

Standing Firmly Upon Ground: Transition to Adulthood in Reform-Era China

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Dissertation submitted in partial fulfillment of  
the requirements for the degree of Doctor  
of Philosophy in the Department of  
Sociology in the Graduate School  
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ABSTRACT

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## **Abstract**

This dissertation aims to examine empirically how the transition to adulthood—the complex process to attain adult independence by completing education, starting the first job, getting married and entering the parenthood—has changed during the Chinese economic reform. The first chapter provides an overall picture of changes in the transition to adulthood in China, and the second and third chapter focus on family and non-family transitions, respectively. The first chapter examines if the transition to adulthood was postponed and de-standardized between 1982 and 2005. Data come from 1982, 1990, 2000 1% census sample and 2005 intercensal survey. The results show a significant postponement of education and employment, but little change in family formation. The transition to adulthood is also de-standardized, especially over the late 20s. The changes are more pronounced among urban residents than rural residents and migrants, and among female migrants than male migrants. The second and third chapters focus on urban China. The second chapter examines how family change is influenced by macro-level institutional contexts. It uses provincial-variations in the levels of economic development and interactions with the global markets to differentiate two broad theoretical perspectives on family change: development and diffusion. Data come from respondents born between 1960 and 1979 from the 2008 Chinese General Social Survey and provincial-level economic indicators in 1990 and 2000. Results from

latent class analysis and multi-level logistic regressions provide more support for the diffusion perspective. The postponement of family formation varies substantially across provinces. This provincial variation is positively associated with the levels of interactions with world markets (as measured by Foreign Direct Investment performance), but not with socioeconomic development or unemployment rate. The third chapter examines the trend of network-based job search in reform-era China. Data come from a pooled sample of first-time job-seekers from 1998 Labor Market and Social Mobility Survey, 2005 Social Capital Survey of China, and 2008 Chinese General Social Survey. The results suggest a stable increase of network use in finding the first job. The use of strong ties also increases initially, and persists afterwards. These findings are, by and large, consistent with other recent studies of the transition to adulthood reported for other countries. However, the culture of origin and local institutions also make the transition to adulthood of Chinese young adults unique in various respects.

## **Dedication**

To my parents, Qifan and Angela.

# Contents

Abstract .....	iv
List of Tables .....	x
List of Figures .....	xi
Acknowledgements .....	xii
1. Introduction .....	1
2. Chapter 1: Transition to Adulthood in China: Urban-Rural Divides, 1982-2005.....	6
2.1 Background and Theory .....	7
2.1.1 Changes in the Transition to Adulthood in the Twentieth Century .....	7
2.1.2 Theories of the Postponed and De-standardized Transition to Adulthood .....	9
2.1.3 The Chinese Context .....	11
2.1.4 Data Analytic Issues.....	12
2.2 Data and Measures.....	13
2.2.1 Data .....	13
2.2.2 Measures .....	15
2.3 Results .....	19
2.3.1 Age-Specific Status Distribution .....	19
2.3.2 Age-Specific Entropy Index .....	24
2.4 Discussion and Conclusion.....	26
3. Chapter 2: Family Change in Reform-Era Urban China .....	29
3.1 Theoretical Perspectives .....	31

3.1.1 The Second Demographic Transition in the Chinese Context .....	31
3.1.2 The Development Perspective .....	33
3.1.3 The Diffusion Perspective .....	34
3.2 Data and Measures .....	39
3.2.1 Individual-Level Data .....	39
3.2.2 Individual-Level Measures .....	41
3.2.3 Provincial-Level Measures .....	44
3.2.4 Analytical Strategy .....	46
3.3 Results .....	48
3.3.1 Family Formation Pathways .....	48
3.3.2 Multi-Level Results .....	57
3.4 Discussion and Conclusion .....	62
4. Chapter 3: Social Networks and First Job Search in Urban China, 1986-2008 .....	66
4.1 Theory and Hypotheses .....	68
4.1.1 Social Networks, Tie Strength and Institutional Contexts .....	68
4.1.2 Marketization Theory .....	71
4.1.3 Uncertainty Theory .....	72
4.1.4 Cultural Repertoire Theory .....	73
4.1.5 Limitations of Past Research .....	75
4.1.6 Hypotheses .....	76
4.2 Data and Methods .....	79
4.2.1 Data .....	79



4.2.2 Measuring Social Networks.....	81
4.2.3 Control Variables.....	83
4.2.4 Missing Data .....	85
4.2.5 Analytical Steps .....	87
4.3 Results .....	87
4.3.1 Finding First Jobs via Social Networks .....	87
4.3.2 Finding First Jobs via Strong Ties .....	90
4.4 Discussion and Conclusion.....	95
Appendix A.....	98
Appendix B .....	116
Appendix C.....	120
References .....	122
Biography.....	140

## List of Tables

Table 1: Sample sizes by gender and hukou (ages 18-30). .....	14
Table 2: Distributions of statuses, by year and hukou, men. ....	16
Table 3: Distributions of statuses, by year and hukou, women. ....	17
Table 4: A hypothetical example of the entropy index. ....	18
Table 5: Descriptive statistics of individual-level characteristics, by gender and cohorts. .....	43
Table 6: Descriptive statistics of provincial-level characteristics, by year. ....	45
Table 7: Fit statistics for latent pathways for young adult men and women, both cohorts combined. ....	51
Table 8: Weighted percentage of slow starters by gender and cohort. ....	57
Table 9: Coefficients from multi-level logistic regressions predicting men’s likelihood of being slow starters, N=612. ....	59
Table 10: Coefficients from multi-level logistic regressions predicting women’s likelihood of being slow starters, N=579. ....	60
Table 11: Descriptives of control variables by cohort. ....	86
Table 12: Coefficients from logistic regression predicting a successful job search used personal networks, 1986-2008. ....	90
Table 13: Coefficients from multinomial logistic regression models predicting a successful job search used strong or weak networks, compared to no networks, 1986- 2008. ....	92

## List of Figures

Figure 1: Age-specific distribution of statuses, by hukou, male. ....	20
Figure 2: Age-specific distribution of statuses, by hukou, female. ....	21
Figure 3: Age-specific percent of maximum entropy, by gender and hukou. ....	24
Figure 4: Proportion of young adults occupying various statuses by age, gender, and cohort .....	48
Figure 5: Latent family formation pathways for young adult men. ....	54
Figure 6: Latent family formation pathways for young adult women.....	55
Figure 7: Distribution of family formation pathways by gender and cohort. ....	56
Figure 8: Predicted odds of slow starters by the levels of FDI performance, based on estimates from Model 5, Table 9 and 10. ....	61
Figure 9: Network usage across stages of Chinese market reform and hypotheses. ....	77
Figure 10: Annual percentage of first jobs found through personal networks, 1986-2008. Three-year moving average.....	88
Figure 11: Predicted probabilities of finding the first job via networks, by tie strength. .	94

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# 1. Introduction

*“At thirty, I had planted my feet firmly upon the ground.” –Confucius.*

The past three decades were a unique experience for hundreds of millions of people in China. The economic reform changed the social contract between Chinese individuals and the society -- moving from a socialist social contract, which required close monitoring but promised job security, basic living standards and a care for those from disadvantaged backgrounds, toward a market social contract, which promised freer reign to individualistic aspirations but was accompanied with higher risk of unemployment and unequal life chances (Tang and Parish 2000). It has profoundly changed the way in which Chinese people organize work and private lives.

This dissertation aims to explore the impact of economic reform on young adults in China. In particular, I am interested in how the transition to adulthood—the complex process to attain adult independence by completing education, starting the first job, getting married and entering the parenthood—has changed during the economic reform. Reform-era China provides an opportunity to unravel the complex linkage between macro-level institutional change and micro-level individual life course. China has experienced rapid economic development and social change over the past thirty years (Bramall 2009). It is an active player in world markets (Jiang, Liping and Sharma 2013). Moreover, China is a big country and there are large geographical variations in the speed and magnitude of change (e.g. Xie and Hannum 1996).

Studying changes in the transition to adulthood also contributes to the rapidly growing literature on the consequences of Chinese economic reform. While prior work indicates that economic reform has profound implications for social stratification and intergenerational mobility (Bian 2002; Keister and Borelli 2012), it has not examined in sufficient detail how past inequality has been changed or reproduced over generations. The transition to adulthood represents a unique window on the life course, providing important insights into how childhood advantages and disadvantages persist, fade away, or are disrupted as individuals move into adulthood (Rindfuss 1991). These demographic transitions, such as educational completion, work, marriage and parenthood, are potential “turning points” that provide individuals with the chance to chart a new life course (Elder, Johnson and Crosnoe 2003; Maughan and Champion 1990). Moreover, their timing and sequencing over the full transition to adulthood serve as anchoring experiences for the remainder of the life course.

The dissertation consists of three papers, which address three general themes in the transition to adulthood. The first paper describes the long-term trend in changes in this transition. The second paper examines how macro-level institutional contexts influence the micro-level pathways to adulthood. Here the focus is primarily on family formation pathways. The third paper examines the role of social relations in first-job searching, which provides a look at social inequality processes operating in the

transition to adulthood. Here the focus is on the relationship between social networks and finding the first job.

Chapter 1, "Transition to Adulthood in China: Urban-Rural Divides, 1982-2005", provides an overall picture of the transition to adulthood over two decades of the Chinese economic reform. It aims to answer two research questions: first, whether the transition to adulthood has been postponed and de-standardized over time; and second, whether the change differs between men and women, and between urban and rural areas. The data come from 1982, 1990 and 2000 1% census samples and 2005 intercensal survey. The results partially support postponement and strongly support de-standardization. With regard to postponement, the results suggest a dramatic postponement in education and employment, but little change in family formation. With regard to de-standardization, results from the entropy index suggest a clear pattern of de-standardization, especially in the late 20s. Moreover, the changes are more pronounced among urban residents than rural residents and migrants, and among female migrants than male migrants.

Given the change is most pronounced among urban residents, I thus focus the next two chapters on urban China. Chapter 2, "Family Change in Reform-Era Urban China", examines how patterns of family formation are influenced by macro-level institutional contexts. Current research gives rise to two contending schools of thought regarding the causes of family change. The development perspective predicts that



socioeconomic development improves material conditions and thus brings family change. The diffusion perspective, on the other hand, emphasizes the independent influence of Western family ideologies. I test these two hypotheses by examining spatial variations in family change in the reform-era urban China. Merging data from 2008 Chinese General Social Survey with provincial-level economic variables, I use latent class analysis to construct family formation pathways, and use multi-level logistic regressions to examine the likelihood of delaying family formation across provinces. The provincial-level development is measured as Gross Domestic Product and related variables, and the level of global interactions is measured as Foreign Direct Investment (FDI) performance. The results provides more support for the diffusion perspective than the development perspective. Specifically, both men's and women's likelihoods of delaying family formation are not affected by provincial-level socioeconomic development and unemployment rate, but are positively associated with the levels of interactions with world markets (as measured by Foreign Direct Investment (FDI) performance). Moreover, FDI performance explained almost half of the between-province variation for men, and all the variation for women.

Chapter 3, "Social Networks and First Job Search in Urban China, 1986-2008" examines the social inequality of transitioning into another important event in the transition to adulthood: finding the first job. The social resources focused on in this paper consist of social networks, and draws from the conceptual tradition associated

with Granovetter's "strength of weak ties" hypothesis (Granovetter 1973). Previous scholarship is sharply divided over how market reform affects the pattern of network use. It is hypothesized variously to decline, follow an inverted-U shape, or persist. We bring new evidence to this debate by analyzing patterns of finding first jobs, through social networks and strong ties, in the reform-era urban China between 1986 and 2008. Our results challenge all three hypothesized patterns. In the study period, the probability of finding the first job through social networks consistently increased. Although part of the increase can be explained by a rise in the use of weak ties, the probability of using strong ties to find the first job increased initially and persisted thereafter.

Taken together, these three papers suggest that the transition to adulthood in China is de-standardizing over time; is highly influenced by the diffusion of Western practices and ideas; and is increasingly differentiated by levels of individual resources. These findings are, by and large, consistent with other recent studies of the transition to adulthood reported for other countries. However, the culture of origin and local institutions also make the transition to adulthood of Chinese young adults unique in various aspects. I hope this dissertation will help future research in the transition to adulthood and life course research.

## **2. Chapter 1: Transition to Adulthood in China: Urban-Rural Divides, 1982-2005**

A growing body of literature suggests that, since the 1980s, a new pattern of the transition to adulthood has occurred in the Western Europe and the United States. In the 1950s and 1960s, the transition to adulthood was early, sequential, and standardized (Fussell and Furstenberg 2005; Stevens 1990); since the 1980s, it has been postponed, reordered, and de-standardized (Bilari and Liefbroer 2010; Buchmann and Kriesi 2011; Liefbroer and Toulemon 2010; Shanahan 2000). Young people have variously stayed in school longer, postponed marriage and childbearing, and had births out of wedlock (Bruckner and Mayer 2005; Cherlin 2004). Moreover, rather than following a uniform sequence of transitions to adulthood, young adults have increasingly adopted different pathways of transition to adulthood, which increase life course variations in the population (Bruckner and Mayer 2005).

Less is known about trends in the transition to adulthood in developing world. Since 86 percent of world's young adults live in the developing world, it is meaningful to understand their lives--how and in what ways it may be the same or different from those living in the developed world. A recent volume on the transition to adulthood in developing countries, commissioned by the National Research Council and the Institute of Medicine (2005), documents a similar trend of postponement of school and family events. Young adults in developing countries are staying in school longer and delaying marriage and childbearing. A few studies explore whether the transition to adulthood

has been de-standardized in Latin America and Africa, in which the results are negative (Fussell 2005; Grant and Furstenberg 2007).

This article explores the trend in the transition to adulthood in China between 1982 and 2005. China is an important case, both because it has the largest population of youth in the world and it has experienced the most rapid social change in the past thirty years compared to other countries. I examine whether the transition to adulthood in China has changed in the direction of other societies. Data for this study come from three censuses collected in 1982, 1990 and 2000, and an inter-censal survey collected in 2005. These data do not permit the analysis of the sequencing of transitions, but some research suggests that the transition to adulthood in China is still very ordered (e.g., Yeung and Hu 2013). I also examine if the pattern differs between men and women, and between urban and rural areas.

## ***2.1 Background and Theory***

### **2.1.1 Changes in the Transition to Adulthood in the Twentieth Century**

In twentieth-century Western Europe and the United States, the transition to adulthood has been standardized and then de-standardized. These two terms refer to the heterogeneity of transitions at the population level (Bruckner and Mayer 2005). Standardization refers to the relative uniformity of the timing and sequencing of transitions in a population, while de-standardization refers to the relatively heterogeneity of timing and sequencing.

The standardization of the transition to adulthood occurred in the first half of the twentieth century. Kohli (1986) identifies two dominant features of this standardization: First, the timing of transitions became homogenized by age. Transitions such as school leaving and marriage became increasingly age-standardized and scheduled at younger ages (Modell, Furstenberg and Hershberg 1976; Stevens 1990). Second, the pathways became less dependent upon gender, race, and social class. Fussell and Furstenberg (2005) document that in the United States until the 1960s, the transition to adulthood homogenized between men and women, between black and white, and between native-born and foreign-born. Bras, Liefbroer and Elzinga (2010) suggest that standardization started as early as the late nineteenth-century: from 1850 to 1900, an early, age-sequenced, family formation pathway gradually gained dominance in Netherlands, among youths of different family background.

This standardization process has been reversed since the 1980s. Most transitions have been postponed and shuffled, especially in the family arena. Young adults have increasingly postponed marriage and childbearing, and more have had births out of wedlock (Cherlin 2004; Espenshade 1985). The pathways to adulthood have been increasingly heterogeneous as well, especially by social class (McLanahan 2004). Youths from disadvantaged family background have become less likely than their wealthier counterparts to follow predictable transition sequences (Settersten and Bay 2010).

Since the 1990s, the transition to adulthood has also become postponed and shuffled in non-Western societies of Central and Eastern Europe and East Asia (Lesthaeghe 2010). Central and Eastern European countries were characterized by early and universal marriage and childbearing before 1989 (Sobotka 2011). Since the collapse of Soviet Union in 1989, marriage and childbearing have been sharply postponed, and the proportion of non-marital births has surged (Kohler, Bilari and Ortega 2002; Perelli-Harris 2008; Thornton and Philipov 2008). The postponement of marriage and childbearing is also observed in East Asia since the 1990s (Jones 2007; Jones 2010). While non-marital birth is still rare in East Asia, recent evidence from Japan suggests that in East Asia shotgun marriages may have become more frequent (Raymo, Iwasawa and Bumpass 2009).

### **2.1.2 Theories of the Postponed and De-standardized Transition to Adulthood**

This new pattern of postponed and de-standardized transitions to adulthood is theorized to be embedded in more individualized societies. Giddens (1991, 1992) highlights two ideas that are relevant to the discussion here. First, individual planning is a general feature of life in post-modern societies. Young adults expect to plan their future life trajectories autonomously. Second, partner relationships are increasingly characterized as pure relationships. Unions are recognized as individual choices to achieve life satisfaction rather than to conform to social obligations. These two changes have implications for de-standardization of the transition to adulthood.

Linked to Giddens is Beck's notion of the "risk society" (Beck 1992; Beck 1995). Beck highlights the uncertainty in the new individualized society brought about by eroding collective institutions and growing exposure to remote hazards. The workplace has become more precarious and insecure for workers (Kalleberg 2009; Western and Rosenfeld 2011) as the global economy has reconstituted the labor market across national boundaries. Welfare states, which have provided institutional mechanisms to buffer uncertainty (Mills and Blossfeld 2005), are increasingly inefficient and are themselves in the process of individualization (O'Rand 2011). In response to increased uncertainty, it is rational for young adults to postpone long-term commitments in marriage and childbearing (McDonald 2006; Mills and Blossfeld 2005).

The shift toward individualization is also emphasized by Lesthaeghe's notion of the "second demographic transition" (Lesthaeghe 2010). The second demographic transition includes a variety of family changes, including postponement of marriage and childbearing, a disconnection of marriage and childbearing, and new family forms such as cohabitation. These changes are closely associated with a cultural shift towards individual autonomy and self-fulfillment. All populations are predicted to experience this change in many of its aspects, depending on their levels of development and secularization. Thus, a convergence of new patterns of the transition to adulthood is predicted across the globe.

### **2.1.3 The Chinese Context**

In China's economic reform era, young adults have faced new and diverse opportunities in transition to adulthood. More opportunities exist for pursuing advanced education, selecting a variety of job options in desired geographical locations, and deciding who and when they marry. Since the 1980s, education opportunities have dramatically expanded (Hannum et al. 2007). In seeking jobs, young adults living in urban areas no longer need to wait for the state to assign them jobs (Davis 1992), but instead can apply directly for their desired jobs on the open labor market. Young adults born in rural areas, who in the past were restricted by their rural household registration from traveling to cities, can now migrate with fewer constraints to cities to follow the jobs (Guo and Iredale 2004; Huang, Guo and Tang 2010; Yang 1993). With regard to marriage, the role of parents has declined sharply, and young adults increasingly dominate the spouse selection process (Xu and Whyte 1990).

On the other hand, these diverse opportunities have also created challenges for young Chinese adults in their transitions to adulthood. Jobs are less secure and no longer a life-time guarantee (Davis 1992). Many employment benefits, such as affordable housing, inexpensive medical care, generous retirement pensions, and childcare subsidies (Lu and Perry 1997) have disappeared. Young adults, in today's China must carefully plan each transition. For example, housing is critical for family formation in China. However, with the rising housing price, both the young adults and



their families had to bear tremendous financial constraints, sometimes more than they can afford. (Tang and Parish 2000). Social inequalities in education and earnings persist and have even increased during the economic reform era (Hauser and Xie 2005; Xie and Hannum 1996; Zhou 1998).

In summary, young adults who are coming of age during the Chinese economic reform as well face increased individualization and greater uncertainty. We thus expect the transition to adulthood in China is moving toward postponement and de-standardization.

#### **2.1.4 Data Analytic Issues**

The study of changes in the transition to adulthood in developing countries faces multiple challenges. The major one is data limitation. The study of postponement, shuffling, and de-standardization requires survey data with detailed timing of each transition event (i.e., leaving home, education, work, marriage and childbearing). Such data are often not available in data from developing countries.

To overcome this deficiency, Fussell (2005) proposed an entropy index method to measure the de-standardization of the transition to adulthood. It is a summary measure of the level of heterogeneity in the transition to adulthood. The entropy index has previously been used to measure residential segregation and income inequality. The method is first used by Billari (2001) to measure the transition to adulthood in Italy from the longitudinal data. Fussell (2005) expands its application to census data where

information about the transition timing are often not available. The entropy index treats census data as synthetic cohorts, and measures the level of heterogeneity in status combinations (e.g., living arrangements, school attendance, employment status, marital status, and parental status) at each age. If the majority of a population is at one typical status combination, the value of the entropy index will be small; otherwise, if the population is equally distributed in all possible status combinations, the value will reach the maximum.

In this article, I adopt Fussell's entropy index to compare the age-specific heterogeneity of four status incumbencies and their combinations (in school, in work, in marriage and in parenthood) across 1982, 1990 and 2000 1% census samples and 2005 inter-censal survey. I examine whether and to what extent the transition to adulthood has changed in these twenty years. I also examine how the change differs by gender and rural/urban areas.

## ***2.2 Data and Measures***

### **2.2.1 Data**

This analysis uses three 1% Chinese census samples (1982, 1990 and 2000) and the 2005 inter-censal survey. The young-adult-year is measured between age 18 and 30 (Rindfuss 1991). Each sample comprises a synthetic cohort.

