban migrants tend to have a lower level of fertility intentions than urban non-migrants among women who have had children, but have a similar level of fertility intentions compared to rural non-migrants. The first hypothesis is thus partially supported. Second, there is no evidence supporting the hypothesis expecting a direct effect of urbanization on fertility intentions. Third, the urbanization level of communities has an indirect and positive effect on the association of fertility intentions and migration status. That is, in more urbanized communities, the difference in fertility preferences between rural-to-urban migrants and urban non-migrants is smaller. This finding does not support the third hypothesis. Fourth, after I included the effects of urbanization in the equation, the intra-class coefficient remained high and significant, which demonstrates that the fertility intentions of a woman with children vary by the social contexts of the community where a woman lives. Last but not least, these effects do not prevail among women without children.

In the next chapter, I will summarize the major findings of my dissertation. I will then discuss in some detail the implications of my research, its limitations and my proposed future work dealing with migration and fertility.

CHAPTER VI

SUMMARY, IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

This chapter begins with a review of the demographic and theoretical perspectives that guided my research in this dissertation. I next present my major findings. I consider especially the implications of my research with regard to demographic and policy changes in China. Next, some of the limitations of the current work are discussed, followed by an outline on future research.

6.1. Urbanization, Migration and Fertility in China

Chapters I through III introduced the demographic and theoretical backgrounds of the current research, including a review of the literature. These led to my research questions.

In recent years, we have witnessed a large influx of migrants from rural to urban areas in China. This experience in China is similar to that in other developing countries, where industrialization, urbanization, and modernization usually lead to a massive rural-urban migration (Bradshaw 1987; Goldscheider 1987; Goldstein 1973). In 2010, the size of China's migrant population was 221 million, compared to only 6.5 million in 1980 (Zheng and Yang 2013). Rural-to-urban migration has resulted in very large numbers of migrants in the major cities. For example, Shanghai, the largest metropolitan area in China, has a migrant population comprising 41 percent of its total population. In Beijing migrants comprise 38 percent of the population; in Shenzhen migrants account for 70 percent of the population (Duan et al. 2008; Sun and Fan 2011). In addition, notwithstanding, there is a negative relationship between the level of urbanization and the fertility rate (see Figure I-2), and different paths of fertility transition have been observed in rural and urban areas (Guo et al. 2012; Zeng and Vaupel 1989).

From the theoretical perspective of Demographic Transition Theory, fertility declines with industrialization and urbanization (Davis 1945; Notestein 1945). The "Urbanism as a Way of Life" perspective claims that rural to urban migration affects the values and norms of individuals and popularizes the idea of a smaller family size (Inkeles 1969; Easterlin 1975b; Freedman 1979; Goldstein 1973). Additionally, empirical studies of migration in China and elsewhere have evaluated four hypotheses to explain how migration affects fertility. These include selectivity, disruption, adaptation, and socialization (Campbell 1989; Goldberg 1959; Goldstein 1973; Goldstein and Tirasawat 1977; Hervitz 1985; Zárate and Zárate 1975).

Considering China's demographic background, two general questions should be asked: (1) What is the current trend in the fertility of rural-to-urban migrants compared to non-migrants in rural and urban places? and (2) What are the fertility preferences of rural-to-urban migrants? I used data from the China Health and Nutrition Survey (CHNS) to address these questions. The first question was addressed in Chapter IV and the second question in Chapter V.

6.2. Effects of Migration on Marital Fertility

Since rural-to-urban migrants in China are influenced by both rural and urban social contexts, it is not clear how their fertility is impacted. It is likely that the timing of their first child depends on their experiences in the urban settings, as suggested by the adaptation hypothesis (Goldstein 1973; Hervitz 1985; Massey and Mullan 1984). In particular, the disruption hypothesis suggests that rural-to-urban migrants may delay childbearing owing to the psychological stress or spousal separation caused by the moving (Hervitz 1985; Massey and Mullan 1984). The selectivity hypothesis suggests that rural-to-urban migrants are a high socioeconomic status group with low fertility desires (Goldstein 1973; Hervitz 1985; Ribe H and Schultz TP 1980). On the other hand, according to the socialization hypothesis, rural-to-urban migrants could retain their relatively higher possibility of having a child, which would have been their behavior had they remained in the rural places (Duncan 1965; Freedman and Slesinger 1961; Hervitz 1985). These four hypotheses were addressed in my analyses of the relationships between migration and marital fertility.

In order to clarify the relationships between migration and fertility, the total fertility rate (TFR) and age-specific fertility rates (ASFRs) were examined along with the recent birth data from the CHNS between 2000 and 2011. The analysis of the aggregate data in Chapter IV indicated that rural-to-urban migrants have, on average, a TFR of 0.03 or higher than rural non-migrants, and 0.91 or higher than urban non-migrants (see Table IV-1). These results tended to support the socialization hypothesis, which stipulated that rural-to-urban migrants are expected to have higher fertility rates than urban non-migrants. However, the TFR is a synthetic measure. Hence, the ASFRs were examined. For women under the age of 20, rural-to-urban migrants have a lower birth rate than rural non-migrants, but have the same birth rate as urban non-migrants. This illustrates the selective effect of migration; that is, migrant women are more likely to be the ones with the lower fertility rate compared to "stayers" (i.e. women who do not move from rural to urban areas). Between the ages of 20 and 24, rural-to-urban migrants have the highest fertility rate, which seems to work against the disruption and adaptation hypotheses. Between the ages of 25 and 35, as well as between the ages of 35 and 39, rural-to-urban migrants have lower birth rates than urban non-migrants, a finding supported by the adaptation hypothesis. However, there was not much evidence of the disruption effect in my analyses, since rural-to-urban migrants seem to have higher fertility rates than rural non-migrants at all ages after age 20.

I then investigated the mediating mechanisms by which migration and fertility are related with each other. I conducted a univariate event history analysis of the duration from marriage to the first birth with migration status used as the major independent variable. Then, I conducted a multivariate event history analysis with the relevant covariates of socioeconomic status, living arrangement with extended family, and family structure as control variables.

The univariate analysis showed that rural-to-urban migrants, on average, wait longer than urban non-migrants to have the first birth (see Table IV-3 and Figure IV-4), but do not differ significantly from rural non-migrants (Figure IV-6). The multivariate analysis showed that rural-to-urban migrants have a greater likelihood of experiencing the hazard of a first birth (i.e. 91.5% higher), compared to urban non-migrants at a given month after marriage, controlling for all the covariates (see Table IV-5). This indicates that rural-to-urban migrants have higher fertility than urban non-migrants. This could be attributed to their socialization in rural places. In particular, the difference between rural-to-urban migrants and urban non-migrants narrows when the variables of status of siblings are added to measure the socialization effect. The socialization hypothesis is also supported by the fact that there is no significant difference between rural-to-urban migrants and rural non-migrants in the timing of having the first birth (see Figure IV-6). Additionally, the difference between rural-to-urban migrants and urban non-migrants tends to be smaller when controlling for socioeconomic status (Table IV-5). This indicates that rural-to-urban migrants may well be selected by their socioeconomic status, thus resulting in a lower fertility rate. However, as I noted above, the disruption hypothesis is not supported in any of my analyses. Rural-to-urban migrants seem to have a higher hazard of the first birth than urban non-migrants when living arrangements were controlled.

6.3. Effects of Urbanization and Migration on Fertility Intentions

In Chapter V, I focused on the effects of migration and urbanization on fertility preferences. I estimated multilevel models, and I again used the data from the 2006 CHNS. Individual migration status and the urbanization index of communities were the two major independent variables. The intention to have children was the dependent variable. The sex composition of prior children and age were controlled.

The models for women with children showed that migration status has a significant effect on fertility intentions (see Table V-3). When age and sex composition of prior children were controlled, the odds of rural-to-urban migrants wanting to have another child are 76% less than those of urban non-migrants. Additionally, the urbanization level of the communities was shown to have an indirect, yet positive effect, on the associations between fertility intentions and migration status. The odds of wanting to have another child for rural-to-urban migrants decreases by 9% compared to that of urban non-migrants, with every one point increase in the urbanization index (the range of the urbanization index is from 1 to 120). However, the direct effect of the urbanization index is not significant, although my results indicate that fertility intentions vary at the community level among women with children. These effects were shown to exist only for women who already have children, but not among women who have not yet had children.

These findings provide evidence for the adaptation hypothesis and the disruption hypothesis. According to the adaptation hypothesis, rural-to-urban migrants adapt to the low fertility levels in urban places. The disruption hypothesis states that migration leads to spousal separation, physiological stress and economic pressures, which results in an even lower level of desire for children (Hervitz 1985; Massey and Mullan 1984).

6.4. Implications

The differences in marital fertility between rural-to-urban migrants and urban non-migrants seem to be related in important ways to socioeconomic inequalities in China. Previous studies have documented the gaps in the fertility levels of rural and urban residents (Zeng and Vaupel 1989; Tu 2000). I also found higher levels of marital fertility of rural-to-urban migrants compared to urban non-migrants, but I did not see any significant difference when I compared them to rural non-migrants. First, it is important to acknowledge that there are different family planning policy implementations for rural and urban residents. Basically, rural residents have been allowed to have, on average, 1.5 children, while urban residents have only been allowed to have one child[1] (Guo et al. 2003). This can partially account for the higher levels of marital fertility of rural-to-urban migrants compared to urban non-migrants. Second, and more importantly, the difference may be due to the persistent socioeconomic inequality between migrants and non-migrants in China. China's social welfare system is heavily dependent on household registration. Household members can only access social services at the place of their household registration. Rural-to-urban migrants thus are not included in pension plans and other necessary social and economic services in their urban destinations, including health care and education. As a result, rural-to-urban migrants are disadvantaged, disenfranchised, and many live an unpleasant life as "second-class citizens" in the cities (Chan 2010; Riley 2004). Due to the obstacles posed by the household registration system, rural-to-urban migrants may not have access to the proper services for birth control. And voluntary participation in fertility control is less likely for rural-to-urban migrants than for urban non-migrants; this might help explain their higher likelihood of having the first birth earlier than urban non-migrants.

I did not see any disruptive effects of migration on fertility in my analysis of the ASFRs by migration groups and in the event history analyses. This finding corresponds to recent developments in the literature, which indicate that family formation and reunion

[1] In 2013, a reform on One Child Policy drew the attention among all of the "Sixty Proposed Reforms" endorsed by the Communist Party Central Committee. The Revised One-Child Policy now allows couples to have two children if either the husband or wife is an only child (Buckley 2013). This new policy was first implemented in 2014.

among migrants in urban areas has become more prevalent (Duan et al. 2008; Duan, Zhang, and Lu 2009). Young males and females of the new generation of migrants, i.e., those who were born after the 1980s, typically meet in the cities and are more likely to have children born and raised in the cities. There is also an increasing number of female migrants joining their migrant husbands in the cities, who migrated earlier than they. In the early stages of migration, it was only the men who migrated to urban places for work; their wives and children were left behind in their rural hometowns. In later stages, it has become more typical for wives to join their husbands in the urban areas, followed shortly thereafter by their children (Duan, Zhang, and Lu 2009). These families would then establish new homes in the cities. For example, a recent survey in Beijing revealed that 70.33% of the female migrants were married and aged between 15 to 45 years old; and more than 60% of the floating migrants were married and living with their core family members (The Beijing News 2014). Additionally, as family reunions becomes more popular, there should be an increase in the fertility rate. In Shanghai, only 2.3% of migrant women, aged 15 to 49, had children born in Shanghai in 1990, but 58.8% of them had a birth in Shanghai in 2011 (Sun 2013). At the country level, in 2013, one third of all births occurred in migrant families, and more than 70% of the migrant women had given birth at the place of destination in 2013 (The Floating Population Division of National Health and Family Planning Commission 2013). Therefore, migration does not seem to necessarily delay the marriage and fertility of migrants as is predicted by the disruption hypothesis.

Furthermore, rural-to-urban migrants do not seem to intend to have more children than urban non-migrants; this was one of my findings in the analysis of fertility preferences. Moving to urban places could potentially offer more opportunities for education and employment for rural-to-urban migrants. The influence of the diversified values and norms of low fertility through education and employment could impact the fertility preferences of rural-to-urban migrants. In addition, when rural-to-urban migrants arrive in cities, they often express the desire to settle there permanently (Chan 2010). Since issues of household registration and social welfare pose to be obstacles for the migrants, the intention to have fewer children may be a result. Meanwhile, the more inclusive and liberal policy on migration and urbanization in China in recent years may well have migrants to live and work in cities with less stress than they would have faced before. For example, the yearly *Communist Party's Central Committee Document No. 1* highlighted the benefits of the labor force being transferred from the agricultural sector ("*Liudong renkou*" or "*rural workers*"). Migrant workers in some big cities are permitted to access the public facilities (including health care and education) and be covered by pension plans, if they have paid taxes for a certain number of years and have obtained residency permits at their workplace (Chan 2010). Nevertheless, the policy changes may not be fully protective of migrants' childbearing rights, which would eventually lead to lower fertility preferences for rural-to-urban migrants.