**Table 1: Sample sizes by gender and hukou (ages 18-30).**

Year	N	% urban residents	% rural residents	% migrant
<i>Men</i>				
1982	120,795	17.43	81.99	0.58
1990	161,497	21.87	74.76	3.37
2000	123,487	21.04	63.38	17.58
2005	216,994	20.85	55.18	23.97
<i>Women</i>				
1982	115,674	16.91	82.17	0.92
1990	153,184	18.91	77.90	3.19
2000	120,760	20.32	59.40	20.28
2005	236,018	20.07	53.47	26.46

To examine if the pattern differs by gender and between urban and rural areas, these 18-to-30-year-olds are further categorized into six subgroups by gender and permanent household registration status (hukou). Table 1 shows the sample size of each subgroup in four samples. I classify hukou into three categories: urban residents, rural residents, and migrants. Urban residents are measured as those who hold urban hukou. This hukou distinction (urban or rural) was not collected in 1982 census, so I approximate urban residents as those who were registered in the city/township at the time of the survey. It is a reasonable assumption given the stringent migration policy of that time (Huang, Guo and Tang 2010). Likewise, rural residents are measured as those who hold rural hukou. Migrants are measured in the year 2000 and 2005 as those who left places to which their hukou were registered, and lived in new destinations for more than six months (Liang 2001), while in the year 1982 and 1990 they were measured as living in new destinations for more one year. This difference is due to a change in

duration category from 1990 to 2000 census. In 1982 and 1990, the smallest duration was measured between zero to one year, while in 2000 census and 2005 intercensal survey, it was measured between zero to six months. Thus part of the rise of migrant population is a result of definition change.

### **2.2.2 Measures**

The transition to adulthood is measured as a combination of potentially four statuses: school attendance status, employment status, marital status, and parental status. Because the parental status was only collected for women, women have four statuses while men have three. To maximize the comparability between surveys, I treat each of the four statuses as dichotomous. Specifically, the school attendance status is coded 1 for respondents who were currently at school and 0 for those who were not. Employment status is coded 1 for respondents who were in the labor force and 0 for those who were not. The marital status is coded 1 for respondents who were married and 0 for those who were never-married, divorced or widowed. And the parental status is coded 1 for respondents who had at least one child and 0 for those who were childless. The 2000 and 2005 surveys did not collect the information for never-married women; I thus code the parental status of never-married women as 0. It is a reasonable assumption, as the pre-marital childbearing is still rare in Chinese context (Yeung and Hu 2013). The distributions of these statuses for men are presented in Table 2 and for women in Table 3.

**Table 2: Distributions of statuses, by year and hukou, men.**

	Year	N	Status (%)		
			In school	In work	In marriage
Overall					
	1982	120,795	2.86	95.16	45.66
	1990	161,497	5.78	91.14	46.87
	2000	123,487	7.42	85.72	46.38
	2005	216,994	11.46	79.68	38.88
Urban Residents					
	1982	21,057	6.73	89.72	38.22
	1990	35,320	13.52	77.04	40.06
	2000	25,977	19.43	64.28	38.01
	2005	45,247	21.49	60.60	33.56
Rural Residents					
	1982	99,043	2.03	96.37	47.29
	1990	120,730	3.58	95.17	49.23
	2000	75,802	3.01	93.27	50.12
	2005	119,728	9.13	83.82	42.01
Migrants					
	1982	695	3.88	87.63	39.86
	1990	5,447	4.39	93.06	39.59
	2000	21,708	8.44	84.99	43.33
	2005	52,019	8.09	86.75	36.30

The level of status heterogeneity is measured by the entropy index (Fussell 2005).

In general, entropy index measures the lack of data redundancy. Lower scores mean higher levels of data redundancy. In the segregation research, lower scores mean high levels of segregation. In the life course research, lower scores mean a more structured life course in a population. The formula is the following:

$$E = \sum_{s=1}^S p_s \log\left(\frac{1}{p_s}\right)$$

where  $S$  is the number of statuses (4 for women and 3 for men) and  $p_s$  is the proportion of the population in status combination  $s$ . Women had  $2^4=16$  possible status combinations and men have  $2^3=8$ . Appendix A includes the distribution of status combinations by year, gender and hukou, and Appendix B includes the Stata code to calculate the entropy index.

**Table 3: Distributions of statuses, by year and hukou, women.**

	Year	N	Status (%)			
			In school	In work	In marriage	In parenthood
<b>Overall</b>						
	1982	115,674	1.58	89.24	62.25	49.78
	1990	153,184	3.84	87.67	61.47	51.38
	2000	120,760	6.19	78.82	61.23	52.88
	2005	236,018	9.95	70.67	54.95	45.41
<b>Urban Residents</b>						
	1982	19,562	4.28	88.33	50.63	37.89
	1990	28,971	11.80	75.66	53.28	43.06
	2000	24,541	17.45	58.60	50.92	41.07
	2005	47,368	20.80	54.57	47.14	36.87
<b>Rural Residents</b>						
	1982	95,047	1.02	89.79	64.44	52.08
	1990	119,328	1.92	91.20	63.50	53.56
	2000	71,730	2.26	87.73	67.05	60.43
	2005	126,208	7.64	75.67	60.22	52.12
<b>Migrants</b>						
	1982	1,065	1.60	56.15	80.09	63.10
	1990	4,885	3.62	72.53	60.47	47.59
	2000	24,489	6.43	72.96	54.52	42.59
	2005	62,442	6.37	72.81	50.22	38.31

To make the index more intuitive, I follow Fussell (2005) and transform the entropy index into a percentage of the maximum entropy index, which is defined as the

status combination when the population is equally distributed in all possible combinations. It is equal to  $2^4 \cdot (1/2^4) \cdot \log(1/2^4) = 1.24$  for women and  $2^3 \cdot (1/2^3) \cdot \log(1/2^3) = .903$  for men. The higher percentage, the greater the heterogeneity.

**Table 4: A hypothetical example of the entropy index.**

Status Combinations	Age-specific distribution			
	Age 18	Age 20	Age 22	Age 24
None	--	.25	.25	.5
School	1	.50	.25	--
Work	--	.25	.25	.5
School-work	--	0	.25	--
Entropy index	0	.452	.601	.301
% of max entropy	0	75%	100%	50%

The entropy index can be illustrated by a hypothetical example in Table 4.

Suppose 100 people can occupy two statuses: school and work. There are four potential status combinations: none, school, work, and school-work. Assume they follow this distribution of status combinations: at age 18, all 100 are at school; at age 20, 25 are at none status, 50 are at school, and 25 are at work; at age 22, 25 are at none, 25 are at school, 25 are at work, and 25 are at school-work; at age 24, 50 are at none and 50 are at work. Age 18 has an entropy index of 0, as all the people are at one status. Age 22 has an entropy index of .603, which is also the highest score, as people are equally distributed across four status combinations. The score is higher in age 22 than age 24, as the distribution of status combinations are more diverse in the former than the latter.

## **2.3 Results**

### **2.3.1 Age-Specific Status Distribution**

To examine whether the transition to adulthood has been postponed in China, I plot the age-specific distribution of school attendance status, employment status, marital status and parental status (women only) for men (Figure 1) and women (Figure 2).

*The school-to-work transition.* There is a significant postponement of school leaving and employment in all groups over time except for male and female migrants. The trend is similar between men and women, but is much larger for urban residents than for rural residents. At age 18, which is usually the timing of high-school completion, about 20% of urban residents in 1982 were in school, but about 50% were in school in 1990. The percentage increased further, reaching almost 80% in 2005. Relative to almost 60% increase in school attendance among urban residents, the proportion of rural residents who were in school increased by only 30%, from around 10% in 1982 to 40% in 2005. The extension of school attendance and urban/rural disparities are consistent with other findings (Hannum et al. 2007; Hannum and Liu 2005).



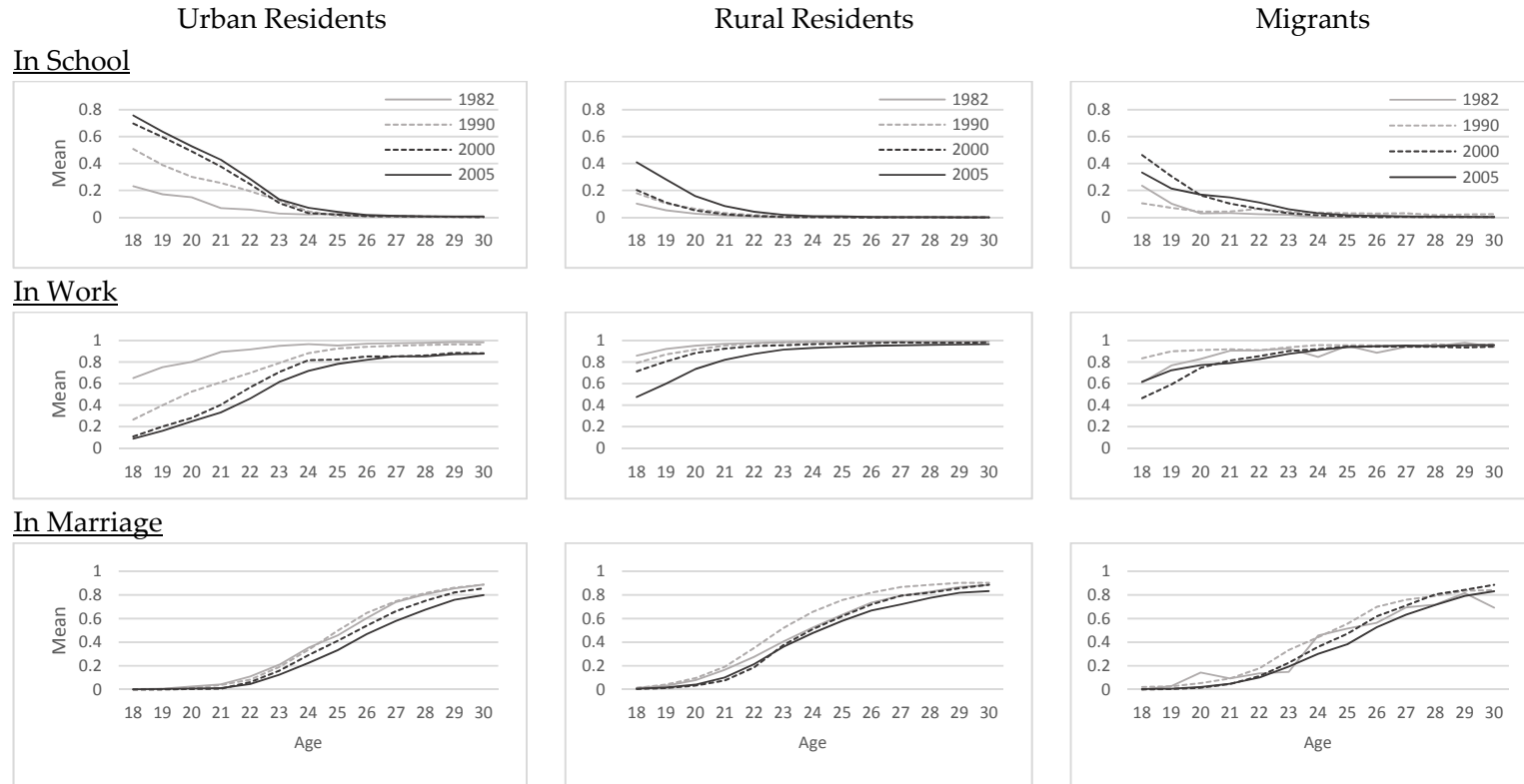
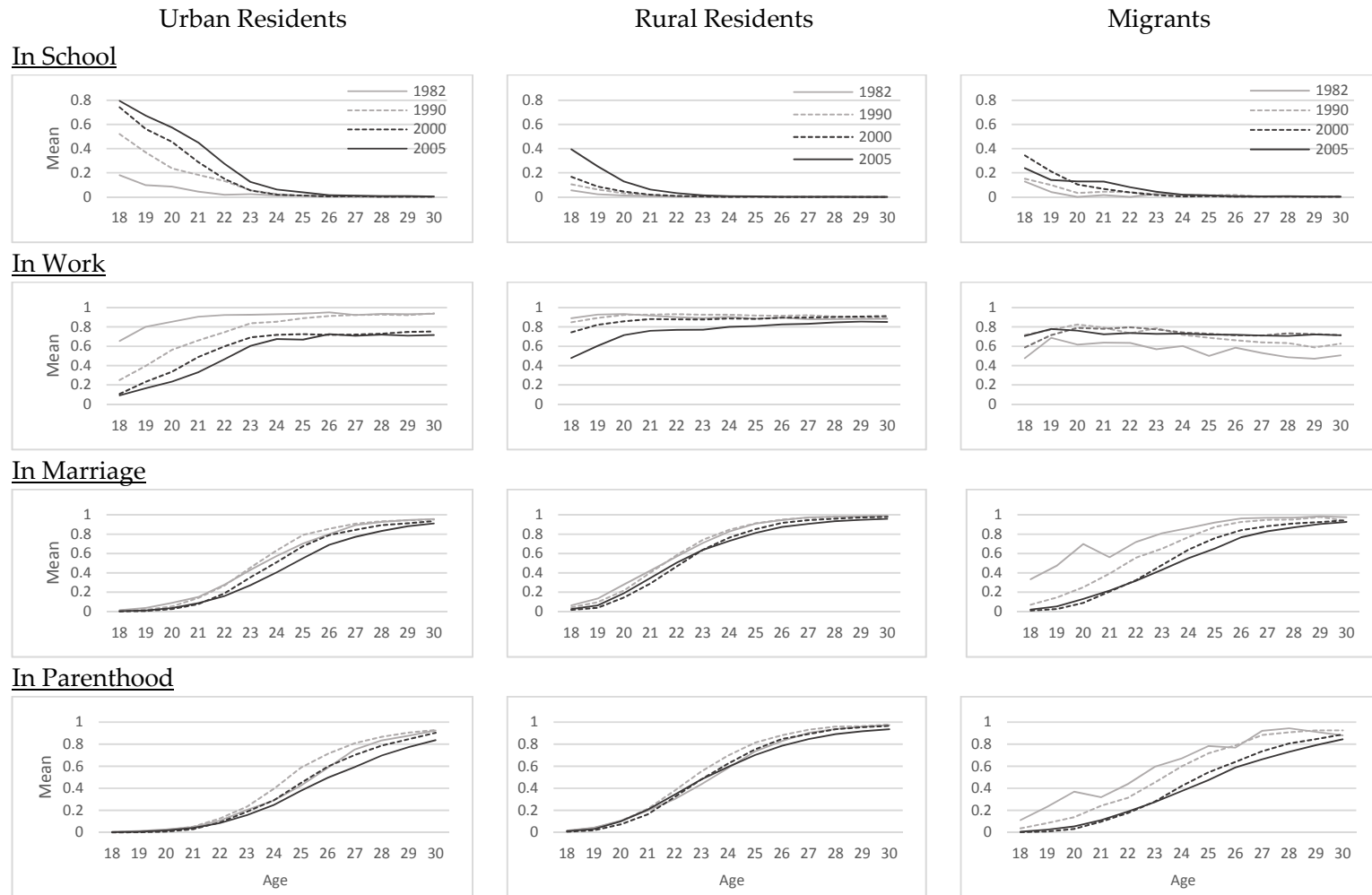


Figure 1: Age-specific distribution of statuses, by hukou, male.



**Figure 2: Age-specific distribution of statuses, by hukou, female.**

Related to the extended school participation is the delayed entry into the labor force. The proportion of urban who were worked at age 18, for example, drops from 65% in 1982 to less than 10% in 2005. The employment percentage stabilizes around age 26, when the majority of male urban residents were out of school.

Urban residents face more risks of unemployment in the 2000s than before. The risks are higher for women than for men. For urban men, the percentage employed at age 27 is over 95% in 1982 and 1990, but only 85% in 2000 and 2005. In contrast, the percentage employed for urban women dropped from 92% in 1982 and 1990 to less than 75% in 2000 and 2005. This gender disparity in unemployment risks is consistent with the findings of an increased gender gap in hiring and promotion in the reform era (Cao and Hu 2007; Summerfield 1994).

*Family formation.* In contrast to the dramatic postponement in school-to-work transition, there is little change in marriage and parenthood, except in the case of female migrants. Among rural and urban residents, the postponement is more pronounced for urban residents than for rural residents and for men than for women. Even for urban men, the group with the most significant postponement, the change is small. By age 28, about 80% and 68% of urban men were married in 1982 and 2005, respectively.

The postponement pattern, if any, is actually temporarily reversed from 1982 to 1990 for rural and urban residents: the age-specific marriage (and parenthood) percentage increases from 1982 to 1990, and drops back in 2000 and 2005 to the 1982

level. This pattern is especially noticeable for rural men. For example, 82% of rural men in 1982 were married by age 28, and a similar percentage is reached in 1990 by age 26, two years earlier. The age at marriage in China declined in the late 1980s and early 1990s (Han 2010). This decline is often explained as a response to the relaxation of 1970s “wang, xi, xiao” policy, which advocated late marriage, longer birth interval, and fewer births (Coale et al. 1991).

The only group who delayed family formation during this period consisted of female migrants. For them, marriage and parenthood are still universal, but significantly postponed. Migrants were a very selective group in 1982 (Liang 2001), but a similar pattern holds between 1990 and 2005. In 1990, about 93% of female migrants were married by age 26; similar percentage is reached in 2005 until age 30. Parenthood is also postponed. About 90% of female migrants in 1990 had the first child by age 28, and only 73% of those in 2005 by the same age.

To summarize, Figure 1 and Figure 2 show a significant postponement in education completion and employment, but little change in family formation. Thus, these results only find partial support for postponement prediction. However, this finding does not imply that de-standardization has not occurred. For example, people may, on average, marry around the same time, but this event may be experienced in a greater age range. In the next section, I use the entropy index to show the level of heterogeneity of the transition to adulthood between 1982 and 2005.

## 2.3.2 Age-Specific Entropy Index

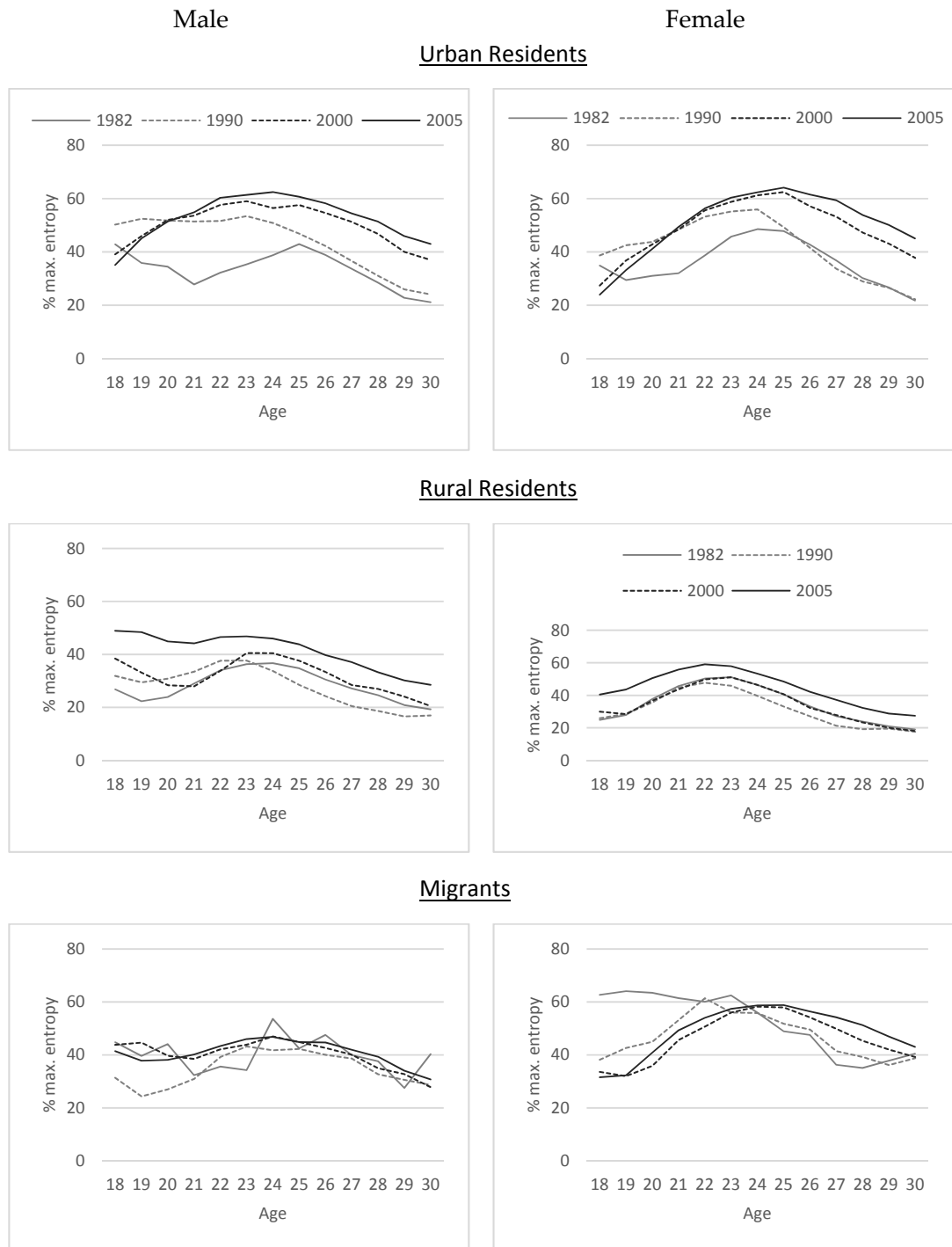


Figure 3: Age-specific percent of maximum entropy, by gender and hukou.

Figure 3 displays the age-specific entropy indices between 1982 and 2005. Most lines follow an inverted-U shape, which indicates that the heterogeneity of the transition to adulthood increases first in the early 20s and declines in the late 20s. This pattern is also found in the transition to adulthood in other societies (Fussell 2005; Park, Ribeiro and Fussell 2010), and is consistent with the multiple status changes in young adulthood years (Rindfuss 1991). Most groups reveal some de-standardization, with the most pronounced pattern among urban residents.