I also found that co-residence with the mother-in-law significantly expedites the transition from marriage to first birth. This finding corresponds to the literature that stated that an extended family living structure encourages women to give birth and have children sooner. The mother-in-law in a traditional family usually pressures married women to have children as early as possible so to continue the family line; she also provides child care services, and this too leads to a more rapid transition from marriage to first birth (Chen, Short, and Entwisle 2000; Chen 2005). However, based on the data, it seems that rural-to-urban migrants are more likely to live with their mother-in-laws. This is controversial because the existing literature has shown that since the 1990s nuclear household forms have prevailed among migrant families (Bian, Logan, and Bian 1998; Duan et al. 2008), and that migration and urbanization have decreased the amount of co-residence between older parents and their adult children (Zeng and Wang 2003).

Finally, although the sex composition of prior children was not one of my primary interests, the models I estimated demonstrated a consistently significant effect of sex composition among rural-to-urban migrants and rural non-migrants (see Table V-4), but not among rural-to-urban migrants and urban non-migrants (see Table V-3). This would seem to mean that women with a rural background are more likely to intend to have another child if they have only sons or daughters than if they have at least one son and one daughter. While in more developed countries, a balanced preference is common, in China, there has been a strong preference for sons over daughters (Arnold 1985; Arnold and Liu 1986; Poston 2002). However, the findings in this dissertation seem to imply that having at least one son and one daughter is important for the decision on whether to have another child, especially for people with a rural background. A balanced sex composition of children may become the ideal family type in China. Thus, it is essential for policy makers to realize that there given a balanced preference for a son and a daughter, an appropriate birth control policy meeting the expectations of Chinese families about the sex composition of children must be proposed.

6.5. Limitations

This section addresses several methodological limitations in this study. One issue that should be noted is that the findings cannot be generalized to the whole population of China. Since the research team was unable to obtain census data for the sampling frame from the State Statistical Office in the 1980s, the samples were selected through a multistage, random and clustering sampling method (Popkin et al. 2010; Zhang et al. 2014). This method cannot ensure that the whole population has the same probability to be selected, thus, the data are not fully representative of all married women in China.

Another problematic issue is the missing data due to attrition in follow-up surveys. In my event history analysis of marital fertility, five waves of data from 2000 to 2011 were used to trace the birth histories of women. However, only half (56%) of the total samples were surveyed at least twice (see Table III-1 and Table III-2). As the investigators explain, the high attrition rate is caused by people missing at random, but there are many other reasons where people were not retrieved, such as going to boarding schools, or colleges and universities, and migrating (Popkin et al. 2010). These types of right censoring may or may not be related to fertility behaviors. The complicated situation of missing data is a limitation of the current research that needs to be kept in mind.

The third issue that should be addressed is that the lack of detail of the available data on migration limits the examination of the causal effects of migration on fertility (see Chapter IV). Although the CHNS has recorded the precise timing of births, the timing of migration is not available; thus, it is impossible to obtain information on the pre-migration and post-migration fertility. This limits the ability to conclude definitively about the causal effects of migration in increasing or depressing fertility.

6.6. Future Work

With respect to the first limitation about the representativeness of data, there is a need to search for alternative data, which would better represent China's population. It is recommended that a similar analysis be conducted with alternative data. These data would allow me to better appraise and understand some of my unexpected findings. For example, I have found that rural-to-urban migrants seem more likely to live with their mother-in-laws than the urban non-migrants. But the existing literature reports the opposite (Bian, Logan, and Bian 1998; Duan et al. 2008). In addition, the third limitation about causality could also be resolved, if more temporal and geographic details are obtained through the recording of migration and birth from other surveys. In particular, some longitudinal surveys have appeared in recent years in China. For example, the China Health and Retirement Longitudinal Study (CHARLS) and China Family Panel Study (CFPS) have surfaced recently. They are both nationally representative, longitudinal surveys launched by the Institute of Social Science Survey of Peking University. In these surveys, individuals are tracked through annual or biennial follow-up surveys. Accordingly, I plan to continue my research using these alternative, secondary dataset. And I also plan to collect some new data altogether.

In the case of new data collection, if I collected my own data, I would design a survey instrument for an exhaustive quantitative analysis of migration and fertility. This would enable me to examine the complete relationships between migration and fertility. Moreover, my quantitative analysis would be supplemented with qualitative data. Detailed interviews with migrant families would be conducted to further analyze some of the adaptation and socialization effects of migration on their fertility.

With respect to the limitation about missing data due to attrition, if I continue to use the CHNS data, the next logical step would be to enlarge the dataset by linking more future waves of samples together, so that there would be fewer observations with right-censoring. However, the new waves of data have not yet been released.

In addition, I think my future research agenda will extend my dissertation in various ways:

First, I would like to extend the multilevel models with more explanatory variables. Due to the small sample sizes of subjects per group in the 2006 CHNS, I only estimated the effects of the major independent variables (i.e., migration status at the individual level and the urbanization level of community, as well as micro-level control variables such as age and the sex composition of children). However, it would be interesting to identify how fertility preferences are influenced by the community characteristics with more contextual variables. Additionally, after examining the effects of the urbanization index, the intra-class coefficient remained high and significant. This encourages me to search for more contextual variables to analyze at the community level. In the future, I would like to combine more waves of the CHNS data to enlarge the sample size.

Second, I have been interested in how fertility attitudes and subjective norms change over time while China is transitioning to low fertility. In the current study, the intended number of children was not investigated because the proportion of women intending to have more children was small. Researchers studying the childbearing preferences in other countries have utilized longitudinal data to examine the extent to which individual preferences have remained stable or have changed over time (Feyisetan and Casterline 2000; Kodzi, Johnson, and Casterline 2010; Morgan and Bachrach 2011; Philipov 2011). They found that people often revise their fertility intentions at different stages of their life course. The background factors, like education and employment may change the constraints and opportunities of childbearing, which can then change their beliefs and attitudes. Accordingly, I plan to explore the temporal dynamics of preferences of fertility with the longitudinal data, such as CHNS, CHARLS or CFPS.

6.7. Conclusions

Since rural-urban migration contributes enormously to urbanization in China, the role of migrant fertility is critical for urban population growth and for the supply of the labor force. Fertility preferences not only represent individual ideas and attitudes towards childbearing, but also represent the more general social norm. My research has shown the importance of considering migration and urbanization as contributors to fertility and the overall national population dynamics. There were two objectives in this dissertation: (1) to identify the effects of migration on marital fertility, and (2) to investigate the effects of urbanization on individual fertility preferences.

My research has demonstrated that the transition from marriage to first birth is significantly accelerated for rural-to-urban migrants compared to urban non-migrants, and that rural-to-urban migrants have a lower desire for more children than urban non-migrants. The urbanization level of communities has an indirect and significant effect on a woman's desire for more children. Among women with children, the more urbanized a community, the more similar the fertility intentions of rural-to-urban migrants are to those of urban non-migrants. But there were no significant differences in the transition from marriage to first birth and the desire for more children between rural-to-urban migrants and rural non-migrants.