Urban residents show a strong de-standardization in the transition to adulthood. The levels of heterogeneity, measured by the percent of maximum entropy, are higher in 2005 than in 1982 since age 19, and the gap increases with age. This pattern is similar between men and women. For example, the percent of maximum entropy for urban women from 1982 to 2005 increases by almost 50% at age 22, and more than doubles at age 30. In the late 20s, most respondents are out of school and have entered the labor market, which may imply that increased heterogeneity may be attributable to the wider age range in which marriage and childbearing occurs in the reform era (Cai and Wang 2011; Yeung and Hu 2013).

De-standardization also occurs for rural residents' transition to adulthood, but the change is relatively modest. Essentially the heterogeneity level remains stable between 1982 and 2000, as these three lines are barely discernable from each other. It is in 2005 that heterogeneity begins to increase, at all ages. The change differs by gender.

For rural women, the increase is similar in all ages. For rural men, the increase is larger in the early 20s than in the late 20s, which implies that changes in education and employment may play a major role.

With regards to migrants, male migrants' transition to adulthood changes little in this period. The transition to adulthood for female migrants de-standardizes between ages 24 and 30. Between 1990 and 2005, the heterogeneity level increases between ages 24 to 27, peaks at age 27, and declines between ages 28 and 30.

To summarize, the entropy index suggests that de-standardization has occurred in the reform-era urban China. The change is most pronounced in urban residents, with a similar pattern between men and women. The rural residents also show a relatively modest de-standardization. With regard to migrants, whereas male migrants' transition to adulthood remains stable, the transition to adulthood has increased for female migrants.

## ***2.4 Discussion and Conclusion***

Since the 1980s, the transition to adulthood in the Western Europe and the United States have increasingly been postponed, shuffled, and de-standardized. Less is known about the changes in the transition to adulthood in the developing countries. This article aims to fill the gap, which uses census data to examine the transition to adulthood in China, the country with the largest youth population in the world,

between 1982 and 2005. It focuses on two features of the transition to adulthood: postponement and de-standardization.

With regard to postponement, the results suggest three clear time trends. First, education completion and employment have been postponed over time, especially for urban residents. Second, family formation has changed little, except for female migrants. Third, the general pattern is similar between men and women among urban and rural residents.

This limited change in family formation needs to be interpreted with caution. Several studies with detailed measurement of timing of marriage show a delayed pattern of marriage formation in urban China since the 1980s (Cai and Wang 2011; Tian 2013; Yeung and Hu 2013). This difference in results compared to the current study may be explained by the tempo and quantum effects of the synthetic cohort approach (Bongaarts and Feeny 1998). The synthetic cohort integrates current cohort experience with cohort experience years earlier. If family formation occurs later and later over time, this approach will likely underestimate the degree of postponement.

With regard to de-standardization, the results suggest three clear time trends. First, the transition to adulthood has been de-standardized, especially for urban residents in their late 20s. Second, the trend is similar between men and women among urban and rural residents. Third, the transition to adulthood is more de-standardized for female migrants than for male migrants.



What accounts for the gender difference between migrants population? We speculate it could be both a composition change and a behavior change. There is an increasing proportion of female migrants who are young and single, and migrate for work (Liang and Chen 2004). This composition change could increase the heterogeneity in the transition to adulthood. This composition change could also lead to a behavior change. Migration serves as an important “turning point” in the transition to adulthood (Clark and Cotton 2013). By leaving parents’ homes at an early age, this experience grants young adults an “age of independence” (Rosenfeld 2007; Rosenfeld and Kim 2005) which allows them to explore their inner and outer worlds and to form their own pathways of family formation. This is especially important for rural women.

In summary, the data suggest a limited postponement of but an increasing de-standardized transition to adulthood in the reform-era China. The change is more pronounced among urban residents than rural residents and migrants, and among female migrants than male migrants. The article benefits from the representation of the census data, but also bears the limitations with the synthetic cohort approach. Nonetheless, it serves as a starting point to understand the changes in the transition to adulthood in the reform-era China.

### **3. Chapter 2: Family Change in Reform-Era Urban China**

In the past few decades a pervasive set of family changes, first observed in Western societies in the 1960s (Lesthaeghe and Neels 2002), have also emerged in non-Western societies of Central and Eastern Europe and East Asia (Lesthaeghe 2010). These family changes, often referred to as “second demographic transition” (Lesthaeghe 1983; Van de Kaa 1987), generally include sub-replacement fertility, postponement marriage and childbearing, increasing non-marital cohabitation, and a disconnection between marriage and birth. After the collapse of Soviet Union in the 1990s, these family changes surged in Central and Eastern Europe (Kohler, Bilari and Ortega 2002; Perelli-Harris 2008; Thornton and Philipov 2008). All the changes except for non-marital childbearing have also occurred in East Asia (Jones 2007; Jones 2010). Recent evidence suggests that in East Asia the “shotgun marriage” may be more frequent, as has been found in Japan (Raymo, Iwasawa and Bumpass 2009).

Research diverges as to the force behind these family changes. The development perspective emphasizes macro-level socioeconomic change -- e.g., economic development, education expansion, urbanization – that improves material conditions and thus leads individuals to change patterns of family formation. The development perspective also mentions the role of culture, but often views it as subsidiary, or a product of socioeconomic development (Inglehart and Baker 2000; Lesthaeghe 2010). The diffusion perspective, on the other hand, emphasizes the diffusion of Western

family ideologies as an independent force for family change. Goode (1963) asserts the Western family ideologies, which emphasize companionship and romantic love, could spread to societies with little socioeconomic development. Thornton (2001, 2005) labels the high respect for Western family forms from the perspective of non-Western countries as “developmental idealism”, which often views western family forms as results of, or sometimes necessary for, socioeconomic development.

Reform-era urban China provides an important case to examine the development and diffusion perspectives. China is on the verge of the second demographic transition: age at marriage has increased (Han 2010; Tian 2013), non-marital cohabitation and shotgun marriages have also emerged (Yeung and Hu 2013), and the fertility level is well below the replacement level, even after accounting for the effect of the one-child policy (Wang, Cai and Guo 2012). Moreover, in the past thirty years, China has experienced dramatic economic development and intensive interactions with world markets. Moreover, the level of development and global interactions vary substantially across provinces (Demurger et al. 2002; Jiang, Liping and Sharma 2013). These spatial patterns allow us to parse the roles of socioeconomic development and diffusion in explaining family change in the reform-era urban China.

In this analysis, I analyze family change in reform-era urban China as follows. First, because of data limitations, this analysis focuses on the timing and sequencing of marriage and childbearing. Instead of modeling them separately, I adopt a life course

perspective (Elder, Johnson and Crosnoe 2003) and use latent class analysis to map the pathways of education, work, marriage and childbearing (Amato et al. 2008; Goldberg 2013). These four events are interconnected (Macmillan and Copher 2005) and often considered as a package in decision-making (Johnson-Hanks et al. 2011). Next, I use multi-level models to study whether individual-level family behaviors are influenced by societal-level development, diffusion or both. In doing so, I merge individual-level data from 2008 Chinese General Social Survey with provincial-level economic variables, and use multi-level logistic regressions to explain family change across Chinese provinces.

### ***3.1 Theoretical Perspectives***

#### **3.1.1 The Second Demographic Transition in the Chinese Context**

In the long history of China, marriage was a universal practice that occurred at an early age. While a significant proportion of poor men remained bachelors throughout their lives, virtually no women were unmarried by the age of 20 (Lee and Wang 1999). Births often happened immediately after marriage, with a typical gap of 17 months (Wang and Yang 1996). The decisions of marriage and childbearing were made beyond individuals or couples. Marriage was arranged by parents or other elderly relatives for lineage preservation or for forging political and economic alliances (Chu and Yu 2010; Lee and Wang 1999). Childbearing reflected decisions related to family security or upward mobility for lineage, not individual or couple choices or decisions (Greenhalgh 1988).

Age at first marriage has noticeably increased since the economic reform in the 1980s. Between mid-1980 and 2000, the median age at first marriage increased by two years in urban China, from 25 to 27 for urban men and from 23 to 25 for urban women (Han 2010). The postponement of first marriage is most evident among the college-educated (Cai and Wang 2011). The proportion of non-marriage, though very low compared to other Asian countries, is on the rise (Jones 2007; Jones 2010).

The fertility level in China has been well below the replacement level. The total fertility rate (TFR) dropped below the replacement level in the early 1990s, and remained between 1.5 and 1.6 in the 2000s (Cai 2008; Morgan, Guo and Hayford 2009; Retherford et al. 2005). Fertility reduction could not solely be attributed to the implementation of the one-child policy. Fertility reduction actually began before the one-child policy was vigorously enforced in the 1980s (Cai 2010). The magnitude of change is substantially larger than predicted by a one-child policy as the only force for fertility change (Wang, Cai and Guo 2012).

Other signs of the second demographic transition have also emerged. In reform-era urban China, premarital sex is commonly accepted among youth (Farrer 2001). About 42% male and 26% female 20-year-olds have had sex prior to marriage (Parish, Laumann and Mojola 2007). Premarital childbearing and shotgun marriages are rare but on the rise (Yeung and Hu 2013).

There are generally two contending school of thoughts about the emergence of second demographic transition in non-Western societies: one emphasizes socioeconomic development, while the other one emphasizes the diffusion of Western family ideologies. I describe them next.

### **3.1.2 The Development Perspective**

The development perspective views family change as a result of socioeconomic development – industrialization, economic globalization, urbanization, education expansion, etc. These structural changes increases material resources controlled by the individual, and increase the geographical and social mobility of younger generation. All these changes reduces the authority of parents and other kin over their children. In this more individualized society, partner relationships are increasingly characterized as individual choices to achieve life satisfaction, rather than conform social obligations (Giddens 1992). As an example, Coontz (2005) provides detailed historical account about how industrialization and urbanization have stripped away the economic foundation of marriage, allowing it to become a locus of personal choice, romance, and affection. In this way, marriage as an institution to define family behaviors is weaken, and new family forms have emerged and flourished.

Reform-era China is a great place to examine the impact of economic development on family change. In the past 30 years, rapid and steady economic growth has occurred in China. With an average GDP growth of 9 percent per year, China has

become the largest export country and the second-largest economy in the world.

Moreover, levels of socioeconomic development vary substantially across provinces. The provincial disparities also increased during the economic reform Demurger et al. (2002) show that the absolute provincial gap in GDP per capita has increased from 1,143 yuan in 1978 to 9,202 yuan in 1998. Provinces also shifted rankings in GDP per capita during the economic reform. The top (e.g., Beijing, Shanghai, and Tianjin) and bottom (e.g., Yunnan, Shaanxi, Gansu, and Guizhou) of the scale have changed little. Coastal provinces, especially Fujian, Shandong, and Hainan, improved their rankings, whereas the rankings of the traditional northeastern industrial bases (i.e., Heilongjiang, Liaoning, and Jilin) dropped. If the socioeconomic development is at least partly responsible for family change, we should find a positive association between economic development and family change.

*Hypothesis 1: individuals who stay in the provinces with higher levels of economic development are more likely to experience family change.*

### **3.1.3 The Diffusion Perspective**

The diffusion scholars recognize it as an independent and influential force for family change (Bachrach 2014). World society scholars have long argued that global cultural scripts produce and maintain behavioral homogeneity at the levels of nation-states, organizations, and individuals (for a review, see Meyer 2010). These global cultural scripts are cultivated, maintained, and disseminated by intergovernmental

organizations (Boli and Thomas 1997) and trade between nation-states (Sachs and Warner 1995). These world society actors are influential in legitimizing and promoting new cultural scripts and models of policy and behavior (Meyer 2010; Meyer and Jepperson 2000). As Mayer et al. (1997:145) put it, “Worldwide models define and legitimate agendas for local action, shaping the structures and policies of nation-states and other national and local actors in virtually all of the domains of rationalized social life – business, politics, education, medicine, science, even the family and religion.”

One component of global cultural scripts is “development idealism”, a cultural model or schema that associates family behaviors with socioeconomic development (Thornton 2001; Thornton 2005). It has three basic propositions: first, it views Western societies and family behaviors as role models for less developed countries. Second, development idealism proposes that the relationship between family behaviors and development is causal – i.e. that Western family behaviors facilitate socioeconomic development and which, in turn, reproduces these family behaviors. Third, it proposes that individuals are free to make decisions without arbitrary decisions. The second proposition--the causal relationship between family behaviors and development--is supported by a recent comparative research, which finds that a large proportion of ordinary people in Argentina, China, Egypt, Iran, Nepal, and the United States believe that development reduces fertility and fertility decline fosters development (Thornton et al. 2012; Zheng 2006).



Development idealism has been embraced by Chinese people for more than a century's time. When China was invaded by Western militaries at the beginning of the twentieth century, many Chinese scholars blamed indigenous culture for China's economic and technological inferiority to the West (Zheng 2006). Prosperity and independence required a transformation of China's traditional political, economic, political, and familial systems. In the early 1900s, many aspects of traditional Chinese family behaviors were campaigned against, including footbinding, concubinage, adoption of daughters-in-law, and child marriage (Burguière et al. 1996; Wang 1999). The demands for family change were more vigorous after the establishment of The People's Republic of China in 1949. Most of these family behaviors were formally abandoned (Meijer 1971). Furthermore, a firm adoption of the belief in the putative causal association between low fertility and economic development led to the implement of the controversial one-child policy in the late 1970s (Greenhalgh and Winckler 2005; Wang, Cai and Guo 2012).

The dissemination of global cultural scripts, or development idealism in particular, depends on the degree of interactions within global society. World society theory predicts that populations that are most closely connected to global society will be most likely to adopt behaviors promoted in that environment (Meyer 2010). In reform-era China, scholarly and popular discourse attributes family change to the country's changing attitudes toward love, marriage, and sex, as the result of exposure to Western

cultural norms (Farrer 2001; Parish, Laumann and Mojola 2007). If the diffusion of development idealism is at least partly responsible for family change, we should find a positive association between access to global society and family change.

I measure the access to global society with the inflow of Foreign Direct Investment (FDI). Although media exposure is often used to measure global norm diffusion (Pierotti 2013), it is not appropriate in the Chinese context, where media and internet access are closely monitored by the central government (Esarey 2006). The State Administration of Press, Publication, Radio, Film and Television of The People's Republic of China regulates television content and imports of foreign movies for ideological appropriateness. The internet is also closely monitored. For example, access to multiple major Western websites, such as YouTube, CNN, Facebook, Twitter, is banned. While Western cultural materials have permeated China, often through illegal channels (Hershatter 1997), this media influence may not have been sufficient to bring about family change, and more importantly, too difficult to measure empirically.

Economic interaction with global markets can provide an important channel for the dissemination of development idealism. International trade relations homogenize behaviors globally through the diffusion of technology, policy models, and ideas (Sachs and Warner 1995). Consumer goods and fast food, along with Hollywood movies, allow Western – particular American – culture to spread to other parts of the world (Tomlinson 1997; Tomlinson 1999). One primary source of China's interaction with

global markets is through FDI. Foreign enterprises create joint ventures with domestic firms; hire, train, and manage Chinese workers; advertise in the Chinese media; and interact intensively with the Chinese government. In the views of government and the public, these foreign enterprises provide more than capital, advanced technology, and modern management: they offer new and advanced ways of thinking, working, and living (Jiang, Liping and Sharma 2013). Chen and colleagues (1995) find FDI inflow reduces ideological commitment among Chinese people. Jiang and colleagues (2009) find that FDI inflows westernize several aspects of Chinese culture, such as future orientation and performance orientation.

In China, FDI was almost non-existent prior to 1978. Since then, China has launched the Open-Door Policy which encourages foreign capital to invest in China. One major component of this policy is to create special economic zones (SEZs), where foreign firms are granted preferential tax treatment, sometimes supplemented by additional tax incentives and lower land use fees. In 1980, four SEZs were created along the southeast coast – Shenzhen, Zhuhai, Xiamen and Shantou. In the early 1990s, SEZs were extended to three deltas – the Pearl River Delta, the Minnan Delta and Yangzi River Delta – and the Hainan province and the Pudong New Area in Shanghai. China further relaxed a number of sectional and regional barriers to foreign investment in 1992, and joined the World Trade Organization in 2001 (Chen, Chang and Zhang 1995; Jiang, Liping and Sharma 2013). FDI grew substantially over time. Currently China is the

largest host of Foreign Direct Investment (FDI) among developing countries, attracting over one-third of total world investment. It is also the second largest recipient of FDI in the world after the United States. FDI has been heavily concentrated in the Eastern (coastal) region. By 2006, 79% of the FDI was in the Eastern region, 15% was in the Central region, and 5% was in the Western region. If the diffusion of development idealism is at least partly responsible for family change, we should find FDI facilitates family change.

*Hypothesis 2: individuals who live in the provinces with higher levels of FDI inflow are more likely to experience family change.*

## **3.2 Data and Measures**

### **3.2.1 Individual-Level Data**

The individual-level data come from the 2008 Chinese General Social Survey (CGSS). Started in 2003, the CGSS is a national representative, repeated cross-sectional household survey of Chinese non-institutionalized adults aged 18-69. It provides rich information on socioeconomic status, life events, and quality of life in rapidly changing Chinese society. The CGSS sample is stratified in a four-stage sampling scheme, which is separated by Chinese urban and rural area<sup>1</sup>. The 2008 CGSS is the latest wave that is

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<sup>1</sup> First, district and counties were sampled from five major Chinese regions with different levels economic development and population density. Second, townships or city streets within these counties/districts were randomly sampled. Third, within these township or city streets, village or neighborhood committees were randomly selected. Finally, households within these village or neighborhood committees were randomly

publicly available. The survey contains detailed retrospective information about education and work histories, as well as the timing of first marriage and childbearing.

In this analysis, I model the family formation pathways of respondents who were born between 1960-69 and 1970-78. The respondents born in the 1980s are excluded because they have not reached age 30 at the time of survey. The respondents born in the 1950s are excluded for two reasons. First, a proportion of them were forcibly relocated to rural areas after graduating from middle or high school during the Cultural Revolution. This dramatic life event profoundly affected their marriage and childbearing decisions (Qian and Hodson 2011; Zhou and Hou 1999). Second, most of these respondents married before 1980, when their ages at first marriage and childbearing were influenced by policy intervention (Coale et al. 1991).

I pose three restrictions on our analytical sample. First, I include respondents who were living in urban area and had urban household registration at the time of survey. The reform regime is quite different between urban and rural China (Lin, Cai and Li 2003). Urban residents and rural migrants are usually employed in different labor market segments; migrants from rural areas are regularly excluded from jobs that are stable and provide social benefits (Lu, Ruan and Lai 2013). Furthermore, migration itself is a significant life event that alters life course trajectories (Clark and Cotton 2013).

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selected, and one eligible household member was selected to be the survey respondent. See <http://www.ust.hk/~websosc/survey/GSS2003e3.html> for details.

Second, I exclude a small number of respondents (N=88) who failed to provide complete answers to questions on education, work, marriage and childbearing. Third, I exclude a small number of respondents (N=80) who were currently divorced, widowed or remarried, because the survey did not collect when their marriages were dissolved. The final sample contains 612 men and 579 women.

### **3.2.2 Individual-Level Measures**

**Family Formation Pathway.** I rely on four variables to construct the family formation pathway -- attending school, being employed, being married, and having the first child. For each age at 18, 20, 22, 24, 26, 28 and 30, I create a binary variable that indicates whether respondents occupied each of these statuses. This procedure generates 28 separate variables (4 status\*7 age points) for each respondent.

The education and employment statuses are coded as recurring events. The education status at these ages is coded from an education calendar. Respondents were asked in the survey to report the calendar year of starting and finishing each educational participation and the highest education degree obtained from this experience. At each age, if the respondents reported being at school, they are coded 1 for that age and 0 otherwise. For example, if a respondent was in school between ages 18-22 and between ages 27-29, her education status is coded 1 at ages 18, 20, 22, and 28, and 0 at ages 24, 26, and 30. The employment status at these ages is coded from the work history in equivalent fashion. Respondents were asked to report the calendar year of starting and

ending each job, including both jobs in firms and as self-employed. Similar to education status, at each age, if the respondents were employed, they are coded as 1 for that age and 0 otherwise.

The marital and childbearing status are coded as non-recurring events. The marital status is derived from the year of first marriage. At each age, the marital status is coded 1 at age of first marriage and after, and 0 otherwise. With regard to childbearing status, the survey asked the age of each child ever born to the respondent. I rely on the age of the oldest child to construct the age of first childbearing. At each age, the childbearing status is coded 1 at the age of first childbearing and after, and 0 otherwise.

**Family background at age 14.** Five family background variables at age 14 are included that are likely to affect family formation. Mother's years of schooling is measured as a continuous variable, recoded from the highest level of education that the mother achieved: 0 = no schooling; 6 = primary school; 9 = junior high/junior-level vocational school; 12 = senior high/senior-level vocational school; 15 = associate's degree; 16 = bachelor's degree; and 19 = master's degree or higher. Father's occupation is measured as a dichotomous variable, with 1 denoting father was a farmer, a manual worker, or unemployed, and 0 otherwise. Father worked in state sector is measured as a dichotomous variable, with 1 denoting to father worked in state-owned or collective-owned enterprises, and 0 otherwise. Father's Chinese Communist Party (CCP) membership is measured as a dichotomous variable, with 1 denoting father was a CCP

member and 0 otherwise. Place of residence is measured as a dichotomous variable, with 1 denoting to respondents who lived in rural area at age 14, and 0 otherwise.

**Other individual-level variables** include in the model are cohort and local residence. Cohort is measured as a dichotomous variable, with 1 denoting to the respondents born between 1970 and 1978 and 0 denoting to the respondents born between 1960 and 69. Local residence is measured as a dichotomous variable, with 1 denoting to the respondents who lived in city and 0 denoting to the respondents who lived in townships. Table 5 reports the mean statistics of family background variables by gender and cohort. All family background variables are similar between men and women.

**Table 5: Descriptive statistics of individual-level characteristics, by gender and cohorts.**

	Male		Female		missing
	1960-69	1970-78	1960-69	1970-78	
Living in city	.86	.87	.86	.82	--
<i>Family Background at age 14</i>					
Mother's years of schooling	4.02	6.00	3.99	5.88	.76%
Father was unemployed, or worked as blue-collar or farmer	.63	.65	.61	.62	3.19%
Father worked in state-owned	.60	.55	.59	.50	25.10%
Father was CCP member	.25	.28	.26	.23	.34%
Lived in rural area	.25	.23	.26	.30	.08%
Number of Observations	319	293	291	288	1,191



**Missing data.** All variables had less than 5% missing data except for father's ownership sector (25.1%) (Table 5). Given the missing data were within the 10%-30% range, I imputed 20 datasets (Graham, Olchowski and Gilreath 2007) using `mi impute` in Stata 12/SE (College Station, Texas). The imputation was done separately for men and women.

### **3.2.3 Provincial-Level Measures**

I match two cohorts with the approximated social context they are embedded in. Because census year generally has more data and better data quality, I match the 1960-69 cohort with indicators measured in year 1990, and the 1970-78 cohort with indicators measured in year 2000.

A province's socioeconomic development is captured through Gross Domestic Product (GDP) per capita, obtained from China Data online. It has been widely used to measure China's economic development (Bian and Zhang 2002; Hauser and Xie 2005; Xie and Hannum 1996). A province's level of interactions with the global market is measured by FDI. To reflect a province's relative FDI to its economic size, I use the FDI performance scores developed by United Nations (World Investment Report 2002), which takes the ratio of FDI relative to GDP:  $\text{FDI performance score} = (\text{provincial FDI}/\text{national FDI})/(\text{provincial GDP}/\text{national GDP})$ . The provincial-level FDI performance scores are obtained from Sauvant, Zhao and Huo (2002).

I also include five indicators which may be related to GDP or FDI: (1) percent of non-state employment, measured as the number of employees outside state-owned and collective-owned enterprises divided by the number of total urban employees<sup>2</sup>; (2) ratio of migrants to residents, measured as the number of migrants divided by the number of registered residents<sup>3</sup>; (3) percent of associate's degree or higher<sup>4</sup>, (4) residents' disposable income<sup>5</sup>, and (5) unemployment rate<sup>6</sup>. The descriptives can be found in Table 2.

**Table 6: Descriptive statistics of provincial-level characteristics, by year.**

	1990		2000	
	Mean	S.D.	Mean	S.D.
GDP in natural log	7.41	.09	8.93	.10
% nonstate employment	1.02	.30	17.26	1.67
% >=associated degree	7.41	.48	19.83	.70
Unemployment rate	2.69	.18	3.16	.13
% income used for consumption	86.52	.75	80.44	.75
Migration ratio	.02	.00	.07	.01
FDI	.80	.24	.72	.14
Number of Provinces	28	28	28	28

A further analysis reveals that GDP is highly correlated with percent of non-state employment, ratio of migrant to residents, percent of associate's degree and residents' disposable income. Thus I construct a development scale using principal component

<sup>2</sup> Percent of non-state employment was obtained from China Data Online, provincial-level statistics.

<sup>3</sup> The provincial-level migration volume was obtained from Liang (2004). The size of resident population was obtained from China Data Online, provincial-level statistics.

<sup>4</sup> Percent of associate's degree of higher was calculated from micro-level census data.

<sup>5</sup> Residents' disposable income was obtained from China Data Online, provincial-level statistics.

<sup>6</sup> Unemployment rate was obtained from China Labor Year Statistics 2001.

analysis. (See Appendix for details.) It is a statistical technique that reduces the dimensionality of a dataset consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the dataset (Jolliffe 2002). The results suggest that one principal component is sufficient. Thus, I use the constructed development scale to represent a province's level of socioeconomic development.

### **3.2.4 Analytical Strategy**

**Latent class analysis.** Based on the timing and sequencing of statuses, 268,435,456  $[(24)^7]$  different pathways are possible. To establish a parsimonious number, I subjected the age-status matrices for each respondent to a latent class cluster analysis, which assumes each respondent belongs to one and only one latent class (Clogg 1995; Magidson and Vermunt 2004). This method has been used in several recent studies to identify family formation and pathways to adulthood in the United States (Amato et al. 2008; Fomby and Bosick 2013; Macmillan and Copher 2005; Macmillan and Eliason 2003; Oesterle et al. 2010; Sandefur, Eggerling-Boeck and Park 2005) and South Africa (Goldberg 2013).

Because our data are sparse in the cross-classification of statuses over time, I adopt a two-staged latent class model (Macmillan and Copher 2005; Macmillan and Eliason 2003) to construct family formation pathways. Basically, the first step constructs the latent clusters of status configurations at each age. Ages 18, 20, 22, 24, 26, 28, and 30 are selected as the ages of estimation. The second step uses these age-specific clusters to

construct the family formation pathway. The two-stage latent class cluster analysis is conducted in LatentGold 4.5.

**Multi-level logistic regressions.** I apply multi-level models to examine the likelihood of particular family formation pathways identified. Specifically, it is a random intercept model of individuals clustered within provinces. The level-1 predictors include individual-level variables. The equation for level-1 is:

$$\eta_{ij} = \beta_{0j} + \beta_x(\text{individual-level variables}) + \gamma_{ij}$$

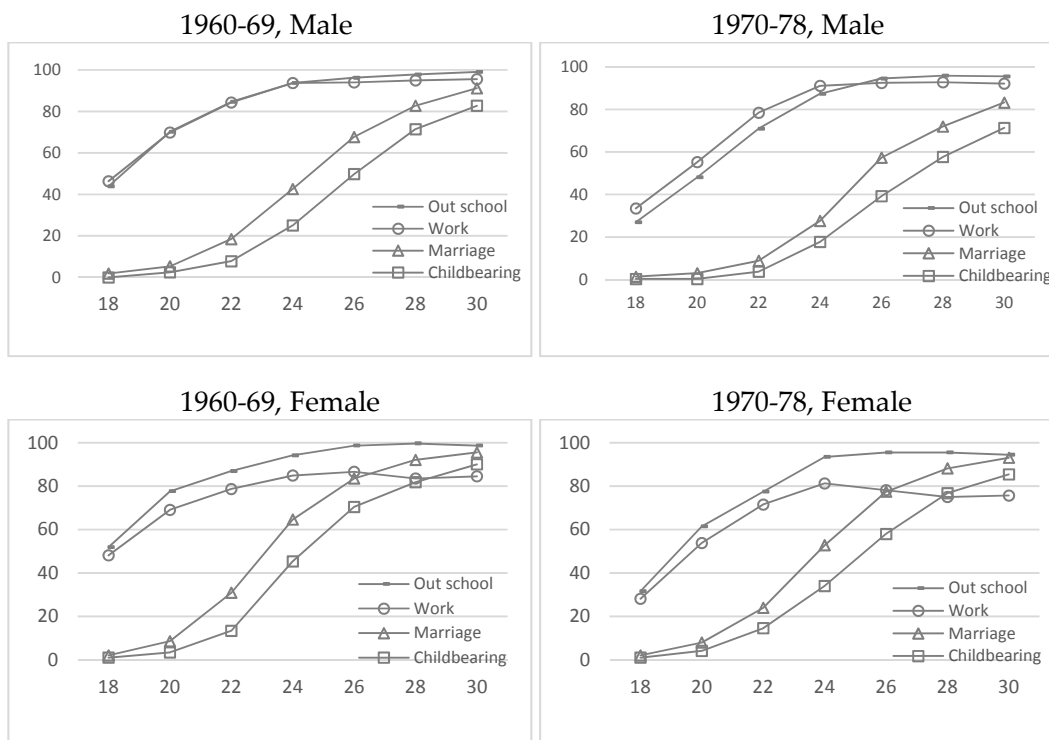
The level-2 predictors include provincial-level variables. The level-2 equation to model intercept is:

$$\beta_{0j} = \gamma_{00} + \gamma_{0x}(\text{provincial-level variables}) + u_{0j}$$

In this model, each individual's likelihood of particular pathways to adulthood identified is composed of three elements: the overall mean ( $\gamma_{00}$ ), the deviation of cluster mean from overall mean ( $u_{0j}$ ), and the deviation of an individual's likelihood from his/her cluster mean ( $\gamma_{ij}$ ). The value of  $u_{0j}$  is assumed to be randomly varies across provinces with a mean of zero and a variance of  $\tau_{00}$ .  $\gamma_{0x}$  represents the unit change in the predicted value of the intercept per unit of change in the provincial-level variables. In the analysis, I first estimate an unconditional model with only a random effect ( $u_{0j}$ ), and then add level-1 and level-2 variables.

### 3.3 Results

#### 3.3.1 Family Formation Pathways



**Figure 4: Proportion of young adults occupying various statuses by age, gender, and cohort**

Figure 4 presents the proportion of women and men who occupied each status (i.e., out of school, employed, married, or parenthood) at each age, separated by cohorts. Men who were born between 1970 and 1978, compared to their counterparts who were born between 1960-69, stayed in school longer and delayed family formation. At age 20, about 70% of men who were born in the 1960s were out of school, and the percentage dropped to less than 60% for those who were born in the 1970s. At age 26, about 70% of men who were born in the 1960s were married and about 50% of them had the first

child. In contrast, less than 60% of men who were born in the 1970s were married and less than 40% of them had the first child at the same age.

Women had a lower proportion of employment and a higher proportion of family transition than men at all ages; at age 26, about 80% of women in both cohorts were employed and married, and more than 60% had the first child. Relative to men, women show less discernable cohort difference in each age-specific status distribution. Age 30 marks the completion of transitioning into each status for majority of men and women in these two cohorts. At age 30, over 90% of men were out of school and employed, 80% were married, and over 70% had the first child; over 90% of women were out of school, married and had the first child, and over 80% were employed.

The numbers shown in Figure 4 represent group averages rather than actual pathways. To calculate the actual pathways, I use latent class clusters models. Specifically, I specify models with 1 to 6 latent classes and relied on three methods to determine the optimal solution (Table 7). The model L2 statistics indicates the amount of the association among the variables that remains unexplained after estimation; the lower the value, the better model fit to the data. The L2 statistics declines continuously from 1 to 6 classes. One criterion to determine the number of clusters is to look in the 'p-value' column which provides the p-value for each model under the assumption that the L2 statistics follows a chi-square distribution. Generally, among models for which the p-value is greater than .05, the one that is most parsimonious (i.e. largest degrees of

freedom) would be selected. These results indicate that the number with the best fit is four clusters for men and three clusters for women. The Bayesian Information Criterion (BIC), in which smaller value indicates better solutions, indicates five is the optimal number of classes for men and six for women. For women, the BIC difference between six classes and five classes is less than 3, which is generally considered as an insignificant improvement. Therefore, I consider the optimal number as five clusters for both men and women. The last criterion is a bootstrap likelihood ratio test, which compares a given model with a model with one fewer class. Results indicate that the five-class model provides a significant better fit than the four-class model (men: likelihood ratio = 69.123,  $p < .001$ ; women: likelihood ratio = 67.759,  $p < .001$ ). On the basis of the three tests, I retain the five-class solution for both men and women for further analysis.

I assign cases to the pathway in which they held the highest probability of membership. The results for men are shown in Figure 5 and the results for women are shown in Figure 6. Men and women in Pathway 1 (men: 28.8%; women: 19.0%) transition out of school and into workforce fairly quickly. By age 22 for men and 20 for women, virtually all people in this class are out of school and in the workforce. Both men and women in this class also have an early family transition. For men in this class, the probability of marriage reaches almost 100% by age 24. The probability of childbearing takes off at a slower rate than marriage. The probability of childbearing is

60% at 24 and reaches 100% at age 30. Women in this class, relative to men, had a closer connection between marriage and childbearing. By age 22, over 90% are married and almost 80% have the first child. By age 24, virtually everyone women in this class complete family transition. I refer to this pathway as *early starters*.

**Table 7: Fit statistics for latent pathways for young adult men and women, both cohorts combined.**

Latent Classes	L <sup>2</sup>	df	p-value	BIC
<i>Men</i>				
I	1177.8966	278	0.00	3942.2960
II	546.3730	268	0.00	3370.9201
III	317.7420	258	0.01	3202.4367
IV	174.3568	248	1.00	3119.1992
V	105.2331	238	1.00	3110.2233
VI	63.1635	228	1.00	3128.3013
<i>Women</i>				
I	1115.9263	386	0.00	3856.5798
II	561.5102	375	0.00	3367.9492
III	354.4619	364	0.63	3226.6864
IV	198.9345	353	1.00	3136.9445
V	131.1757	342	1.00	3134.9712
VI	68.7216	331	1.00	3138.3027

Pathway 2 (men: 30.5%; women: 24.2%) shows a slower transition out of school and into workforce and a slower family transition. Men and women in Pathway 2 tend to stay in school until age 22, which corresponds to the timing of college completion. With regard to family formation, at age 24, whereas virtually all men in pathway 1 have married, only 25% of men are married. The marriage transition is fairly swift. The probability of marriage increased to 80% by age 26 and almost 100% by age 28. By age



30, virtually every man in this pathway has the first child. Women in Pathway 2, compared to men, have an overall lower probability of employment and a faster transition into marriage and childbearing. Over 90% of women are out of school by age 24, but the probability of employment remains around 80% between age 24 and age 30. The probability of marriage reaches 50% at age 24, 80% at age 26, and almost 100% at age 28. Childbearing progresses at a slower rate, but by age 28, almost every woman in Pathway 2 has the first child. Because the median age at marriage in urban China in the 2000s is 27 for men and 25 for women (Han 2010), people in this pathway make the family transition on time. Therefore, I refer to this pathway as *higher-educated normatives*.

Pathway 3 (Men: 17.9%; Women: 29.8%) differs from Pathway 2 with faster transitions out of school and into the labor force. The probability of employment reaches over 90% at age 22, but slightly dropped at age 24 and after. For men in this pathway, the probabilities of marriage and childbearing are close to zero by age 24. By age 30, almost all men in this group are married and have the first child. Women in this pathway transition into marriage and childbearing earlier than men. At age 20, virtually no women are married or have the first child; at age 26, almost every woman in this pathway completes family transition. I refer to this pathway as *lower-educated normatives*.

Pathway 4 (Men: 14.2% ; Women: 8.5%) is distinguished by delayed family transition. The school-work transition in this pathway is similar to that of Pathway 2, with the probability of employment at age 24 being 90% for men and 80% for women.

Respondents in this pathway have much slower transitions into marriage and childbearing. Men's family formation takes off slowly at age 26. By age 30, slightly 50% of men are married and 30% have the first child. Women in this pathway transitions into marriage faster than men, with the probability of marriage being over 40% at age 26 and almost 80% at age 30. The marriage transitions, however, are not proximate to the transition into parenthood. The probability of childbearing remains close to zero at age 28, and reaches slightly under 60% at age 30. I refer to this pathway as *higher-educated slow starters*.

Pathway 5 (Men: 8.6%; Women: 15.6%) also delays the family transition, but has a relatively early education-work transition. Over 90% of men and women in this pathway leave school and are in the labor force at age 22. The probabilities of men's marriage and childbearing are under 10% at age 26. At age 30, 60% of men are married and slightly under 40% have the first child. In contrast, 60% of women in this group are married at age 26, and over 80% are married at age 30. The probability of childbearing, on the other hand, remains under 10% at age 26, and reaches about 70% at age 30. I refer to this pathway as *lower-educated slow starters*.

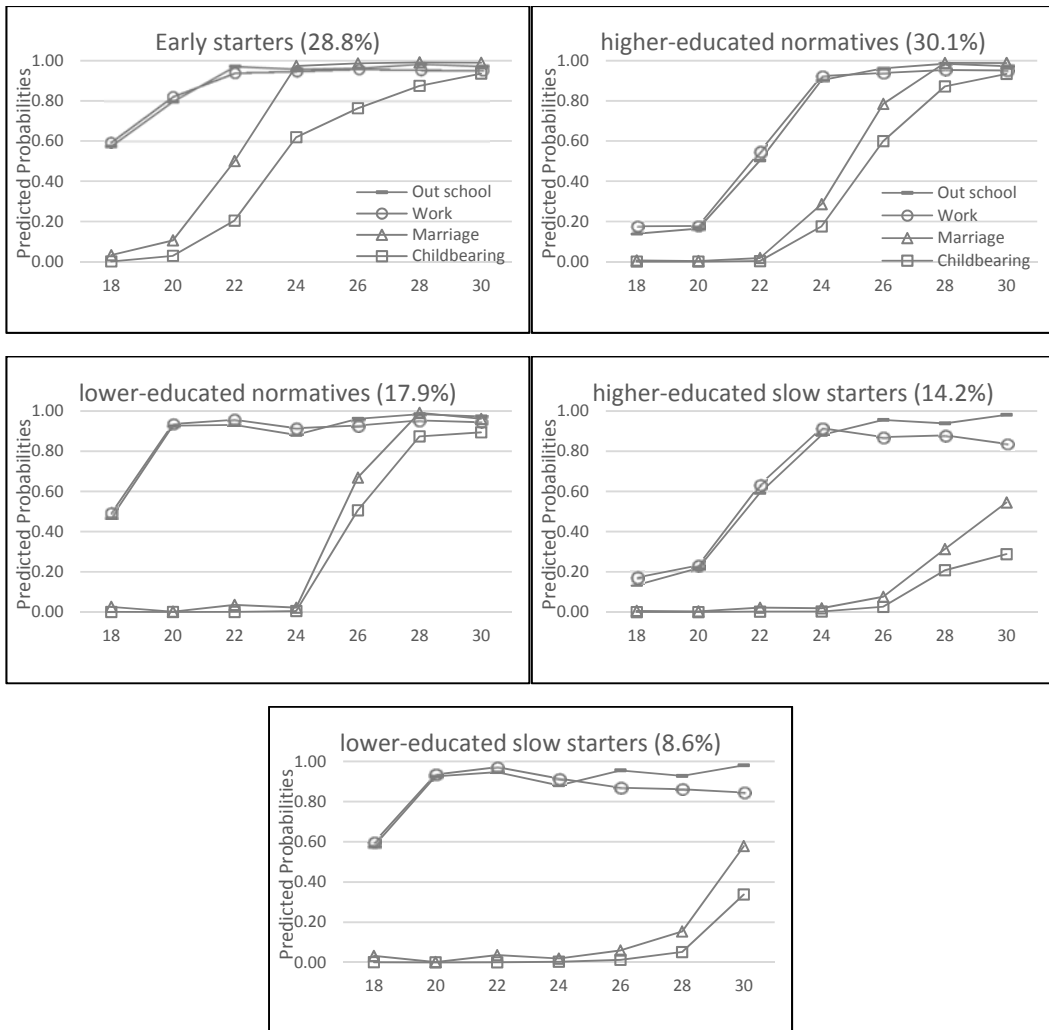
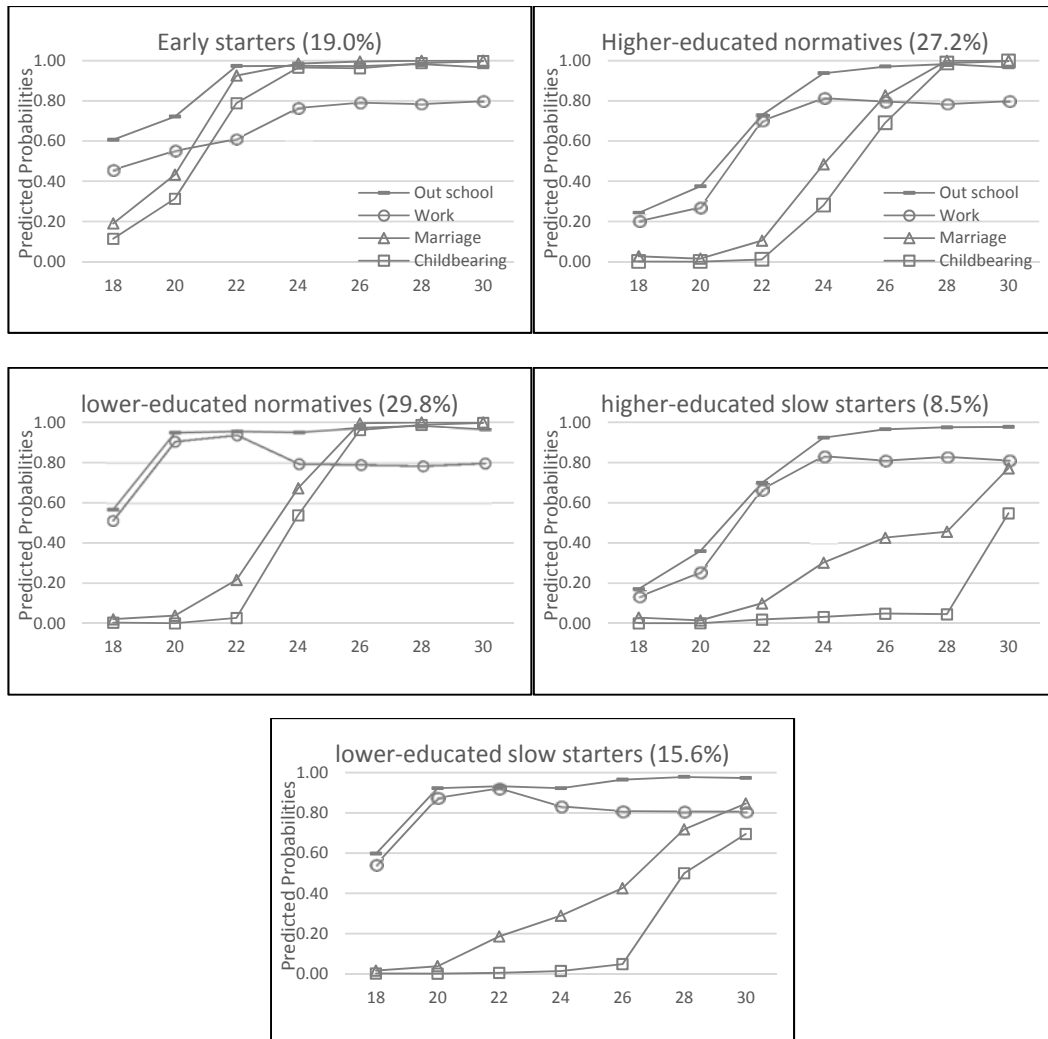


Figure 5: Latent family formation pathways for young adult men.