Migration and fertility is a complex relationship. This has been shown in numerous studies in the extant literature. Four hypotheses have been set forth to help understand the relationship. My dissertation has contributed to a better understanding of this relationship in a country that has experienced and is still experiencing massive amounts of rural to urban migration.

REFERENCES

Ajzen, Icek. 2011. "Reflections on Morgan and Bachrach's Critique." *Vienna Yearbook of Population Research* 9:63-9.

Ajzen, Icek and Martin Fishbein. 1977. "Attitude-Behavior Relations: A Theoretical Analysis and Review of Empirical Research." *Psychological Bulletin* 84:888.

Allison, Paul D. 2013. *Event History Analysis.* Los Angeles, CA: SAGE.

Arnold, Fred. 1985. "Measuring the Effect of Sex Preference on Fertility: The Case of Korea." *Demography* 22:280-8.

Arnold, Fred and Zhaoxiang Liu. 1986. "Sex Preference, Fertility, and Family Planning in China." *Population and Development Review*:221-46.

Axinn, William G., Marin E. Clarkberg and Arland Thornton. 1994. "Family Influences on Family Size Preferences." *Demography* 31:65-79.

Bacal, RA, K. Srinivasan, S. Kulkarni, S. Parasuraman, RH Chaudhury, TD Ivanova, J. Weeramunda, JE Vander Haar, R. Kominski and TH Kwon. 1988. "Migration and Fertility in the Philippines: Hendershots Selectivity Model Revisited." *Philippine Population Journal* 4:53-67.

Banister, Judith. 1987. *China's Changing Population.* Stanford University Press.

Bankole, Akinrinola and Charles F. Westoff. 1998. "The Consistency and Validity of Reproductive Attitudes: Evidence from Morocco." *Journal of Biosocial Science* 30:439-55.

Barber, Jennifer S. 2000. "Intergenerational Influences on the Entry into Parenthood: Mothers' Preferences for Family and Nonfamily Behavior." *Social Forces* 79:319-48.

Bean, Frank D. and Gray Swicegood. 1985. *Mexican American Fertility Patterns.* Austin, Texas: University of Texas Press.

Berrington, Ann. 2004. "Perpetual Postponers? Women's, Men’s and Couple’s Fertility Intentions and Subsequent Fertility Behaviour." *Population Trends* 117:9-19.

Bian, Fuqin, John R. Logan and Yanjie Bian. 1998. "Intergenerational Relations in Urban China: Proximity, Contact, and Help to Parents." *Demography* 35:115-24.

Bian, Yanjie. 2002. "Chinese Social Stratification and Social Mobility." *Annual Review of Sociology*:91-116.

Bian, Yanjie and Lulu Li. 2012. "The Chinese General Social Survey (2003-8)." *Chinese Sociological Review* 45:70-97.

Bilsborrow, Richard E. 1998. *Migration, Urbanization, and Development: New Directions and Issues.* Springer Science & Business Media.

Bongaarts, John. 2001. "Fertility and Reproductive Preferences in Post-Transitional Societies." *Population and Development Review*:260-81.

------.2002. "The End of the Fertility Transition in the Developed World." *Population and Development Review* 28:419-43.

------.2013. "The Implementation of Preferences for Male Offspring." *Population and Development Review* 39:185-208.

Bongaarts, John and Robert E. Lightbourne. 1992. "Fertility Preferences in Latin America: Trends and Differentials in Seven Countries." *Notas De Población* 20:79.

Bongaarts, John and Susan C. Watkins. 1996. "Social Interactions and Contemporary Fertility Transitions." *Population and Development Review*:639-82.

Bradshaw, York W. 1987. "Urbanization and Underdevelopment: A Global Study of Modernization, Urban Bias, and Economic Dependency." *American Sociological Review* 52:224-39.

Brockerhoff, Martin. 1995. "Fertility and Family Planning in African Cities: The Impact of Female Migration." *Journal of Biosocial Science* 27:347-58.

Brockerhoff, Martin and Hongsook Eu. 1993. "Demographic and Socioeconomic Determinants of Female Rural to Urban Migration in Sub-Saharan Africa." *International Migration Review* 27:557-77.

Brockerhoff, Martin and Xiushi Yang. 1994. "Impact of Migration on Fertility in sub-Saharan Africa." *Biodemography and Social Biology* 41:19-43.

Buckley, Chris. 2013. "Hurdles seen for Change to China's One-Child Rule." New York Times, Retrieved 4/13, 2014 (http://www.nytimes.com/2013/11/18/world/asia/chinas-vow-to-relax-one-child-policy-faces-reality-check.html?_r=0).

Cai, Yong. 2010. "China's Below-Replacement Fertility: Government Policy Or Socioeconomic Development?" *Population and Development Review* 36:419.

Caldwell, John C. 1976. "Toward a Restatement of Demographic Transition Theory." *Population and Development Review*:321-66.

Caldwell, John C. 1982. "The Wealth Flows Theory of Fertility Decline.".

Campbell, Eugene K. 1989. "A Note on the Fertility-Migration Interrelationship: The Case of Men in Western Area Sierra Leone." *Demography India* 18:103-14.

Chan, Kam W. 1996. "Post-Mao China: A Two-Class Urban Society in the Making." *International Journal of Urban and Regional Research* 20:134-50.

------.2010. "The Household Registration System and Migrant Labor in China: Notes on a Debate." *Population and Development Review* 36:357-64.

Chan, Kam W. and Li Zhang. 1999. "The Hukou System and Rural-Urban Migration in China: Processes and Changes." *The China Quarterly* 160:818-55.

Chattopadhyay, Arpita, Michael J. White and Cornelius Debpuur. 2006. "Migrant Fertility in Ghana: Selection Versus Adaptation and Disruption as Causal Mechanisms." *Population Studies* 60:189-203.

Chen, Feinian. 2005. "Residential Patterns of Parents and their Married Children in Contemporary China: A Life Course Approach." *Population Research and Policy Review* 24:125-48.

------.2006. "The Impact of Family Structure on Fertility." Pp. 53-64 in *Fertility, Family Planning, and Population Policy in China*, edited by Dudley L. Poston Jr., Che-Fu Lee, Chiung-Fang Chang, Sherry L. McKibben and Carol S. Walther. New York: Routledge.

Chen, Feinian, Susan E. Short and Barbara Entwisle. 2000. "The Impact of Grandparental Proximity on Maternal Childcare in China." *Population Research and Policy Review* 19:571-90.

Chen, Jiajian, Robert D. Retherford, Minja K. Choe, Li Xiru and Hu Ying. 2009. "Province-Level Variation in the Achievement of Below-Replacement Fertility in China." *Asian Population Studies* 5:309-28.

Chen, Wei and Lili Wu. 2006. "Research on the Relationships between Migration and Fertility in China." *Population Research* 1:12-20.