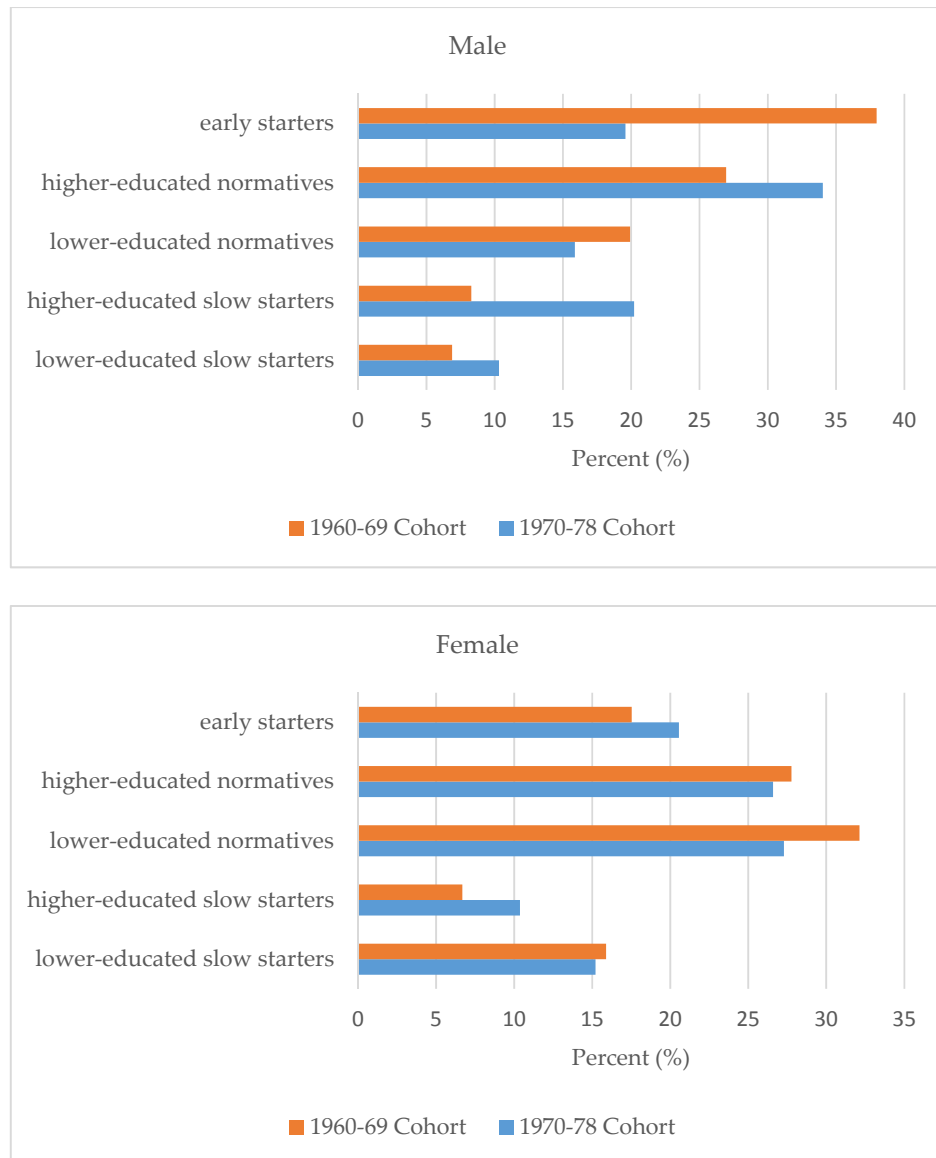


**Figure 6: Latent family formation pathways for young adult women.**

Figure 7 displays the distributions of five pathways by gender and cohort. The greatest difference is observable in the family formation pattern for men. Men who were born in the 1970s, compared to those who were born in the 1960s, were much less likely to be early starters, and much more likely to be higher-educated slower starters. The percentage of early starters drops from over 35% in the 1960s cohort to less than 20% in the 1970s cohort, while the percentage of higher-educated slower starters doubles. No

cohort difference is obvious for women. The early starters in fact slightly increase.

Though women in the 1970s cohort are more likely to be higher-educated slow starters than those in the 1960s cohort, the increase is less than 5%.



**Figure 7: Distribution of family formation pathways by gender and cohort.**

The latent class analysis clearly shows the family formation pathway in urban China still occurs in an ordered fashion: marriage still occurs after school completion and employment, and childbearing still occurs after marriage. The major family change is the postponement of marriage and childbearing. Table 8 contrasts the percentage of slower starters (both higher-educated and lower-educated) with early starters and normatives. The proportion of male slower starters doubles, from 15% in the 1960s cohort to 31% in the 1970s cohort. In contrast, female slower starters remain around 25% in both cohorts. I thus model the spatial patterns of the likelihood of slower starters in the next section.

**Table 8: Weighted percentage of slow starters by gender and cohort.**

Cluster	Pathway	Men		Women	
		1960-69	1970-78	1960-69	1970-78
1,2,3	Early starters/regulars	84.84	69.47	77.43	74.42
4,5	Slow starters	15.16	30.53	22.57	25.58
	N. Obs	319	293	291	288

### 3.3.2 Multi-Level Results

I use multilevel logistic regressions to predict the likelihood of slow starters across provinces. Table 9 reports the coefficients for men and Table 10 reports the coefficients for women. Model 1 is a fully unconditional model which contains no explanatory variables. It indicates that the average proportion of slower starters and variations between provinces. The estimate of the intercept indicates that, on average, 24% [ $e^{-1.31}/(1+e^{-1.31})$ ] of men and 27.2% [ $e^{-.983}/(1+e^{-.983})$ ] of women postpone family

formation. The variations between provinces is larger for men (.440) than for women (.300).

Model 2 adds individual-level family background variables. Men born in the 1970s has 1.19 higher ( $e^{.751}-1$ ) odds than men born in the 1960s to be slower starters. I also examined if the cohort difference varies by provinces, but the results are not statistically significant (results upon request). No cohort differences are found for women. Most family background variables do not make a difference, either. One substantial difference is by whether or not a respondent lived in rural area at age 14. Relative to those living in urban area as teenagers, men and women living in the rural area at age 14 have 57.5% ( $1-e^{-.874}$ ) and 58.3% ( $1-e^{-.856}$ ) lower odds of delaying family formation, respectively.

Model 3 tests the development perspective (hypothesis 1). To support this hypothesis, I would expect that the coefficients of the development scale and the unemployment rate to be statistically significant, and, adding these variables reduces the between-province variations. They are not. The coefficients for both variables are small and insignificant. I also examine the six economic development variables separately, but none of them is statistically significant (results upon request). The between-province variations in fact slightly increase, from .517 to .574 for men and from .233 to .247 for women. Thus, these indicators of socioeconomic development do not explain between-province variations in the likelihood of delaying family formation. Our results do not support the development perspective.

**Table 9: Coefficients from multi-level logistic regressions predicting men's likelihood of being slow starters, N=612.**

	Model1	Model2	Model3	Model4	Model5
	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)
Intercept	-1.13** (.18)	-1.91** (.50)	-1.91** (.68)	-2.20** (.51)	-2.68** (.71)
Cohort (ref: 1960-69)		.751* (.21)	1.02* (.46)	.817** (.74)	.986* (.41)
Living in city		.695+ (.36)	.707* (.36)	.744* (.35)	.703* (.35)
<i>Family Background at age 14</i>					
Lived in rural area		-.874** (.30)	-.884** (.30)	-.854** (.30)	-.872** (.30)
Mother's years of schooling		.045+ (.03)	.045+ (.03)	.043+ (.03)	.044+ (.03)
Father in lower occupation		-.289 (.24)	-.289 (.25)	-.306 (.24)	-.309 (.24)
Father in state-owned		-.244 (.32)	-.237 (.25)	-.241 (.32)	-.239 (.32)
Father is CCP member		-.336 (.25)	-.331 (.25)	-.337 (.25)	-.314 (.25)
<i>Provincial-level variables</i>					
Development scale			-.065 (.10)		-.066 (.08)
Unemployment rate			-.049 (.18)		.127 (.17)
FDI performance				.265* (.11)	.332** (.12)
Province $\sigma^2$ intercept	.440	.517	.574	.348	.292
Number of Observations	612	612	612	612	612

two sided test. + p<.01; \* p<.05; \*\* p<.01.

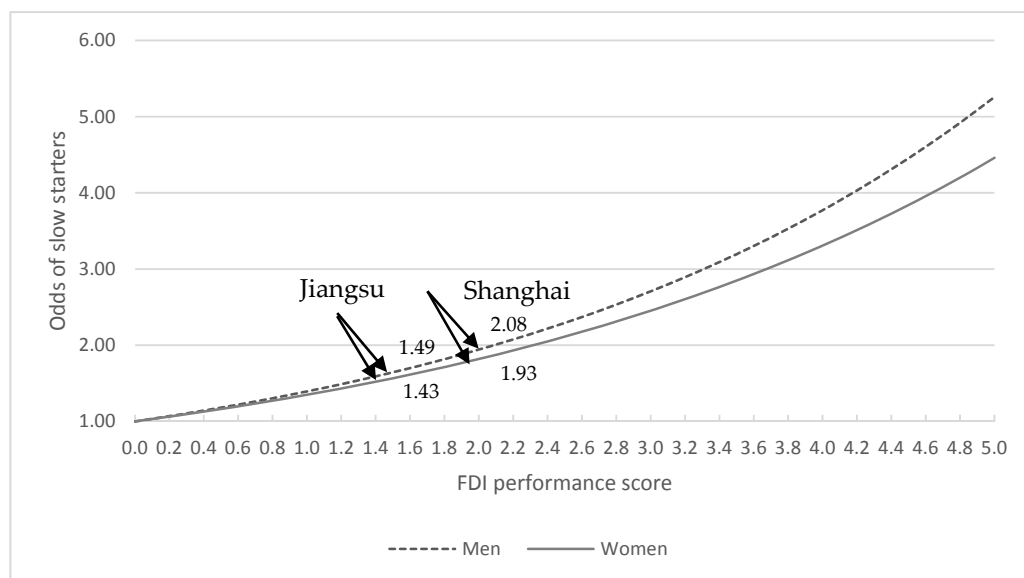


**Table 10: Coefficients from multi-level logistic regressions predicting women's likelihood of being slow starters, N=579.**

	Model1	Model2	Model3	Model4	Model5
	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)
Intercept	-1.983** (.12)	-1.03** (.44)	-1.21** (.56)	-1.49** (.47)	-2.13** (.61)
Cohort (ref: 1960-69)		.313 (.20)	.270 (.37)	.406* (.21)	.632+ (.37)
Living in city		.364 (.30)	.356 (.30)	.475 (.30)	.430 (.30)
<i>Family Background at age 14</i>					
Lived in rural area		-.856** (.26)	-.878** (.26)	-.748** (.26)	-.795** (.26)
Mother's years of schooling		.016 (.03)	.016 (.03)	.016 (.03)	.016 (.03)
Father in lower occupation		-.346 (.22)	-.340 (.23)	-.361 (.22)	-.364 (.22)
Father in state-owned		-.161 (.29)	-.217 (.29)	-.067 (.30)	-.131 (.29)
Father is CCP member		-.084 (.24)	-.072 (.24)	-.056 (.24)	-.037 (.24)
<i>Provincial-level variables</i>					
Development scale			-.005 (.08)		-.094 (.08)
Unemployment rate			.084 (.15)		.189 (.15)
FDI performance				.222** (.07)	.299** (.08)
Province $\sigma^2$ intercept	.300	.233	.247	.000	.000
Number of Observations	579	579	579	579	579

two sided test. + p<.01; \* p<.05; \*\* p<.01.

Models 4 and 5 test the diffusion perspective (hypothesis 2). In Model 4, FDI performance significantly increases both men’s and women’s likelihood of being slow starters. These associations are further strengthened in Model 5, after accounting for the development scale and unemployment rate. With a one unit increase of FDI performance score, men’s log odds of being slower starters increases .332, and women’s log odds increases .299. To put this association into perspective, I plot in Figure 8 the odds of delaying family formation by the levels of FDI performance. After accounting for other factors, men and women in Shanghai (average FDI performance = 2.2) have an odds of 2.08 and 1.93 to be slow starters, respectively. In Jiangsu (average FDI performance = 1.2), an adjacent province of Shanghai, the odds are 1.49 for men and 1.43 for women.



**Figure 8: Predicted odds of slow starters by the levels of FDI performance, based on estimates from Model 5, Table 9 and 10.**

FDI performance also explains the variations between provinces. For men, adding FDI performance reduces the between-province variation from .574 (Model 3, Table 9) to .292 (Model 5, Table 9), a 47.5% decline. For women, adding FDI performance explains away the between-province variation, dropping from .247 (Model 3, Table 10) to .000 (Model 5, Table 10). Hence, our results provide more support the diffusion hypothesis.

### **3.4 Discussion and Conclusion**

Since the 1960s, several profound family changes have occurred in Western Europe and the United States. These family changes, often labeled as the second demographic transition (Lesthaghe 1983, van de Kaa 1987), include below-replacement fertility, postponement of marriage and childbearing, non-marital cohabitation, and a disconnection between marriage and birth. Lesthaeghe (2010) reports that these new family forms have more recently emerged in non-Western settings, such as Central and Eastern Europe and East Asia. Research on the spread of the second demographic transition gives rise to two contending schools of thought. The development perspective predicts socioeconomic development increases material conditions and thus brings family change. The diffusion perspective, on the other hands, emphasizes the independent role played by Western family ideologies.

Much of the debate on the second demographic transition focuses within Western societies. I conduct our analysis in reform-era urban China, a non-Western

setting with a strong traditional family system. The results find early signs of the second demographic transition. While the family formation pathway is still very ordered, urban men are increasingly likely to postpone marriage and childbearing. The postponement is not quite significant for urban women. The results may provide some support for the convergence of second demographic transition (Lesthaeghe 2010), but it is more in line with the story of path dependence.

Furthermore, I use multi-level data to empirically examine the development and diffusion perspectives. The debate between development and diffusion theories on the demographic transition has a long history in social demography. Most research examines the transition at the same level of analysis (either at macro-level or micro-level) Arguably, however, while development or diffusion tends to work at a societal or regional level, individual family behaviors operate at an individual level (Liefbroer and Toulemon 2010). I address this issue by making use of China's spatial (provincial) variation in the levels of economic development and in interactions with world markets by merging individual-level data with provincial-level economic variables, and applying multi-level models to disentangle the role of development and diffusion on the postponement of family formation. Our results suggest that provinces with higher levels of FDI inflows tend to have a greater likelihood of delaying family formation. The levels of economic development, on the other hand, do not make a difference. Our results thus support the diffusion perspective.

Future research can benefit by addressing some limitations in this analysis. First, I examine whether provinces with greater access to global markets tend to have greater likelihood of delaying family formation, I do not directly test for the spatial variations of the diffusion of Western family ideologies. This is a data limitation. The next step is to collect individual-level or provincial-level attitudes toward Western family ideologies to directly test the influence of these ideas.

Second, the focus of this study is the timing and sequencing of marriage and childbearing. The other features of second demographic transition, for example, non-marital cohabitation, are not covered. However, with limited information on cohabitation, I cannot address it in our data. Some research suggests that premarital cohabitation is on the rise in urban China (Yeung and Hu 2013). Better data are needed to investigate the other features of second demographic transition.

Third, future study should further explore the mechanisms of cultural diffusion. Coale's ready-willing-able theory identifies that both "knowing" and "legitimatizing" the new family forms are necessary to produce family change (Coale 1973). The positive association between FDI inflow and family formation postponement in our results suggests the importance of "knowing." With regard to legitimization, social networks can be meaningful. Bongaarts and Watkins (1996) suggest that daily interactions between social network members about information on and ideas of new family forms can be crucial. Rindfuss et al. (2004) demonstrate that, in Japan, knowing network

members who adopt new family forms significantly increases one's likelihood of accepting, or at least tolerating, new family behaviors. Future research can further this line of research to explore how the family formation postponement is legitimized in China.

Christine Bachrach, in her 2013 presidential address of Population Association of America, describes the long-held relationship between culture and demography as reluctant bedfellows, "like strangers forced to share a room at an inn, they have a necessary but uncomfortable relationship." (Bachrach forthcoming: 2). She advocates making them "committed partners". This article responds to her calling, by proving cultural diffusion is independent and critical for family change in a non-Western context.

## **4. Chapter 3: Social Networks and First Job Search in Urban China, 1986-2008**

Sociologists have long recognized the importance of social networks in finding jobs. Personal networks help job seekers find better jobs faster (for a review, see Marsden and Gorman 2001). Tie strength also matters. Weak ties have advantages over strong ties in the job search, because the former are likely to provide new information outside job seekers' social circles (Burt 2007; Granovetter 1973), and help job seekers to connect with persons of different socioeconomic statuses (Lin 1990; Lin 2001). More recent work, however, has found that the benefits of social networks, particularly those with weak ties, depend on the institutional contexts in which job seekers are embedded (Chua 2011; de Graaf and Flap 1988; Korpi 2001; Murray, Rankin and Magill 1981; Smith 2005; Wegener 1991). In general, economic actors are not only embedded in a web of social relationships, but also in a set of social and economic institutions (Baker and Faulkner 2009; McDonald, Benton and Warner 2012).

Most comparative studies examine established market economies (for reviews, see Granovetter [1974] 1995; Lin 1999; Marsden and Gorman 2001). However, established market economies may not provide the best contexts to study institutional influence, because these relatively stable labor market contexts offer limited opportunities to anticipate substantial changes in the use of social networks. Only a few studies explore the pattern of network use in non-market or emerging market contexts

(e.g., Bian 1997; Gerber and Mayorova 2010; Guseva and Rona-Tas 2001). Assessing network use in the labor market across various contexts should facilitate our knowledge of institutional influences on labor market outcomes. As such, the rapid transition from a redistributive to a market economy in post-socialist countries provides a unique opportunity to assess how institutional contexts shape network use in the labor market.

In this study, we examine the pattern of change in network-based job finding in urban China between 1986 and 2008. This 22-year period brought dramatic institutional change to the Chinese labor market. The centralized job-assignment system was abandoned and replaced with a labor market that matches employees with employers directly. Previous scholarship offers three hypotheses of how the market reform will affect the pattern of network use: that network use will decline, follow an inverted-U shape, or persist. Our goal is to scrutinize these competing predictions empirically. Using pooled data from three network surveys, we examine changes in general network use and changes in the use of strong ties. The attention on strong ties follows Bian (1997), who finds that strong ties are more beneficial than weak ties in finding jobs in a job-assignment system. To our knowledge, we provide the most comprehensive assessment of the longitudinal pattern of network-based job finding in a transitional economy.



## ***4.1 Theory and Hypotheses***

### **4.1.1 Social Networks, Tie Strength and Institutional Contexts**

Baker and Faulkner (2009) contend that economic actors are double embedded, in that they are embedded in a web of social relationships and in a set of economic and cultural institutions. Previous comparative research shows that institutional arrangements influence the opportunities and resources available for network-based economic actions (for a review, see McDonald, Benton and Warner 2012). For the purpose of this analysis, we concentrate on the difference between network-based job finding in the redistributive and market economies. The redistributive economy differs from the market economy in the distribution of goods and service. The redistributive economy distributes goods and services through centralized decision-making outside the market, while the market economy self-regulates (Polanyi 1957). This difference leads to distinctive patterns in the use of weak or strong ties to find jobs.

There is little systematic difference between market and redistributive economies in the prevalence of network-based job finding. In market economies, about 30-50% of jobs are found through social networks. In the United States, about half of the jobs are obtained through personal networks (Marsden and Gorman 2001). The prevalence of network use is about 47% in Netherlands (de Graaf and Flap 1988), 32% in the Federal Republic of Germany (Wegener 1991), 35% in Singapore (Chua 2011) and 47% in Sweden (Korpi 2001). A similar level of network use is reported in redistributive economies.

Völker and Flap (1999) report that about half of the jobs were found through personal networks in the German Democratic Republic during the early 1990s. During the late period of the Soviet Union, 33% of jobs in Russia were found through personal contacts (Gerber and Mayorova 2010). In pre-reform China, Bian (1994) shows that about 42% jobs were found through personal networks. However, Lin and Bian (1989) report a lower rate of about 23% for men and 14% for women for the same period.

A systematic difference exists in the efficacy of weak (strong) ties between the two economies. While weak ties have advantages over strong ties in market economies, strong ties are more useful for finding jobs in redistributive economies. Following Granovetter's pioneering work (Granovetter 1973; Granovetter [1974] 1995), a variety of studies based on the United States and other market economies find that weak ties lead to better jobs than strong ties do (Diaz, Green and Tigges 1999; Lin, Ensel and Vaughn 1981; Wegener 1991). In contrast, strong ties are more efficient for finding jobs in redistributive economies. In pre-reform China, Bian (1997) shows that strong ties were used more frequently than weak ties were to locate jobs. In the German Democratic Republic, Völker and Flap (1999) find that strong ties often lead to better jobs than weak ties did during the early 1990s.

Bian (1997) attributes the difference in network composition between the two economies to the differences in the job-matching process. In market economies, job candidates and employers are matched directly through market. Weak ties disseminate

non-redundant information about job openings, and thus facilitate searches for jobs with good fit (Granovetter 1973; Yakubovich 2005). In redistributive economies, however, jobs are collected and distributive through a centralized job-assignment system: the government matches employees with employers (Bian 1994). In the job-assignment system, the non-redundant information carried through weak ties is of little relevance to the job search, since job candidates cannot individually apply for positions. Strong ties with job-assignment authorities, however, exert influence on the job-assignment process and thus help the job seeker to obtain a desired job. In addition to influencing the job-assignment process, strong ties can also create a bridge for the job seeker who have no connections with job-assignment authorities. As Bian (1997: 375) described, “the ultimate helper [with decision power] was usually targeted first and search for the ‘right’ intermediary was planned accordingly.” This bridge is successful only if the relationships between the job-seeker and the intermediary, and between the intermediary and the ultimate helper, are close and entail reciprocal obligations (Lin 2002).

The transition from the redistributive economy toward the market economy poses a new question about the use of social networks in the labor market: When former redistributive economies replace their job-assignment systems with a less regulated labor market, how will the role of social networks, especially those with strong ties, in finding jobs change? The literature generally points to three hypotheses. Marketization

theory predicts that the use of networks to find jobs will decline during the market reform. Uncertainty theory predicts an inverted-U shape: the use of networks will increase as the labor market emerges and eventually decline as the labor market becomes institutionalized. Finally, cultural repertoire theory predicts that the pattern will persist, with no significant change.

#### **4.1.2 Marketization Theory**

Marketization theory assumes that the benefit of social networks is embedded in the redistributive economy (Gold 1985; Walder 1986). In a redistributive economy, resources are controlled by a central government and networks are necessary to “bypass officially sanctioned, and onerous, bureaucratic procedures, solicit protection from more powerful actors, and acquire otherwise unavailable resources.” (Chang 2011: 316).

During the job-assignment process, job-seekers and employers have incentives to build or maintain connections with authorities. Therefore, the rise of the market economy reduces network benefits in the labor market and thus leads to a decline in jobs found through networks. In the market economy, however, hiring decisions aim to maximize the firm’s profit (Nee 1989; Nee 1996). This change in the employer’s purpose can shift the hiring focus from networks to meritocracy (Guthrie 1998).

Consistent with marketization theory, some studies suggest that the importance of networks declines during market reform. In reform-era China, interviews with hiring managers in the late 1990s show that employers discredited networks as part of the

hiring evaluation (Guthrie 1998). Interviews with college students reveal that job-seekers do not perceive social networks as the best, the most effective, or even the most common way to secure jobs (Hanser 2002). Another interview study of job-seekers from a variety of educational backgrounds also suggests that, while personal contacts can be used to find state-related jobs, their effectiveness is limited in large, market-based firms (Huang 2008). In post-socialist Russia, Yakubovich (2005) finds that weak ties are more advantageous than strong ties to find jobs. Together, these studies suggest that, as the labor market replaces the centralized job-assignment system, the use of social networks to find jobs declines.

#### **4.1.3 Uncertainty Theory**

Uncertainty theory predicts that network-based job finding patterns will follow an inverted-U shape pattern over the course of the market reform. The transition from a centralized job-assignment system to an unregulated labor market generates a high degree of uncertainty regarding access to resources and information (Chang 2011; Xin and Pearce 1996). The emerging labor market is full of “institutional holes” (Bian 2002) – an early labor market stage without sufficient institutional support or regulation in the job-matching process. Without institutional support, employers and job seekers must rely on mutual trust to guarantee matching outcomes. As Bian (2002: 128) suggests, “[they] need a minimal level of trust about each other’s accountability before they sign a [labor] contract, and must be subject to obligation-binding measures to ensure that

contracted terms are fulfilled.” The level of uncertainty can be greatly reduced if the job is matched through personal networks (Cook 2005; Guseva and Rona-Tas 2001). Social networks – especially those with strong ties – facilitate trust and reciprocal obligation in the exchange between the two parties (Burt 2007). Therefore, networks are particularly valuable as the labor market emerges, but they are less useful when the labor market becomes institutionalized.

The initial increase in network use, as predicted by uncertainty theory, is supported by a number of studies. In China, Bian and Huang (2009) and Zhao (2012) find a sharp increase in jobs found through networks after the market reform in the 1990s. In post-Soviet Russia, Gerber and Mayorova (2010) document that the rate of network use grew by almost 20% immediately following the Soviet collapse and “shock therapy” reforms.

#### **4.1.4 Cultural Repertoire Theory**

Some scholars contend that the use of social networks, especially those with strong ties, persists during market reform. Personal contacts are deeply embedded in the social interactions of Chinese people (Hwang 1987; Yan 1996; Yang 1994). Social networks lubricate social interactions and give “the flow of many events a helping hand” (Zuo 1997: 69). Building and maintaining networks is critical to business success in China (Alngenberg 2008; Keister 2002; Yeung and Tung 1996). Sometimes, the network relationship, rather than the business transaction, is the purpose of social

interactions. In other words, “it is the relationship that is valued and must be maintained, not the value of the favored transaction per se, [thus] instrumental action becomes the means and guanxi [building] becomes the end” (Lin 2001b: 22). Thus, network-based job finding is hypothesized to persist, because it resists institutional changes in the job-matching process.

This cultural account is supported by the prevailing use of networks in other market-based countries in eastern Asia. Bian and Ang (1997) compare network use between pre-reform China and Singapore, two countries which share Confucian culture but differ significantly in their job-matching processes. Pre-reform China allocated jobs through a centralized job-assignment system, and Singapore allocates jobs through the labor market. In both societies, jobs are channeled through networks at a comparable rate. Ma, Huang and Shenka (2011) compare the role of tie strength in facilitating strategic management between the United States and Taiwan, which are both market economies but with different cultural traditions. Their results suggest that weak ties are crucial in the United States, and strong ties are critical in Taiwan. Lin, Fu and Chen (2013) conduct a cross-national comparison about social capital in China, Taiwan and the United States. They find that Taiwan is closer to China with regard to the access and mobilization of social capital, despite differences in their labor-market structures, and Taiwan differs from the United States, despite similarities in their labor-market

structures. Taken together, these comparative studies suggest that culture plays an important role in shaping network-based job search.

#### **4.1.5 Limitations of Past Research**

Despite a wave of research, disagreement exists over whether network-based job finding has declined, persisted, or followed an inverted-U shape during Chinese market reform. Indeed, empirical data support each of these seemingly contradictory hypotheses. These mixed findings must be interpreted with caution. The qualitative evidence is not generalizable, and it is “sensitive to when, where, in what sectors, and on what kinds of jobs the researchers conducted their studies” (Bian and Huang 2009: 259). The quantitative results, especially those in China, use regional samples with limited measures of networks. Nevertheless, because the evidence is relatively limited. These analyses require nuanced network measures, representative samples of a broader population, and a more extensive study period of the Chinese market reform.

Our study advances existing research in three ways. First, prior research focuses extensively on a single dichotomous measure of networks [whether or not use networks] and ignores the potential changes in network composition over time. Strong and weak ties carry distinctive resources (Obukhova 2012; Yakubovich 2005) that may benefit job seekers differently across different job-matching processes. Therefore, we use personal networks and three measures of strong ties to examine whether the pattern varies by absolute network use or shifts in network composition. Second, prior research uses

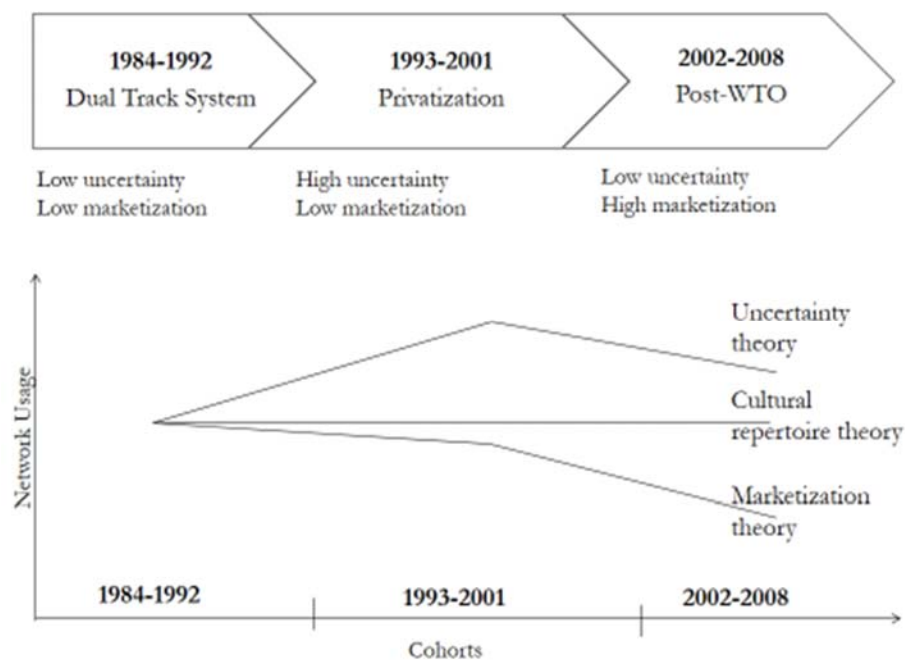


either convenient samples or small-scale regional samples, which impedes the generalizability of their results. In contrast, we combine three nationally representative surveys. Finally, the existing quantitative studies analyze the pattern of network use in the 1990s, before the Chinese labor market became institutionalized in the 2000s. Our sample examines the pattern of network use from 1984 to 2008 and thus covers an extensive period of market reform.

#### **4.1.6 Hypotheses**

To assess the three hypotheses, we compare the experience of three job cohorts. Those cohorts entered the labor market at different phases of the Chinese economic reform. Cohort comparison captures social change, as each cohort “makes fresh contacts with the contemporary social heritage and carries the impression of the encounter through life.” (Ryder 1965: 844). The 1984-1992 job cohort first entered the labor market during the dual-track system period (the dual-track cohort). The introduction of a less regulated market was cautious. The centralized job-assignment system dominated the job-matching process, as the labor market emerged (Bian 1994). The 1993-2001 job cohort entered the labor market during the rapid privatization period (the privatization cohort). In this period, the centralized job-assignment system was abandoned, but the job market was not fully institutionalized (Bramall 2009). This created a high level of uncertainty in the job-matching process. The uncertainty was exacerbated by massive layoffs and involuntary job shifts caused by rapid privatization of the state-owned enterprises

(Bramall 2009). The 2002-2008 cohort entered the labor market after China joined the World Trade Organization (WTO) in December 2001 (the post-WTO cohort). Joining the WTO indicated that China's labor market had reached an internationally recognized standard. In summary, the three cohorts entered labor markets at different levels of marketization and uncertainty (see Figure 9). The dual-track cohort faced a labor market with a lower level of marketization and a lower level of uncertainty; the privatization cohort faced a market with a lower level of marketization but a higher level of uncertainty; and the post-WTO cohort faced a labor market with a higher level of marketization but a lower level of uncertainty.



**Figure 9: Network usage across stages of Chinese market reform and hypotheses.**

Differentiating levels of marketization and uncertainty help to distinguish the patterns predicted by marketization theory, uncertainty theory, and cultural repertoire theory, respectively. Marketization theory predicts a negative association between network use and the level of marketization. Uncertainty theory predicts a positive relationship between network use and the level of uncertainty. Cultural repertoire theory predicts that network use does not associate with either marketization or uncertainty. Specifically, we expect that:

*H1a (marketization):* the probability of finding jobs through social networks changes little between the dual-track cohort and the privatization cohort, but it declines between the privatization cohort and the post-WTO cohort.

*H2a (uncertainty):* the probability of finding jobs through social networks increases between the dual-track cohort and the privatization cohort, but it declines between the privatization cohort and the post-WTO cohort.

*H3a (cultural repertoire):* the probability of finding jobs through social networks shows no significant difference among the dual-track cohort, the privatization cohort, and the post-WTO cohort.

Influence, trust, and obligations are often conveyed by strong ties (Obukhova 2012; Yakubovich 2005), so we expect the same mechanisms to apply to the trend in strong tie use. Specifically, we expect that:

*H1b (marketization)*: the probability of finding jobs through strong ties changes little between the dual-track cohort and the privatization cohort, but it declines between the privatization cohort and the post-WTO cohort.

*H2b (uncertainty)*: the probability of finding jobs through strong ties increases between the dual-track cohort and the privatization cohort, but it declines between the privatization cohort and the post-WTO cohort.

*H3b (cultural repertoire)*: the probability of finding jobs through strong ties shows no significant difference among the dual-track cohort, the privatization cohort, and the post-WTO cohort.

## **4.2 Data and Methods**

### **4.2.1 Data**

To answer these questions, we pool three surveys collected in urban China: the 1998 Labor Market and Social Mobility Survey (LMSM), the 2004 Survey of Social Capital (SSC), and the 2008 Chinese General Social Survey (CGSS). The LMSM is one of the few surveys collected in China in the 1990s. Although it is not nationally representative, it sampled a wide range of cities at different levels of economic development (Lin 2001). The SSC is a nationally representative survey of individuals living in urban areas (Lin, Fu and Chen 2013). This survey is longitudinal, and we use the first wave of its data. The CGSS is a nationally representative, repeated cross-sectional survey of Chinese non-institutionalized adults aged 18-69. The CGSS draws

separate urban and rural samples. We use the 2008 CGSS urban sample, which is the most recent wave that is publically available.

The questions about social networks are similar in the three surveys, so we can pool them to obtain a large sample that spans from the early stage of market reform to the later stage of a more institutionalized labor market. All of the surveys ask whether personal contacts were used to obtain the respondents' current job. They also asked about the respondent's relationship with the helper, such as they type of relationship, the level of intimacy, and the kind of assistance offered<sup>1</sup>. To our knowledge, the pooled data from these three surveys provide the most comprehensive network data for Chinese market reform period. An alternative to retrospective network data in urban China does not exist at this time.

We pose three restrictions on the analytic sample. First, we include only respondents who were employed at the time of the survey, because the LMSM did not collect network information on those outside the labor market. Second, we restrict the pooled sample to first-time job seekers to simplify age, period, and cohort associations in our analysis. Third, to limit the recall bias or sample selection for those who stay in first

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<sup>1</sup> This type of assistance question was not asked in the LMSM.

jobs for long periods, we restrict the pooled sample to respondents who stayed in their first jobs for fewer than 12 years<sup>2</sup>.

#### 4.2.2 Measuring Social Networks

**A dichotomous measure of networks.** In the LMSM, the respondents were asked, “During the process of getting your present job, did anyone help you? (yes/no)”. Respondents were coded 1 if someone helped them to get their jobs and 0 if no one helped. In both the SSC and CGSS, the respondents were asked, “During the process of getting your current job, how many people helped you? (Number\_\_\_\_)”. Respondents were coded 1 if they reported one or more helpers, and 0 if they reported zero helpers.

**Three measures of strong ties.** We measure strong ties in three ways: kinship, intimacy, and resource flow. Using three separate measures not only strengthens the robustness of our results, but also examines various aspects of tie strength. *Kinship* emphasizes the importance of familial ties in the Confucian tradition and in the daily interactions of Chinese people (Yang 1994). The survey questions are similar, but the response categories are different in the three surveys<sup>3</sup>. To reconcile these differences, we define strong ties as those in which the helper is a relative of the respondent (0 = no, 1 =

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<sup>2</sup> Logistic regressions of job tenure on network use show large and significant negative associations between job tenure and network use after 12 years in their first jobs. The associations are much smaller for people staying in their first jobs for 12 or fewer years.

<sup>3</sup> The LMSM included 24 different types of role relationships, which included 16 different types of relatives. The SSC asked whether the respondent was directly or indirectly related to the helper and, about relationship type (including 8 types of relatives and 20 other types) in each step of the network chain. The CGSS included 7 types of role relationships, of which relatives were listed as one category.

yes). *Intimacy* measures the closeness of a relationship, which is arguably the best indicator of tie strength (Marsden and Campbell 1984). All three surveys asked respondents to report how well they knew the helper, and the response categories are orderly arranged from “very close” to “not at all”. We define strong ties as networks that respondents defined as “very close.”<sup>4</sup> *Resource flow* measures the types of assistance that helpers offered to the job seeker. Strong ties often entail a sense of obligation and commitment, which encourages the helper to spend time, effort, and resources to influence the hiring process (Obukhova 2012; Yakubovich 2005). We include this measure to address the possibility that job seekers use the same networks for different purpose over time (Guthrie 2002). The SSC asked if the help was “information,” “influence,” or “both.” We code the variable as 1 if help was “influence” or “both” and as 0 if the help was “information”. The CGSS listed seven specific types of help offered by the helper. We follow Bian and Huang (2009) and code the variable as 1 if the helper delivered the application to the hiring organization; contacted “a relevant person” of the hiring organization; solved a problem leading to hiring at the organization; or provided financial aid. We code this as 0 if the helper gave information about a job opening, assisted in preparing the job application, or replied “Other” on the survey.

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<sup>4</sup> Only a few respondents reported that the relationship with their helpers was “not close” or “not at all.” Thus, our analysis contrasts “very close” relationships with “not very close” relationships.

### 4.2.3 Control Variables

**Sociodemographic characteristics.** Sociodemographic characteristics include gender, education, Communist Party membership, age at the time of first job, marital status, and geographical regions that may affect the access to social networks in job search. *Education* is found to be negatively associated with network use in job searching in urban China (Zang 2003). We measure education by years of schooling, which is recoded from the achieved highest level of education. We use the following methods to calculate years of schooling from levels of education: 0 = no schooling; 6 = primary school; 9 = junior high/junior-level vocational school; 12 = senior high/senior-level vocational school; 15 = associate's degree; 16 = bachelor's degree; and 19 = master's degree or higher. *Communist Party membership* (dummy, 1= yes; 0 = no) may be positively associated with network use in job searches, as party members are able to convert political power into social capital in terms of party-based contacts (Fong and Chen 2007; Rona-Tas 1994). We also include a continuous measure of age at first job, a dichotomous measure of *marital status* (dummy, 1= currently married; 0 = not currently married), and indicators of *geographical regions* (categorical, east and middle, relative to west).

**Employment characteristics.** Requirements associated with different employment contexts often affect the likelihood of network use. We focus on three job characteristics: occupation, ownership sector, and firm size. Networks have been found to be more heavily used among blue-collar workers and far less among those in



professional and managerial positions (Marsden and Gorman 2001). We classify occupation into five categories: managers, professionals, clerks, sales and service, and production workers. *Ownership sector* is found to be strongly associated with network use in China. Social networks, particularly those with strong ties, help to obtain state-sector jobs, but their roles are more limited in non-state sectors (Huang 2008; Zhao 2012). We follow Zhou, Tuma and Moen (1997) to classify ownership sector into three categories: government agencies (e.g., offices in the Communist Party and state bureaucracies, and nonprofit organizations in the public domain), state-owned firms (e.g., enterprises owned or sponsored by central or municipal governments), and market-based firms (e.g., privately-owned firms, foreign-owned firms, or hybrid firms). *Firm size* is found to be negatively associated with network use (Gerber and Mayorova 2010). We classify firm size into three levels: fewer than 100 employees, 100-499 employees, and more than 500 employees.

**Family characteristics.** Family characteristics are likely to affect network access. *Father's years of schooling* is measured as a continuous variable, recoded from the highest level of education that the father achieved: 0 = no schooling; 6 = primary school; 9 = junior high/junior-level vocational school; 12 = senior high/senior-level vocational school; 15 = associate's degree; 16 = bachelor's degree; and 19 = master's degree or higher. *Father's ownership sector* is measured in four categories: government agencies, state-owned enterprises, market-based firms, and not working. We also include a

dummy variable that indicates *whether the job seeker lived in an urban area at age 16* (1 = yes, 0 = no) as a proxy for household registration and migration status, as the LMSM did not ask these questions directly.

Table 11 reports the mean statistics of control variables by cohort. The results show a decline in jobs in state-owned enterprises and an increase in jobs in market-based firms over the course of market reform. There is also a growth of smaller firms (fewer than 100 people) over time. Though the average years of school slightly increases, an intergenerational comparison of years of schooling shows significant educational upgrading. While the fathers' years of schooling average fewer than 10 years, the respondents' years of schooling average more than 12 years. These findings are consistent with market transition theory (Nee 1989, 1996) and related empirical evidence (e.g., Bramall 2009).

#### **4.2.4 Missing Data**

All variables have less than 15% missing data (Table 11). The three variables with the highest percentage of missing data are the father's ownership sector (15%), the respondent's ownership sector (10%), and firm size (7%). The remaining variables have less than 7% missing data. Given our missing data are within the 10% - 30% range, we impute 20 datasets (Graham, Olchowski and Gilreath 2007) using `mi impute` in Stata 12/SE (College Station, Texas). Dependent variables are included in the imputation, but

the imputed cases are excluded during the analysis (von Hippel 2007). The imputation is done separately for men and women (von Hippel 2009).

**Table 11: Descriptives of control variables by cohort.**

	Dual-Track <sup>a</sup>	Privatization	Post-WTO	Total	Missing
Female	.589	.485	.515	.515	0
<i>Sociodemographic Characteristics</i>					
Years of Schooling	13.17	12.56	13.10	12.87	0.14%
CCP member	.209	.151	.160	.165	5.81%
Currently married	.838	.774	.383	.626	0
Age of first job	21.18	24.32	24.61	23.85	0
Geographic Region					0
East	.327	.443	.514	.448	
Middle	.268	.374	.285	.322	
West	.404	.186	.201	.230	
<i>Employment Characteristics</i>					
Occupation level					6.68%
Managers	.028	.039	.038	.036	
Professionals	.471	.322	.253	.324	
Clerks	.173	.185	.215	.193	
Sales/services	.126	.219	.289	.227	
Blue-collars	.202	.236	.206	.219	
Ownership Sector					9.99%
Government	.471	.388	.302	.372	
State-owned	.451	.275	.187	.275	
Market-based	.078	.338	.512	.353	
Firm Size					7.29%
<100	.399	.506	.588	.516	
100-499	.307	.247	.218	.248	
≥500	.293	.248	.194	.236	
<i>Family Characteristics</i>					
Father's schooling	9.21	8.91	9.54	9.19	3.44%
Father's ownership sector					14.65%
Government	.349	.236	.210	.247	
State-owned	.531	.419	.294	.395	
Market-based	.097	.296	.466	.321	

	Dual-Track <sup>a</sup>	Privatization	Post-WTO	Total	Missing
Not working	.022	.048	.029	.037	
In urban at 16	.783	.686	.647	.690	0.20%
Job tenure	9.38	6.43	1.83	5.31	0
<i>Surveys</i>					0
LMSM	.860	.169	0	.234	
SSC	.140	.627	.443	.471	
CGSS	0	.202	.557	.294	
Number of Cases	272	801	537	1,481	1,481

a. Job cohorts have 6.81% missing data.