Chen, Zi and Changrong Deng. 2007. "Study on Desired Birth of Chinese Women (in Chinese)." *Chinese Journal of Population Science* 6:011.

CHNS. 2014. "Project Description.", Retrieved 12/31, 2014 (http://www.cpc.unc.edu/projects/china/about/proj_desc).

Cleves, Mario A., William Gould, Roberto Gutierrez and Yulia Marchenko. 2010. *An Introduction to Survival Analysis using Stata.* College Station, Tex.: Stata Press.

Coale, Ansley J. 1984. "The Demographic Transition." *The Pakistan Development Review* 23:531-52.

Davis, Kingsley. 1945. "The World Demographic Transition." *The Annals of the American Academy of Political and Social Science*:1-11.

Ding, Q. J. and T. Hesketh. 2006. "Family Size, Fertility Preferences, and Sex Ratio in China in the Era of the One Child Family Policy: Results from National Family Planning and Reproductive Health Survey." *BMJ (Clinical Research Ed.)* 333:371-3.

DiPrete, Thomas A. and Jerry D. Forristal. 1994. "Multilevel Models: Methods and Substance." *Annual Review of Sociology*:331-57.

Duan, Chenrong and Yujing Sun. 2006. "The Historical Changes of the Definitions of Floating Migrants in China." *Population Research* 30:70-46.

Duan, Chenrong, Ke Yang, Fei Zhang and Xuehe Lu. 2008. "The Nine Trends of Floating Migrants in China since the Open and Reform." *Population Research* 6:30-43.

Duan, Chenrong, Fei Zhang and Xuehe Lu. 2009. "State of Migrant Women Population in China." *Collection of Women's Studies* 4:11-27.

Duncan, Otis D. 1965. "Farm Background and Differential Fertility." *Demography* 2:240-

249.

Dyson, Tim. 2011. "The Role of the Demographic Transition in the Process of Urbanization." *Population and Development Review* 37:34-54.

Easterlin, Richard A. 1975a. "An Economic Framework for Fertility Analysis." *Studies in Family Planning*:54-63.

------.1975b. "The Economics and Sociology of Fertility: A Synthesis.".

Entwisle, Barbara and Feinian Chen. 2002. "Work Patterns Following a Birth in Urban and Rural China: A Longitudinal Study." *European Journal of Population/Revue Européenne De Démographie* 18:99-119.

Entwisle, Barbara and William M. Mason. 1985. "Multilevel Effects of Socioeconomic Development and Family Planning Programs on Children Ever Born." *American Journal of Sociology*:616-49.

Feng, Xiaotian. 2009. "Youth Characteristic and their Fertility Desire_A Survey of 1986 Young Workers in 12 Cities (in Chinese)." *The Journal of Jiangsu Administration Institute* 46(4).

Feyisetan, Bamikale and John B. Casterline. 2000. "Fertility Preferences and Contraceptive Change in Developing Countries." *International Family Planning Perspectives* 26:100-9.

Fishbein, Martin and Icek Ajzen. 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research.*

------.2011. *Predicting and Changing Behavior: The Reasoned Action Approach.* Taylor & Francis.

Foreit, K. G. and M. H. Suh. 1980. "The Effect of Reproductive Intentions on Subsequent Fertility among Low-Parity Korean Women, 1971-76." *Studies in Family Planning* 11:91-104.

Freedman, Ronald. 1979. "Theories of Fertility Decline: A Reappraisal." *Social Forces* 58:1-17.

Freedman, Ronald, Lolagene C. Coombs and Larry Bumpass. 1965. "Stability and Change in Expectations about Family Size: A Longitudinal Study." *Demography* 2:250-75.

Freedman, Ronald and Doris P. Slesinger. 1961. "Fertility Differentials for the Indigenous Non-Farm Population of the United States." *Population Studies* 15:161-73.

Gipson, Jessica D. and Michelle J. Hindin. 2009. "The Effect of Husbands' and Wives' Fertility Preferences on the Likelihood of a Subsequent Pregnancy, Bangladesh 1998–2003." *Population Studies* 63:135-46.

Goldberg, David. 1959. "The Fertility of Two-Generation Urbanites." *Population Studies* 12:214-22.

Goldscheider, Calvin. 1987. "Migration and Social Structure: Analytic Issues and Comparative Perspectives in Developing Nations." *Sociological Forum* 2:674-96.

Goldstein, Alice and Sidney Goldstein. 1987. "Varieties of Population Mobility in Relation to Development in China." *Studies in Comparative International Development (SCID)* 22:101-24.

Goldstein, Alice, Sidney Goldstein and Shengzu Gu. 1991. "Rural Industrialization and Migration in the People's Republic of China." *Social Science History*:289-314.

Goldstein, Alice, Michael J. White and Sidney Goldstein. 1997. "Migration, Fertility, and

State Policy in Hubei Province, China." *Demography* 34:481-91.

Goldstein, Sidney. 1973. "Interrelations between Migration and Fertility in Thailand." *Demography* 10:225-41.

------.1990. "Urbanization in China, 1982-87: Effects of Migration and Reclassification." *Population and Development Review*:673-701.

Goldstein, Sidney and Alice Goldstein. 1981. "The Impact of Migration on Fertility: An ‘Own Children’ Analysis for Thailand." *Population Studies* 35:265-84.

------.1982. *Techniques for Analysis of the Interrelations between Migration and Fertility*. Santa Monica, California: Rand Corporation.

------.1991. *Permanent and Temporary Migration Differentials in China.* Honolulu, Hawaii: East-West Center Population Institute.

Goldstein, Sidney and Penporn Tirasawat. 1977. "Fertility of Migrants to Urban Places in Thailand.".

Greenhalgh, Susan. 2008. *Just One Child: Science and Policy in Deng's China.* Univ of California Press.

Guo, Zhen, Zheng Wu, Christoph M. Schimmele and Shuzhuo Li. 2012. "The Effect of Urbanization on China’s Fertility." *Population Research and Policy Review* 31:417-34.

Guo, Zhigang, Erli Zhang, Baochang Gu and Feng Wang. 2003. "Diversity of China's Fertility Policy by Policy Fertility." *Population Research* 5:1-27.

Hayford, Sarah R. 2009. "The Evolution of Fertility Expectations Over the Life Course." *Demography* 46:765-83.

Heiland, Frank, Alexia Prskawetz and Warren C. Sanderson. 2008. "Are Individuals' Desired Family Sizes Stable? Evidence from West German Panel Data." *European Journal of Population/Revue Européenne De Démographie* 24:129-56.

Hermalin, Albert I., Ronald Freedman, Te-Hsiung Sun and Ming-Cheng Chang. 1979. "Do Intentions Predict Fertility? the Experience in Taiwan, 1967-74." *Studies in Family Planning* 10:75-95.