## 4.2.5 Analytical Steps

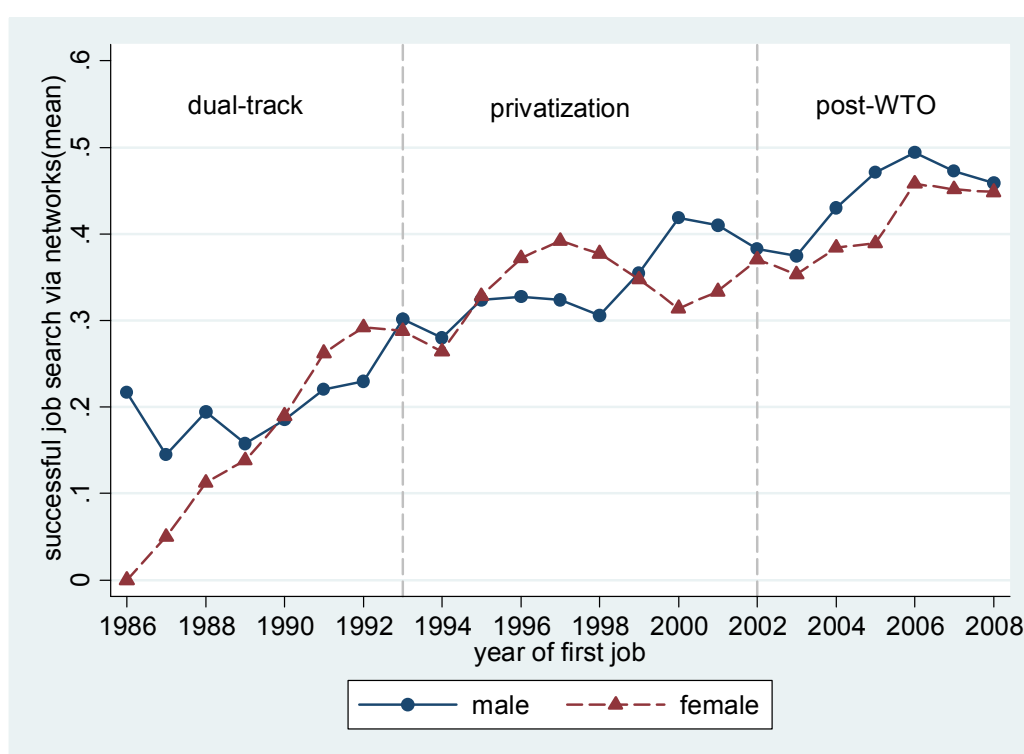
We begin by describing the changes in the use of personal networks to find first jobs in urban China between 1986 and 2008. Next, we employ logistic regressions to examine cohort differences in the probability of finding first jobs through social networks, controlling for sociodemographic, employment, and family characteristics. Finally, we use multinomial logistic regressions to examine cohort differences in the probability of finding first jobs through strong ties – measured by kinship, intimacy and resource flow – with not using networks as the reference category. All models control job tenure for recall errors and survey dummies for design variations.

## 4.3 Results

### 4.3.1 Finding First Jobs via Social Networks

Figure 10 plots the annual percentage of first jobs found via personal networks, smoothed by the three-year average. Since the market reform, there has been a steady increase in the proportion of first jobs obtained through personal networks. In 1986,

networks accounted for about 20% of first jobs. By 2008, roughly 45% of first jobs were found through networks, more than doubling in the twenty years of the reform. Our data confirm the findings reported by Bian and Huang (2009) and Zhao (2012) which are based on samples from earlier time points: the importance of social networks to locate jobs has grown since the Chinese market reform.



**Figure 10: Annual percentage of first jobs found through personal networks, 1986-2008. Three-year moving average.**

We then compare the likelihood of using networks for first jobs among the three cohorts. Table 12 presents the coefficients from logistic regressions. Model 1 examines the cohort difference without control variables, and Model 2 adds sociodemographic,

employment, and family characteristics. After accounting for these factors, the average log-odds of finding first jobs through networks, relative to the dual-track cohort, are 0.714 for the privatization cohort and 1.13 for the post-WTO cohort, corresponding to a predicted probability of 67.1% ( $e^{0.714}/(1+e^{0.714})$ ) and 75.6% ( $e^{1.13}/(1+e^{1.13})$ ) increases, respectively. Furthermore, the difference between the privatization and post-WTO cohorts is statistically significant at the 0.05 level. Model 3 adds interactions between gender and cohort to examine whether the pattern differs between men and women. Neither of the interactions is statistically different from zero. Together, these results suggest a steady increase in using networks to find first jobs in urban China over the course of reform. It partially supports the uncertainty theory (*H1b*), but fully rejects the marketization theory (*H1a*) and cultural repertoire theory (*H1c*).

These results are tentative, however. It is possible that the rise of network use for first-time job seekers is associated with a shift in network composition. For example, marketization theory is supported if the growth of absolute network use results from an increase in weak tie use and a decrease in strong tie use. Cultural repertoire theory is supported if the growth of absolute network usage results from an increase in weak tie use and a persistence of strong tie use. Therefore, it is important to look at the pattern of finding first jobs through strong ties.

**Table 12: Coefficients from logistic regression predicting a successful job search used personal networks, 1986-2008.**

	Model 1	Model 2	Model 3
Female	-.115 (.11)	-.115 (.12)	-.240 (.31)
Job cohort (ref=dual-track)			
Privatization	.731*** (.18)	.714*** (.20)	.602* (.27)
Post-WTO	1.04*** $\alpha$ (.25)	1.13*** $\alpha$ (.27)	1.09** $\alpha$ (.33)
Female*job cohort			
Female*rapid privatization			.212 (.35)
Female*post-WTO			.067 (.35)
Controls <sup>b</sup>	No	Yes	Yes
Number of Cases	1,481	1,481	1,481

Standard errors in parentheses.

+ p<.1, \* p<.05, \*\* p<.01, \*\*\* p<.001 (two-tailed test).

$\alpha$ : p<.05 for difference in the coefficients between rapid privatization and post-WTO.

b: controls include sociodemographic characteristics (e.g., gender, years of schooling, Communist Party membership, age at the time of first job, marital status, and geographical regions); employment characteristics (e.g., occupation, ownership sector, and firm size), and family characteristics (father's years of schooling, father's ownership sector, and whether the job-seeker lived in urban area at age 16).

### 4.3.2 Finding First Jobs via Strong Ties

Table 13 presents coefficients from multinomial logistic regressions of cohort differences in finding first jobs through strong ties. The results for kinship are presented in the first and second columns, the results for intimacy are presented in the third and fourth columns, and the results for resource flow are presented in the fifth and sixth columns. All models control for sociodemographic, employment, and family resources. The reference category is defined as not using any network. We also examine gender

and cohort interactions (results not shown), but none of them are statistically significant. All three measures show somewhat consistent patterns. A steady increase in the use of weak ties to find first jobs (e.g., non-relative or not very close) accounts primarily for the steady increase of absolute network use in Table 12. With regard to strong ties (e.g., relatives, very close, or influence), the log-odds of using strong ties to find first jobs increase between the dual-track cohort and the privatization cohort, but they are comparable between the privatization cohort and the post-WTO cohort.

To present the cohort difference in the probability of strong-tie use for first jobs, we plot the predicted probabilities (with 95% confidence intervals) of finding first jobs through strong (and weak ties) by cohort in Figure 11. All control variables are calculated at mean values. The predicted probabilities and confidence intervals are presented separately for the three cohorts in the kinship and intimacy measures, but only between the privatization and the post-WTO cohorts for the resource flow measure (LMSM did not collect this information).

Both the kinship and intimacy measures suggest an increase in strong-tie use during the early stage of the reform. With regard to kinship measure, the predicted probability of using relatives to find first jobs increases from 12% in the dual-track cohort to 18% in the privatization cohort. The point estimate (bar height) of the privatization cohort does not overlap with the upper confidence interval of the dual-track cohort, which suggests the difference is statistically significant at  $p < 0.05$



(Cumming and Fidler 2005). Similarly, with regard to the intimacy measure, the privatization cohort has 5% higher probabilities to find first jobs through very close ties than the dual-track cohort does. The pattern is consistent with the initial rise hypothesized in the uncertainty theory (*H2b*).

**Table 13: Coefficients from multinomial logistic regression models predicting a successful job search used strong or weak networks, compared to no networks, 1986-2008.**

	Kinship		Intimacy		Resource flow <sup>c</sup>	
	Relative	Non- relative	Very close	Not very close	Influence	Information
Job cohort (ref=dual-track)						
Privatization	.514* (.23)	.896* (.38)	.428+ (.22)	1.32** (.39)		
Post-WTO	1.002** <sup>α</sup> (.31)	1.41** <sup>α</sup> (.47)	.582+ (.31)	2.38*** <sup>α</sup> (.48)	-.082 (.23)	.634+ (.33)
Controls <sup>b</sup>	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs	1,422		1,460		1,072	

Standard errors in parentheses.

Reference category for all models is not using networks.

+  $p < .1$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$  (two-tailed test).

$\alpha$ :  $p < .05$  for difference in the coefficients between rapid privatization and post-WTO.

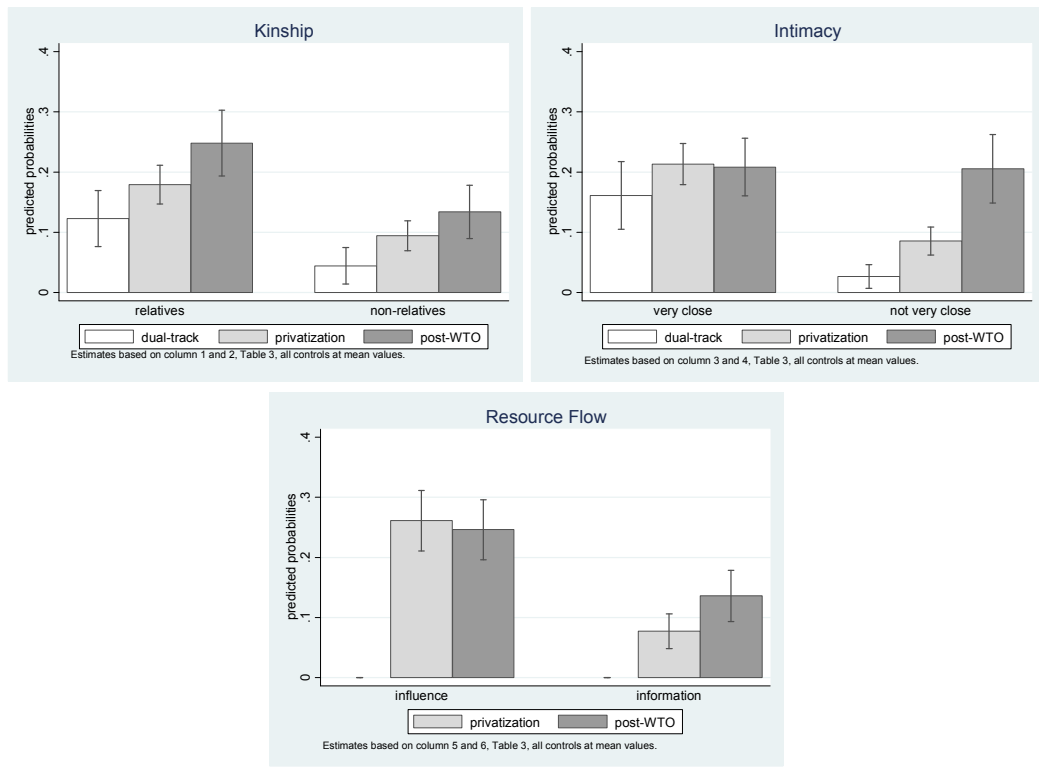
b: controls include sociodemographic characteristics (e.g., gender, years of schooling, Communist Party membership, age at the time of first job, marital status, and geographical regions); employment characteristics (e.g., occupation, ownership sector, and firm size), and family characteristics (father's years of schooling, father's ownership sector, and whether the job-seeker lived in urban area at age 16).

c: For resource flow measure, the reference cohort is privatization cohort.

The comparison between the privatization cohort and post-WTO cohort, however, rejects the uncertainty theory (*H2b*) prediction of a decline in strong-tie use. It supports the cultural repertoire theory (*H3b*) prediction of persistent strong-tie use. With

regard to the kinship measure, the predicted probability that the post-WTO cohort would use relatives to find first jobs is about 25%, which is significantly higher than the 18% for the privatization cohort. With regard to the intimacy measure, the predicted probability of using very close ties is comparable for the privatization and the post-WTO cohorts. The resource flow measure also shows a pattern of persistent use of influence networks for the privatization and post-WTO cohorts. Together, we conclude that the use of strong ties persists, even as the Chinese labor market becomes institutionalized.

Figure 11 also shows a steady increase across cohorts in the use of weak ties to find first jobs. This trend accounts primarily for the steady increase of absolute network use in the post-WTO cohort. With regard to kinship measure, the predicted probabilities of using non-relatives to find first jobs triples, from about 4% in the dual-track cohort to about 13% in the post-WTO cohort. With regard to the resource flow measure, the predicted probability of using networks purely for job information increases from about 8% in the privatization cohort to 14% in the post-WTO cohort. The sharpest increase is observed in the intimacy measure. The predicted probability of using not-very-close ties triples between the dual-track (3%) and privatization cohorts (9%), and more than doubled between the privatization cohort (9%) and the post-WTO cohort (21%). Although these three measures show different magnitudes of change, they suggest a consistent and steady increase in weak-tie use over the course of market reform.



**Figure 11: Predicted probabilities of finding the first job via networks, by tie strength.**

In summary, over the course of Chinese market reform, there is a steady increase in finding first jobs through social networks. Part of the increase can be explained by a steady increase in weak-tie use, but no evidence is apparent to show any decline in strong-tie use over time. In fact, the use of strong ties to find first jobs increases in the early stage of the reform and persists after the institutionalization of the Chinese labor market. Therefore, our results reject *H1a* and *H2a* from the marketization theory, and partially support *H2b* from the uncertainty theory and *H3b* from the cultural repertoire theory.

#### ***4.4 Discussion and Conclusion***

The transition from redistributive to market economies in former socialist countries provide a unique opportunity to examine how institutional contexts shape network-based job searches. We situate our study in reform-era urban China. This nation experienced rapid economic and industrial transitions over the past several decades. Our results indicate that, between 1986 and 2008, the probability of finding first jobs through personal networks consistently increased. Though part of the increase can be explained by a steady rise in the use of weak ties, the probability of using strong ties in first jobs increased initially and persisted afterwards. Therefore, results from both social networks and strong ties reject a steady decline, which is hypothesized in the marketization theory. Results from strong ties, on the other hand, partially support the uncertainty theory and the cultural repertoire theory. This pattern is consistent with the initial increase that is hypothesized in the uncertainty theory, and the persistence that is hypothesized in the cultural repertoire theory.

Future studies can benefit from addressing the limitations of this analysis. First, our data rely on respondents' memories of their first-time job search experiences. Although people can correctly report employment events and job characteristics (Paull 2002), they may forget contacts of unfamiliar people in the distant past (Bell, Belli-McQueen and Haider 2007). We tried to address this concern by restricting the sample to people who remained in jobs for 12 or fewer years and by controlling for job tenure in

the regressions. Future longitudinal data with prospective measures of job searches can assess the biases of retrospective measures in the Chinese context. Second, to construct job cohorts, our analysis is restricted to individuals staying in first jobs. This may not be a major issue in our analysis, since the majority of urban residents in the dual-track cohort never changed jobs. However, because social networks increase the rate of job mobility in urban China (Knight and Yueh 2004), we may potentially underestimate network use in privatization and post-WTO cohorts and thus underestimate the actual increase in network use over time. To address this selection bias, future research can collect longitudinal data from multiple job cohorts to increase the precision of the results. Third, our analysis clearly documents the pattern of change in finding first jobs through personal networks and strong ties over time, but our data do not allow us to examine the mechanisms behind these changes. It may be the changes in job seekers' motivations, access, or mobilization of social networks (Lin 2001) that leads to the observed pattern. Future research with more detailed measures may define these mechanisms.

Our study contributes to the broader literature on the interplay between network-based economic behaviors and institutional arrangements. By tracing the pattern of network-based job searches over the course of Chinese economic reform, our analysis demonstrates that macro-level institutional arrangements are not sufficient to influence economic actions. Instead, local market conditions and local cultural

repertoires play an important role in filtering the institutional influence on labor market outcomes. Future research should continue to unpack the interplay among macro-level institutional arrangement, local market conditions and cultural repertoires to clarify how personal networks affect labor market outcomes.

## Appendix A

Distribution of age-specific status combinations by gender, hukou and year.

Male urban residents, 1982

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.12	0.00	0.65	0.00	0.23	0.00	0.00	0.00	2044
19	0.07	0.00	0.75	0.01	0.17	0.00	0.00	0.00	2353
20	0.05	0.00	0.78	0.02	0.15	0.00	0.00	0.00	1270
21	0.04	0.00	0.85	0.04	0.07	0.00	0.00	0.00	1137
22	0.03	0.00	0.81	0.11	0.06	0.00	0.00	0.00	1505
23	0.02	0.00	0.74	0.21	0.03	0.00	0.00	0.00	1331
24	0.01	0.00	0.61	0.35	0.02	0.00	0.00	0.00	1892
25	0.02	0.00	0.50	0.45	0.02	0.00	0.00	0.00	1702
26	0.01	0.00	0.37	0.60	0.01	0.00	0.00	0.00	1620
27	0.01	0.01	0.24	0.73	0.01	0.00	0.00	0.00	1724
28	0.01	0.00	0.18	0.80	0.00	0.00	0.00	0.00	1613
29	0.01	0.00	0.13	0.85	0.00	0.00	0.00	0.00	1441
30	0.01	0.01	0.10	0.88	0.00	0.00	0.00	0.00	1425
Total	0.03	0.00	0.52	0.38	0.07	0.00	0.00	0.00	21057

Male urban residents, 1990

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.22	0.00	0.27	0.00	0.51	0.00	0.00	0.00	2319
19	0.21	0.00	0.40	0.00	0.39	0.00	0.00	0.00	2406
20	0.17	0.00	0.51	0.01	0.30	0.00	0.00	0.00	2733
21	0.13	0.00	0.58	0.03	0.26	0.00	0.00	0.00	2750
22	0.10	0.01	0.62	0.08	0.20	0.00	0.00	0.00	3199
23	0.07	0.01	0.61	0.18	0.12	0.00	0.00	0.00	2390
24	0.06	0.02	0.56	0.32	0.04	0.00	0.00	0.00	2650
25	0.05	0.02	0.45	0.48	0.01	0.00	0.00	0.00	2851
26	0.03	0.01	0.31	0.63	0.01	0.00	0.00	0.00	3080
27	0.03	0.02	0.23	0.73	0.00	0.00	0.00	0.00	4036
28	0.02	0.02	0.16	0.80	0.00	0.00	0.00	0.00	2989
29	0.02	0.01	0.12	0.85	0.00	0.00	0.00	0.00	1762
30	0.02	0.02	0.10	0.87	0.00	0.00	0.00	0.00	2155
Total	0.09	0.01	0.38	0.39	0.13	0.00	0.00	0.00	35320

Male urban residents, 2000

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.19	0.00	0.11	0.00	0.70	0.00	0.00	0.00	2,130
19	0.20	0.00	0.20	0.00	0.60	0.00	0.00	0.00	2,023
20	0.23	0.00	0.28	0.00	0.49	0.00	0.00	0.00	1,804
21	0.22	0.00	0.40	0.01	0.38	0.00	0.00	0.00	1,830
22	0.18	0.01	0.51	0.05	0.25	0.00	0.00	0.00	1,813
23	0.16	0.02	0.57	0.14	0.10	0.00	0.00	0.00	1,659
24	0.12	0.03	0.55	0.26	0.03	0.00	0.00	0.00	1,747
25	0.12	0.04	0.45	0.37	0.02	0.00	0.00	0.00	1,854
26	0.08	0.06	0.37	0.49	0.01	0.00	0.00	0.00	1,894
27	0.08	0.06	0.25	0.60	0.01	0.00	0.00	0.00	2,131
28	0.06	0.07	0.18	0.68	0.00	0.00	0.00	0.00	2,308
29	0.04	0.07	0.14	0.75	0.00	0.00	0.00	0.00	2,306
30	0.04	0.08	0.10	0.78	0.00	0.00	0.00	0.00	2,478
Total	0.13	0.04	0.30	0.34	0.19	0.00	0.00	0.00	25,977

Male urban residents, 2005

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.16	0.00	0.09	0.00	0.76	0.00	0.00	0.00	3,958
19	0.20	0.00	0.16	0.00	0.63	0.00	0.00	0.00	3,324
20	0.22	0.00	0.24	0.01	0.53	0.00	0.00	0.00	2,828
21	0.24	0.00	0.32	0.01	0.43	0.00	0.00	0.00	2,862
22	0.25	0.01	0.42	0.04	0.28	0.00	0.00	0.00	3,062
23	0.24	0.02	0.50	0.11	0.13	0.00	0.00	0.00	3,547
24	0.19	0.03	0.52	0.19	0.06	0.00	0.01	0.00	3,408
25	0.14	0.04	0.48	0.29	0.04	0.00	0.00	0.00	3,098
26	0.12	0.05	0.40	0.42	0.01	0.00	0.00	0.00	3,477
27	0.08	0.06	0.33	0.52	0.01	0.00	0.00	0.00	3,814
28	0.08	0.06	0.24	0.61	0.00	0.00	0.00	0.00	3,558
29	0.05	0.07	0.18	0.68	0.00	0.00	0.00	0.00	3,958
30	0.05	0.07	0.15	0.72	0.00	0.00	0.00	0.00	4,353
Total	0.15	0.03	0.30	0.30	0.21	0.00	0.00	0.00	45,247