Hervitz, Hugo M. 1985. "Selectivity, Adaptation, Or Disruption? A Comparison of Alternative Hypotheses on the Effects of Migration on Fertility: The Case of Brazil." *International Migration Review* 19:293-317.

Higgins, Louise T., Mo Zheng, Yali Liu and Chun H. Sun. 2002. "Attitudes to Marriage and Sexual Behaviors: A Survey of Gender and Culture Differences in China and United Kingdom." *Sex Roles* 46:75-89.

Hirschman, Charles. 1994. "Why Fertility Changes." *Annual Review of Sociology*:203-33.

Hirschman, Charles and Philip Guest. 1990. "Multilevel Models of Fertility Determination in Four Southeast Asian Countries: 1970 and 1980." *Demography* 27:369-96.

Hox, Joop J. 2010. *Multilevel Analysis: Techniques and Applications (2nd Edition).* New York, NY: Routledge.

Inkeles, Alex. 1969. "Making Men Modern: On the Causes and Consequences of Individual Change in Six Developing Countries." *American Journal of Sociology* 75:208-25.

Jourdan, Adam. 2014. "China's Urbanization Rate to Hit 60 Pct by 2018." Reuters, Retrieved 5/16, 2015 (http://www.reuters.com/article/2013/12/27/china-urbanizationidUSL3N0K607G20131227).

Kahn, Joan R. 1988. "Immigrant Selectivity and Fertility Adaptation in the United States." *Social Forces* 67:108-28.

------.1994. "Immigrant and Native Fertility during the 1980s: Adaptation and Expectations for the Future." *International Migration Review*:501-19.

Klobas, Jane. 2011. "The Theory of Planned Behaviour as a Model of Reasoning about Fertility Decisions." *Vienna Yearbook of Population Research* 9:47-54.

Knodel, John and Etienne Van de Walle. 1979. "Lessons from the Past: Policy Implications of Historical Fertility Studies." *Population and Development Review*:217-45.

Kodzi, Ivy A., John B. Casterline and Peter Aglobitse. 2010. "The Time Dynamics of Individual Fertility Preferences among Rural Ghanaian Women." *Studies in Family Planning* 41:45-54.

Kodzi, Ivy A., David R. Johnson and John B. Casterline. 2010. "Examining the Predictive Value of Fertility Preferences among Ghanaian Women." *Demographic Research* 22:965.

Lavely, William and Ronald Freedman. 1990. "The Origins of the Chinese Fertility Decline." *Demography* 27:357-67.

Lee, Bun S. 1992. "The Influence of Rural-Urban Migration on Migrants Fertility Behavior in Cameroon." *International Migration Review* 26:1416-47.

Lee, Bun S. and Stephen C. Farber. 1984. "Fertility Adaptation by Rural—urban Migrants in Developing Countries: The Case of Korea." *Population Studies* 38:141-55.

Lee, Bun S. and Louis G. Pol. 1993. "The Influence of Rural-Urban Migration on Migrants' Fertility in Korea, Mexico and Cameroon." *Population Research and Policy Review* 12:3-26.

Lee, James and Feng Wang. 1999. "Malthusian Models and Chinese Realities: The Chinese Demographic System 1700–2000." *Population and Development Review* 25:33-65.

Lee, Ronald D. 1980. "Aiming at a Moving Target: Period Fertility and Changing Reproductive Goals." *Population Studies* 34:205-26.

Li, Jiayan. 2003. "The Willingness of "One Child for One Couple": A Survey in Beijing (in Chinese)." *Chinese Journal of Population Science*.

Li, Jin-Kai G. 2005. "The Influence of Women's Status on Fertility Behavior between Taiwan and China---a Multilevel Analysis." Texas A&M University, .

Liang, Ying, Yingying Yi and Qiufen Sun. 2013. "The Impact of Migration on Fertility Under China's Underlying Restrictions: A Comparative Study between Permanent and Temporary Migrants." *Social Indicators Research*:1-20.

Liang, Zai and Zhongdong Ma. 2004. "China's Floating Population: New Evidence from the 2000 Census." *Population and Development Review* 30:467-88.

Liefbroer, Aart C. 2011. "On the Usefulness of the Theory of Planned Behaviour for Fertility Research." *Vienna Yearbook of Population Research* 9:55-62.

Lightbourne, Robert E. 1985. "Desired Number of Births and Prospects for Fertility Decline in 40 Countries." *International Family Planning Perspectives* 11:pp. 34-39.

------.1987a. "New Approaches for Estimating the Demand for Children." *Population*

Bulletin of the United Nations:21.

------.1987b. "Reproductive Preferences and Behaviour.".

Lin, D. Y. and L. J. Wei. 1989. "The Robust Inference for the Cox Proportional Hazards Model." *Journal of the American Statistical Association* 84:1074-8.

Lindstrom, David P. and Silvia G. Saucedo. 2002. "The Short- and Long-Term Effects of U.S. Migration Experience on Mexican Women's Fertility." *Social Forces* 80:1341-68.

Liu, G. and Sidney Goldstein. 1996. "Migrant-Nonmigrant Fertility Differentials in Anhui, China." *Chinese Environment & Development (Armonk, N.Y.)* 7:144-69.

Long, J. S. and Jeremy Freese. 2006. *Regression Models for Categorical Dependent Variables using Stata.* Stata press.

Lyngstad, Torkild H. and Alexia Prskawetz. 2010. "Do Siblings' Fertility Decisions Influence each Other?" *Demography* 47:923-34.

Maas, Cora J. and Joop J. Hox. 2005. "Sufficient Sample Sizes for Multilevel Modeling." *Methodology* 1:86-92.

Mason, Karen O. 1997. "Explaining Fertility Transitions." *Demography* 34:443-54.

Massey, Douglas S. and Brendan P. Mullan. 1984. "A Demonstration of the Effect of Seasonal Migration on Fertility." *Demography* 21:501-17.

Mazharul Islam, M. and Radheshyam Bairagi. 2003. "Fertility Intentions and Subsequent Fertility Behaviour in Matlab: Do Fertility Intentions Matter?" *Journal of Biosocial Science* 35:615-9.

Merton, Robert K. 1968. "Manifest and Latent Functions." *Social Theory and Social*

Structure, Anonymous Simon and Schuster.

Morgan, S. P. and Kellie J. Hagewen. 2005. "Fertility." *Handbook of Population,* edited by Dudley L. Poston Jr. and Michael Micklin. US: Springer.

Morgan, S. P. and Heather Rackin. 2010. "The Correspondence between Fertility Intentions and Behavior in the United States." *Population and Development Review* 36:91-118.

Morgan, S. P. and Christine A. Bachrach. 2011. "Is the Theory of Planned Behaviour an Appropriate Model for Human Fertility?" *Vienna Yearbook of Population Research* 9:11-8.

Murphy, Michael and Lisbeth B. Knudsen. 2002. "The Intergenerational Transmission of Fertility in Contemporary Denmark: The Effects of Number of Siblings (Full and Half), Birth Order, and Whether Male Or Female." *Population Studies* 56:235-48.

Murphy, Michael and Duolao Wang. 2001. "Family-Level Continuities in Childbearing in Low-Fertility Societies." *European Journal of Population/Revue Européenne De Démographie* 17:75-96.

Murphy, Mike. 1999. "Is the Relationship between Fertility of Parents and Children really Weak?" *Social Biology* 46:122-45.

Murphy, Rachel, Ran Tao and Xi Lu. 2011. "Son Preference in Rural China: Patrilineal Families and Socioeconomic Change." *Population and Development Review* 37:665-90.

Namboodiri, N. K. 1972. "Some Observations on the Economic Framework for Fertility Analysis." *Population Studies* 26:185-206.

NBSC. 2011. "The Sixth National Census Bulletin Number 1.", Retrieved 4/13, 2013 (http://www.stats.gov.cn/tjsj/tjgb/rkpcgb/qgrkpcgb/201104/t20110428_30327.html).

------.2012. "The Sixth National Census of China.", Retrieved 2/7, 2015 (http://www.stats.gov.cn/tjsj/pcsj/rkpc/6rp/html/B0604a.htm).

------.2014. "China Statistical Yearbook (2014)." Beijing: China Statistics Press, Retrieved 2/8, 2015 (http://www.stats.gov.cn/tjsj/ndsj/2014/indexch.htm).

Notestein, Frank W. 1945. "Population: The Long View." *Food for the World,* edited by TW Schultz. Chicago, Illinois: University of Chicago Press 1945.

------.1953. *Economic Problems of Population Change.* London: Oxford University Press.

Pan, Suiming. 1994. "A Sex Revolution in Current China." *Journal of Psychology & Human Sexuality* 6:1-14.

Peng, Xizhe. 2011. "China's Demographic History and Future Challenges." *Science* 333:581-7.

Philipov, Dimiter. 2011. "Theories on Fertility Intentions: A Demographer's Perspective." *Vienna Yearbook of Population Research* 9:37-45.

Popkin, B. M. 2000. "Weights for the China Health and Nutrition Study.".

Popkin, Barry M., Shufa Du, Fengying Zhai and Bing Zhang. 2010. "Cohort Profile: The China Health and Nutrition Survey—monitoring and Understanding Socio-Economic and Health Change in China, 1989–2011." *International Journal of Epidemiology* 39:1435-40.

Poston, Dudley L.,Jr. 2000. "Social and Economic Development and the Fertility Transitions in Mainland China and Taiwan." *Population and Development Review*

26:pp. 40-60.

------.2002. "Son Preference and Fertility in China." *Journal of Biosocial Science* 34:333-47.

Poston, Dudley L.,Jr., Mary A. Davis and Danielle X. Deng. 2012. "Demographic Structure and Process in Rural China." Pp. 137-54 in *International Handbook of Rural Demography,* edited by László J. Kulcsár and Katherine J. Curtis. Springer.

Poston, Dudley L.,Jr. and Baochang Gu. 1987. "Socioeconomic Development, Family Planning, and Fertility in China." *Demography* 24:pp. 531-551.

Pritchett, Lant H. 1994. "Desired Fertility and the Impact of Population Policies." *Population and Development Review*:1-55.

Quesnel-Vallée, Amélie and S. P. Morgan. 2003. "Missing the Target? Correspondence of Fertility Intentions and Behavior in the US." *Population Research and Policy Review* 22:497-525.

Raudenbush, Stephen W. and Anthony S. Bryk. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods.* Sage.

Ribe H and Schultz TP. 1980. *Migrant and Native Fertility in Colombia: Evidence of Selectivity from the 1973 Census.* New Haven, Connecticut: Economic Growth Center, Yale University.

Riley, Nancy E. 2004. *China's Population: New Trends and Challenges.* Population Reference Bureau Washington.

Rindfuss, Ronald R. and Larry L. Bumpass. 1976. "How Old is Too Old? Age and the Sociology of Fertility." *Family Planning Perspectives* 8:226-30.

Roberts, Kenneth D. 1997. "China's "Tidal Wave" of Migrant Labor: What can we Learn from Mexican Undocumented Migration to the United States?" *International Migration Review*:249-93.

Robinson, W. S. 1950. "Ecological Correlations and the Behavior of Individuals." *American Sociological Review* 15:351-7.

Roy, Tarun K., R. K. Sinha, Michael A. Koenig, Sanjay K. Mohanty and Sangram K. Patel. 2008. "Consistency and Predictive Ability of Fertility Preference Indicators: Longitudinal Evidence from Rural India." *International Family Planning Perspectives* 34:138-45.

Ryder, Norman B. and Charles F. Westoff. 1967. "The Trend of Expected Parity in the United States: 1955, 1960, 1965." *Population Index*:153-68.

------.1971. *Reproduction in the United States, 1965.* Princeton University Press.

Scott, Wilbur J. and Carolyn S. Morgan. 1983. "An Analysis of Factors Affecting Traditional Family Expectations and Perceptions of Ideal Fertility." *Sex Roles* 9:901-14.

Short, Susan E., Feinian Chen, Barbara Entwisle and Zhai Fengying. 2002. "Maternal Work and Child Care in China: A Multi-Method Analysis." *Population and Development Review* 28:31-57.

Silva, W. I. D. 1991. "Consistency between Reproductive Preferences and Behavior: The Sri Lankan Experience." *Studies in Family Planning* 22:188-97.

Simmel, Georg. 1950. "The Metropolis and Mental Life." Pp. 409-24 in *The Sociology of Georg Simmel*, vol. 92892, Anonymous Glencoe, Illinois: Free Press.

StataCorp. 2013. "U20 Estimation and Postestimation Commands." *Stata 13 Base Reference Manual*, edited by StataCorp. College Station, TX: Stata Press.

------.2014. "Stset — Declare Data to be Survival-Time Data." College Station, Texas: Stata Press, Retrieved 6/16, 2015 (http://www.stata.com/manuals13/ststset.pdf#ststset).

Stephen, Elizabeth H. and Frank D. Bean. 1992. "Assimilation, Disruption and the Fertility of Mexican-Origin Women in the United States." *International Migration Review*:67-88.

Sun, Gang. 2013. "More Floating Population Gave Births in Shanghai; More Pressure on Old Aged Social Security." Shanghai: Revolution Daily, Retrieved 4/11, 2014 (http://sh.eastday.com/m/20130515/u1a7390873.html).

Sun, Mingjie and C. C. Fan. 2011. "China's Permanent and Temporary Migrants: Differentials and Changes, 1990–2000." *The Professional Geographer* 63:92-112.

Symeonidou, Haris. 2000. "Expected and Actual Family Size in Greece: 1983–1997." *European Journal of Population/Revue Européenne De Démographie* 16:335-52.

Tan, Poo C. and Nai P. Tey. 1994. "Do Fertility Intentions Predict Subsequent Behavior? Evidence from Peninsular Malaysia." *Studies in Family Planning* 25:222-31.

Testa, Maria R. and Laurent Toulemon. 2006. "Family Formation in France: Individual Preferences and Subsequent Outcomes." *Vienna Yearbook of Population Research*:41-75.

The Beijing News. 2014. "The Mean Age of Floating Population is 28; Over 70% Hope to Settle Down in Cities.", Retrieved 4/13, 2014 (http://www.chinanews.com/sh/2013/09-11/5269659.shtml).

The Floating Population Division of National Health and Family Planning Commission. 2013. *2013 Report on China's Migrant Population Development (in Chinese).* Beijing, China: China Population Publishing House.

Thomson, Elizabeth. 1997. "Couple Childbearing Desires, Intentions, and Births." *Demography* 34:343-54.

Tien, H. Y. 1984. "Induced Fertility Transition: Impact of Population Planning and Socio-Economic Change in the People's Republic of China." *Population Studies* 38:385-400.

Tu, Ping. 2000. "Trends and Regional Differentials in Fertility Transition." *The Changing Population of China*, edited by Xizhe Peng and Zhigang Guo. Blackwell Publishers Ltd.

Vlassoff, Carol. 2012. "Desire for Sons and Subsequent Fertility in Rural India. A 20-Year Longitudinal Study." *Journal of Biosocial Science* 44:345-56.

Wang, Feng. 2011. "The Future of a Demographic Overachiever: Long-Term Implications of the Demographic Transition in China." *Population and Development Review* 37:173-90.

Wang, Feng and Quanhe Yang. 1996. "Age at Marriage and the First Birth Interval: The Emerging Change in Sexual Behavior among Young Couples in China." *Population and Development Review*:299-320.

Watkins, Susan C. 1987. "The Fertility Transition: Europe and the Third World Compared." *Sociological Forum* 2:645-73.

------.1991. "From Provinces into Nations: Demographic Integration in Western Europe

1870-1960.".

Westoff, Charles F. and Norman B. Ryder. 1977. "The Predictive Validity of Reproductive Intentions." *Demography* 14:431-53.

Whelpton, Pascal K., Arthur A. Campbell and John E. Patterson. 1966. *Fertility and Family Planning in the United States,* Princeton, N.J.: Princeton, N.J., Princeton University Press.

White, Michael J., Lorenzo Moreno and Shenyang Guo. 1995. "The Interrelation of Fertility and Geographic Mobility in Peru: A Hazards Model Analysis." *International Migration Review*:492-514.

Wirth, Louis. 1938. "Urbanism as a Way of Life." *American Journal of Sociology*:1-24.

Xu, Anqi, Xiaolin Xie, Wenli Liu, Yan Xia and Dalin Liu. 2007. "Chinese Family Strengths and Resiliency." *Marriage & Family Review* 41:143-64.

Yang, Xiushi. 2000a. "Determinants of Migration Intentions in Hubei Province, China: Individual Versus Family Migration." *Environment and Planning A* 32:769-88.

------.2000b. "The Fertility Impact of Temporary Migration in China: A Detachment Hypothesis." *European Journal of Population/Revue Européenne De Démographie* 16:163-83.

------.2001. "Are Temporary Migrants Escapees of the One-child-per-family Population Policy: A Revisit to the Detachment Hypothesis." *Biodemography and Social Biology* 48:151-70.

Yeatman, Sara, Christie Sennott and Steven Culpepper. 2013. "Young Women’s Dynamic Family Size Preferences in the Context of Transitioning Fertility." *Demography*

50:1715-37.

You, Helen X. and Dudley L. Poston Jr. 2004. "Are Floating Migrants in China "Child-Bearing Guerrillas"?: An Analysis of Floating Migration and Fertility." *Asian and Pacific Migration Journal* 13:405-22.

You, Xiuhong and Dudley L. Poston Jr. 2006. "The Effect of Floating Migration on Fertility." Pp. 122 in *Fertility, Family Planning and Population Policy in China*, edited by Dudley L. Poston Jr., Che-Fu Lee, Chiung-Fang Chang, Sherry L. McKibben and Carol S. Walther. New York: Routledge.

Zárate, Alvan and Alicia U. d. Zárate. 1975. "On the Reconciliation of Research Findings of Migrant-Nonmigrant Fertility Differentials in Urban Areas." *International Migration Review* 9:115-56.

Zeng, Yi. 1996. "Is Fertility in China in 1991–92 Far Below Replacement Level?" *Population Studies* 50:27-34.

Zeng, Yi and James W. Vaupel. 1989. "The Impact of Urbanization and Delayed Childbearing on Population Growth and Aging in China." *Population and Development Review*:425-45.

Zeng, Yi and Zhenglian Wang. 2003. "Dynamics of Family and Elderly Living Arrangements in China: New Lessons Learned from the 2000 Census." *China Review*:95-119.

Zhang, Kevin H. and Shunfeng Song. 2003. "Rural–urban Migration and Urbanization in China: Evidence from Time-Series and Cross-Section Analyses." *China Economic Review* 14:386-400.

Zhang, B., F. Y. Zhai, S. F. Du and B. M. Popkin. 2014. "The China Health and Nutrition Survey, 1989-2011." *Obesity Reviews* 15:2-7.

Zhao, Zhongwei and Wei Chen. 2011. "China's Far Below-Replacement Fertility and its Long-Term Impact: Comments on the Preliminary Results of the 2010 Census." *Demographic Research* 25:819-36.

Zheng, Zhenzhen. 2004. "Fertility Desire of Married Women in China." *Population Science of China* 5.

------.2014. "The Measurement and Application of Fertility Intention (in Chinese)." *Chinese Journal of Population Science*:15-25.

Zheng, Zhenzhen, Yong Cai, Feng Wang and Baochang Gu. 2009. "Below-Replacement Fertility and Childbearing Intention in Jiangsu Province, China." *Asian Population Studies* 5:329-47.

Zheng, Zhenzhen and Ke Yang. 2013. "The Current Situation and Future Trend of Floating Population in China." Beijing, China: People's Tribune, Retrieved 4/13, 2014 (http://paper.people.com.cn/rmlt/html/2013-04/11/content_1234514.htm).

Zhou, Fulin. 2005. "Study on Chinese People's Fertility Desire by Age and Gender (in Chinese)." *Northwest Population Journal* 2.

Zick, Cathleen D. and Nina Xiang. 1994. "Assessing the Correlates of Desired Family Size in Shaanxi, China." *Social Biology* 41:150.