Male rural residents, 1982

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.04	0.00	0.85	0.01	0.10	0.00	0.00	0.00	10465
19	0.03	0.00	0.89	0.03	0.05	0.00	0.00	0.00	11381
20	0.02	0.00	0.87	0.08	0.03	0.00	0.00	0.00	6426
21	0.01	0.00	0.81	0.16	0.01	0.00	0.00	0.00	4087
22	0.02	0.00	0.70	0.28	0.01	0.00	0.00	0.00	5777
23	0.01	0.00	0.58	0.41	0.00	0.00	0.00	0.00	5931
24	0.01	0.00	0.46	0.52	0.00	0.00	0.00	0.00	8286
25	0.01	0.00	0.36	0.63	0.00	0.00	0.00	0.00	7999
26	0.01	0.00	0.26	0.73	0.00	0.00	0.00	0.00	7563
27	0.01	0.00	0.20	0.79	0.00	0.00	0.00	0.00	8499
28	0.01	0.00	0.17	0.82	0.00	0.00	0.00	0.00	7813
29	0.01	0.00	0.13	0.87	0.00	0.00	0.00	0.00	7405
30	0.01	0.00	0.11	0.88	0.00	0.00	0.00	0.00	7411
Total	0.01	0.00	0.49	0.47	0.02	0.00	0.00	0.00	99043

Male rural residents, 1990

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.03	0.00	0.78	0.01	0.18	0.00	0.00	0.00	10579
19	0.02	0.00	0.83	0.04	0.10	0.00	0.00	0.00	10640
20	0.02	0.00	0.82	0.10	0.06	0.00	0.00	0.00	10879
21	0.01	0.00	0.76	0.19	0.03	0.00	0.00	0.00	10043
22	0.01	0.00	0.62	0.35	0.02	0.00	0.00	0.00	11377
23	0.01	0.00	0.46	0.52	0.01	0.00	0.00	0.00	9214
24	0.01	0.00	0.33	0.66	0.00	0.00	0.00	0.00	10457
25	0.01	0.00	0.24	0.76	0.00	0.00	0.00	0.00	9736
26	0.00	0.00	0.17	0.82	0.00	0.00	0.00	0.00	9044
27	0.01	0.00	0.13	0.87	0.00	0.00	0.00	0.00	10819
28	0.00	0.00	0.11	0.88	0.00	0.00	0.00	0.00	8710
29	0.00	0.00	0.09	0.90	0.00	0.00	0.00	0.00	4324
30	0.01	0.00	0.09	0.90	0.00	0.00	0.00	0.00	4908
Total	0.01	0.00	0.46	0.49	0.04	0.00	0.00	0.00	120730

Male rural residents, 2000

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.08	0.00	0.71	0.00	0.20	0.00	0.00	0.00	6,375
19	0.08	0.00	0.80	0.01	0.11	0.00	0.00	0.00	5,105
20	0.06	0.00	0.85	0.03	0.05	0.00	0.00	0.00	4,578
21	0.05	0.00	0.85	0.07	0.02	0.00	0.00	0.00	4,557
22	0.04	0.00	0.76	0.19	0.01	0.00	0.00	0.00	4,906
23	0.03	0.01	0.59	0.37	0.00	0.00	0.00	0.00	4,610
24	0.02	0.01	0.46	0.50	0.00	0.00	0.00	0.00	5,341
25	0.02	0.01	0.36	0.61	0.00	0.00	0.00	0.00	5,593
26	0.02	0.01	0.26	0.71	0.00	0.00	0.00	0.00	6,137
27	0.01	0.01	0.20	0.79	0.00	0.00	0.00	0.00	6,423
28	0.01	0.01	0.17	0.81	0.00	0.00	0.00	0.00	7,016
29	0.01	0.01	0.13	0.85	0.00	0.00	0.00	0.00	7,254
30	0.01	0.01	0.11	0.88	0.00	0.00	0.00	0.00	7,907
Total	0.03	0.01	0.44	0.50	0.03	0.00	0.00	0.00	75,802

Male rural residents, 2005

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.12	0.00	0.47	0.01	0.41	0.00	0.00	0.00	13,039
19	0.12	0.00	0.58	0.02	0.28	0.00	0.00	0.00	10,186
20	0.11	0.00	0.69	0.04	0.16	0.00	0.00	0.00	8,634
21	0.09	0.00	0.72	0.10	0.08	0.00	0.00	0.00	8,198
22	0.08	0.01	0.67	0.21	0.04	0.00	0.00	0.00	8,117
23	0.06	0.01	0.56	0.35	0.02	0.00	0.00	0.00	9,132
24	0.05	0.01	0.47	0.46	0.01	0.00	0.00	0.00	8,585
25	0.04	0.01	0.37	0.57	0.01	0.00	0.00	0.00	8,467
26	0.03	0.02	0.30	0.65	0.00	0.00	0.00	0.00	8,571
27	0.03	0.02	0.25	0.70	0.00	0.00	0.00	0.00	8,804
28	0.02	0.02	0.20	0.76	0.00	0.00	0.00	0.00	8,292
29	0.02	0.02	0.16	0.80	0.00	0.00	0.00	0.00	9,439
30	0.02	0.02	0.15	0.82	0.00	0.00	0.00	0.00	10,264
Total	0.06	0.01	0.43	0.41	0.09	0.00	0.00	0.00	119,728

Male migrants, 1982

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.16	0.00	0.61	0.00	0.23	0.00	0.00	0.00	64
19	0.13	0.00	0.74	0.03	0.10	0.00	0.00	0.00	69
20	0.14	0.00	0.69	0.14	0.03	0.00	0.00	0.00	35
21	0.06	0.00	0.81	0.09	0.03	0.00	0.00	0.00	32
22	0.07	0.00	0.77	0.14	0.02	0.00	0.00	0.00	44
23	0.06	0.00	0.78	0.15	0.02	0.00	0.00	0.00	54
24	0.09	0.07	0.46	0.39	0.00	0.00	0.00	0.00	46
25	0.03	0.02	0.45	0.50	0.00	0.00	0.00	0.00	62
26	0.10	0.00	0.34	0.55	0.00	0.02	0.00	0.00	62
27	0.03	0.03	0.28	0.67	0.00	0.00	0.00	0.00	69
28	0.04	0.02	0.25	0.70	0.00	0.00	0.00	0.00	57
29	0.00	0.02	0.18	0.80	0.00	0.00	0.00	0.00	49
30	0.02	0.04	0.29	0.65	0.00	0.00	0.00	0.00	52
Total	0.07	0.01	0.49	0.38	0.04	0.00	0.00	0.00	695

Male migrants, 1990

Statuses	N	M	W	WM	S	SM	SW	SWM	Total
18	0.06	0.00	0.81	0.02	0.10	0.00	0.00	0.00	334
19	0.03	0.00	0.87	0.03	0.07	0.00	0.00	0.00	410
20	0.04	0.00	0.86	0.05	0.04	0.00	0.00	0.00	494
21	0.03	0.00	0.83	0.09	0.04	0.00	0.00	0.00	508
22	0.02	0.00	0.73	0.18	0.06	0.00	0.00	0.00	625
23	0.02	0.00	0.61	0.33	0.04	0.00	0.00	0.00	456
24	0.00	0.00	0.52	0.44	0.03	0.00	0.00	0.00	478
25	0.00	0.01	0.41	0.54	0.02	0.01	0.00	0.00	493
26	0.01	0.01	0.28	0.67	0.01	0.01	0.00	0.00	454
27	0.01	0.02	0.22	0.73	0.02	0.02	0.00	0.00	454
28	0.01	0.01	0.19	0.77	0.01	0.01	0.00	0.00	349
29	0.02	0.01	0.14	0.81	0.01	0.02	0.00	0.00	183
30	0.00	0.01	0.16	0.81	0.00	0.02	0.00	0.00	209
Total	0.02	0.01	0.55	0.38	0.04	0.01	0.00	0.00	5447

Male migrants, 2000

Statutes	N	M	W	WM	S	SM	SW	SWM	Total
18	0.07	0.00	0.46	0.00	0.46	0.00	0.00	0.00	1,776
19	0.10	0.00	0.59	0.00	0.31	0.00	0.00	0.00	1,479
20	0.09	0.00	0.73	0.01	0.16	0.00	0.00	0.00	1,298
21	0.08	0.00	0.77	0.04	0.10	0.00	0.00	0.00	1,407
22	0.08	0.01	0.75	0.11	0.06	0.00	0.00	0.00	1,485
23	0.05	0.02	0.69	0.21	0.03	0.00	0.00	0.00	1,396
24	0.04	0.02	0.58	0.34	0.01	0.00	0.00	0.00	1,585
25	0.02	0.03	0.50	0.45	0.00	0.00	0.00	0.00	1,673
26	0.02	0.03	0.36	0.59	0.00	0.00	0.00	0.00	1,819
27	0.02	0.04	0.27	0.67	0.00	0.00	0.00	0.00	1,904
28	0.01	0.04	0.18	0.76	0.00	0.00	0.00	0.00	1,978
29	0.01	0.05	0.14	0.79	0.00	0.00	0.00	0.00	1,845
30	0.01	0.04	0.10	0.84	0.00	0.00	0.00	0.00	2,063
Total	0.04	0.02	0.44	0.41	0.08	0.00	0.00	0.00	21,708

Male migrants, 2005

Statutes	N	M	W	WM	S	SM	SW	SWM	Total
18	0.05	0.00	0.61	0.00	0.33	0.00	0.00	0.00	3,801
19	0.06	0.00	0.72	0.01	0.21	0.00	0.00	0.00	3,720
20	0.06	0.00	0.75	0.02	0.17	0.00	0.00	0.00	3,639
21	0.06	0.00	0.74	0.05	0.15	0.00	0.00	0.00	3,725
22	0.06	0.01	0.73	0.10	0.11	0.00	0.00	0.00	3,826
23	0.06	0.01	0.69	0.19	0.06	0.00	0.00	0.00	4,415
24	0.05	0.01	0.62	0.29	0.03	0.00	0.00	0.00	4,132
25	0.04	0.01	0.57	0.37	0.01	0.00	0.00	0.00	4,028
26	0.03	0.02	0.44	0.51	0.01	0.00	0.00	0.00	4,156
27	0.02	0.02	0.34	0.61	0.00	0.00	0.00	0.00	4,165
28	0.02	0.03	0.26	0.69	0.00	0.00	0.00	0.00	3,746
29	0.01	0.03	0.19	0.76	0.00	0.00	0.00	0.00	4,164
30	0.01	0.03	0.15	0.80	0.00	0.00	0.00	0.00	4,502
Total	0.04	0.01	0.52	0.35	0.08	0.00	0.00	0.00	52,019

Female urban residents, 1982

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.16	0.00	0.00	0.00	0.64	0.00	0.01	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2004
19	0.09	0.00	0.00	0.00	0.77	0.00	0.02	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2161
20	0.05	0.00	0.01	0.01	0.78	0.00	0.06	0.02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1186
21	0.03	0.00	0.01	0.01	0.77	0.00	0.09	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1161
22	0.03	0.00	0.02	0.02	0.68	0.00	0.16	0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1315
23	0.01	0.00	0.01	0.03	0.53	0.00	0.22	0.17	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1252
24	0.01	0.00	0.01	0.04	0.40	0.00	0.27	0.25	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1627
25	0.01	0.00	0.01	0.04	0.28	0.00	0.27	0.39	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1545
26	0.00	0.00	0.00	0.04	0.19	0.00	0.21	0.54	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1508
27	0.00	0.00	0.00	0.06	0.10	0.00	0.14	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1623
28	0.00	0.00	0.00	0.06	0.07	0.00	0.09	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1478
29	0.00	0.00	0.01	0.06	0.04	0.00	0.07	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1383
30	0.00	0.00	0.00	0.06	0.03	0.01	0.04	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1319
Total	0.04	0.00	0.01	0.03	0.41	0.00	0.12	0.35	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19562

Female urban residents, 1990

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.22	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2100
19	0.22	0.00	0.01	0.01	0.39	0.00	0.01	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2145
20	0.18	0.00	0.01	0.01	0.53	0.00	0.02	0.01	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2411
21	0.12	0.00	0.01	0.02	0.55	0.00	0.08	0.03	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2338
22	0.08	0.00	0.01	0.03	0.52	0.00	0.13	0.09	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2614
23	0.05	0.00	0.01	0.04	0.44	0.00	0.21	0.19	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1783
24	0.04	0.00	0.02	0.06	0.30	0.00	0.22	0.33	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2005
25	0.02	0.00	0.01	0.07	0.17	0.00	0.20	0.51	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2303
26	0.01	0.00	0.01	0.07	0.13	0.01	0.14	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2474
27	0.01	0.00	0.01	0.06	0.08	0.01	0.10	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3118
28	0.00	0.00	0.00	0.06	0.05	0.01	0.07	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2436
29	0.00	0.00	0.00	0.06	0.03	0.01	0.05	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1442
30	0.00	0.00	0.00	0.05	0.03	0.02	0.04	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1802
Total	0.07	0.00	0.01	0.04	0.27	0.00	0.10	0.38	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28971

Female urban residents, 2000

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.15	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2220
19	0.20	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1865
20	0.20	0.00	0.01	0.00	0.32	0.00	0.01	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1512
21	0.19	0.00	0.02	0.01	0.45	0.00	0.03	0.02	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1670
22	0.18	0.00	0.03	0.05	0.48	0.00	0.07	0.04	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1581
23	0.13	0.00	0.05	0.08	0.46	0.00	0.12	0.11	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1517
24	0.10	0.00	0.06	0.11	0.37	0.00	0.16	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1678
25	0.07	0.00	0.06	0.14	0.24	0.00	0.17	0.30	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1842
26	0.04	0.00	0.04	0.19	0.16	0.00	0.15	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1884
27	0.03	0.00	0.03	0.20	0.11	0.00	0.12	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2025
28	0.03	0.00	0.02	0.21	0.07	0.01	0.09	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2186
29	0.02	0.00	0.02	0.21	0.05	0.01	0.07	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2165
30	0.01	0.01	0.01	0.22	0.03	0.01	0.04	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2385
Total	0.10	0.00	0.03	0.12	0.21	0.00	0.08	0.29	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24530

Female urban residents, 2005

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.11	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3623
19	0.16	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3136
20	0.17	0.00	0.01	0.01	0.22	0.00	0.01	0.01	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2889
21	0.17	0.00	0.02	0.03	0.29	0.00	0.02	0.01	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2869
22	0.18	0.00	0.03	0.05	0.38	0.00	0.05	0.03	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3291
23	0.16	0.00	0.04	0.08	0.44	0.00	0.08	0.08	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3842
24	0.12	0.00	0.04	0.11	0.41	0.00	0.11	0.14	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3471
25	0.10	0.00	0.04	0.16	0.31	0.00	0.14	0.21	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3562
26	0.06	0.00	0.04	0.16	0.23	0.00	0.15	0.33	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3900
27	0.05	0.00	0.04	0.19	0.16	0.01	0.15	0.39	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4016
28	0.04	0.00	0.03	0.21	0.12	0.01	0.12	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3885
29	0.03	0.00	0.03	0.23	0.08	0.01	0.09	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4246
30	0.02	0.00	0.02	0.24	0.05	0.01	0.07	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4638
Total	0.10	0.00	0.03	0.12	0.22	0.00	0.08	0.24	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47368



Female rural residents, 1982

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.05	0.00	0.01	0.00	0.84	0.00	0.04	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10439
19	0.03	0.00	0.01	0.01	0.81	0.00	0.08	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11455
20	0.02	0.00	0.02	0.02	0.69	0.00	0.16	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6792
21	0.02	0.00	0.02	0.03	0.55	0.00	0.20	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4114
22	0.01	0.00	0.03	0.06	0.41	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5505
23	0.01	0.00	0.03	0.07	0.28	0.00	0.25	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5491
24	0.00	0.00	0.01	0.08	0.16	0.00	0.23	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7494
25	0.00	0.00	0.01	0.09	0.08	0.00	0.16	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7392
26	0.00	0.00	0.01	0.09	0.05	0.00	0.11	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7038
27	0.00	0.00	0.01	0.11	0.02	0.00	0.07	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7716
28	0.00	0.00	0.01	0.11	0.01	0.00	0.04	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7454
29	0.00	0.00	0.00	0.11	0.01	0.00	0.03	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7094
30	0.00	0.00	0.00	0.11	0.00	0.00	0.02	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7063
Total	0.01	0.00	0.01	0.07	0.33	0.00	0.11	0.45	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95047

Female rural residents, 1990

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.04	0.00	0.00	0.00	0.81	0.00	0.03	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9957
19	0.04	0.00	0.00	0.00	0.80	0.00	0.05	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10283
20	0.03	0.00	0.01	0.01	0.72	0.00	0.11	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10556
21	0.02	0.00	0.01	0.02	0.56	0.00	0.18	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10117
22	0.01	0.00	0.01	0.04	0.40	0.00	0.20	0.34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11175
23	0.01	0.00	0.01	0.05	0.24	0.00	0.18	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9137
24	0.00	0.00	0.01	0.06	0.15	0.00	0.14	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10089
25	0.00	0.00	0.01	0.07	0.08	0.00	0.09	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9843
26	0.00	0.00	0.00	0.08	0.04	0.00	0.07	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9424
27	0.00	0.00	0.00	0.07	0.02	0.00	0.04	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10579
28	0.00	0.00	0.00	0.09	0.01	0.00	0.02	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8779
29	0.00	0.00	0.00	0.09	0.01	0.01	0.02	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4463
30	0.00	0.00	0.00	0.11	0.01	0.01	0.01	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4926
Total	0.01	0.00	0.01	0.05	0.33	0.00	0.10	0.48	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	119328

Female rural residents, 2000

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.09	0.00	0.00	0.00	0.73	0.00	0.01	0.01	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5422
19	0.09	0.00	0.00	0.00	0.79	0.00	0.02	0.02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4497
20	0.08	0.00	0.01	0.01	0.73	0.00	0.06	0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4050
21	0.06	0.00	0.01	0.02	0.63	0.00	0.11	0.14	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4381
22	0.05	0.00	0.02	0.04	0.48	0.00	0.13	0.28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4539
23	0.03	0.00	0.02	0.07	0.32	0.00	0.14	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4403
24	0.02	0.00	0.02	0.08	0.21	0.00	0.13	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5029
25	0.01	0.00	0.01	0.09	0.13	0.01	0.09	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5316
26	0.01	0.00	0.01	0.08	0.07	0.00	0.06	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5958
27	0.01	0.00	0.01	0.09	0.04	0.00	0.05	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6289
28	0.00	0.00	0.00	0.09	0.03	0.01	0.03	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6692
29	0.00	0.00	0.00	0.08	0.02	0.00	0.02	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6951
30	0.00	0.00	0.00	0.08	0.01	0.01	0.02	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8176
Total	0.03	0.00	0.01	0.06	0.27	0.00	0.06	0.54	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71703

Female rural residents, 2005

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.13	0.00	0.00	0.00	0.46	0.00	0.01	0.01	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12515
19	0.13	0.00	0.01	0.01	0.55	0.00	0.03	0.02	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10028
20	0.12	0.00	0.02	0.02	0.56	0.00	0.07	0.08	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8739
21	0.09	0.00	0.04	0.05	0.50	0.00	0.11	0.15	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8591
22	0.07	0.00	0.04	0.09	0.39	0.00	0.13	0.25	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8782
23	0.05	0.00	0.04	0.12	0.30	0.00	0.12	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10077
24	0.03	0.00	0.03	0.13	0.22	0.00	0.11	0.46	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9290
25	0.03	0.00	0.03	0.13	0.15	0.00	0.09	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9521
26	0.02	0.00	0.02	0.14	0.10	0.01	0.08	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9326
27	0.01	0.00	0.01	0.14	0.07	0.01	0.05	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9486
28	0.01	0.00	0.01	0.13	0.05	0.01	0.04	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8904
29	0.01	0.00	0.01	0.13	0.04	0.01	0.03	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10166
30	0.01	0.00	0.01	0.14	0.02	0.01	0.03	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10783
Total	0.05	0.00	0.02	0.09	0.26	0.00	0.07	0.42	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	126208

Female migrants, 1982

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.29	0.00	0.05	0.06	0.25	0.00	0.17	0.05	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63
19	0.13	0.00	0.06	0.08	0.34	0.01	0.19	0.14	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99
20	0.11	0.00	0.14	0.14	0.19	0.00	0.19	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73
21	0.09	0.00	0.06	0.20	0.33	0.00	0.18	0.12	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66
22	0.07	0.00	0.05	0.24	0.21	0.00	0.23	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	82
23	0.05	0.00	0.08	0.28	0.10	0.01	0.15	0.30	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	79
24	0.03	0.00	0.08	0.27	0.10	0.00	0.11	0.40	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73
25	0.01	0.00	0.09	0.39	0.06	0.00	0.05	0.40	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	88
26	0.00	0.01	0.05	0.35	0.02	0.00	0.16	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	82
27	0.00	0.01	0.00	0.46	0.02	0.00	0.06	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102
28	0.02	0.00	0.03	0.47	0.00	0.01	0.01	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	107
29	0.00	0.01	0.03	0.49	0.00	0.00	0.06	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68
30	0.01	0.00	0.05	0.43	0.01	0.00	0.05	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83
Total	0.06	0.00	0.06	0.31	0.12	0.00	0.12	0.32	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1065

Female migrants, 1990

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.10	0.00	0.01	0.02	0.68	0.00	0.02	0.02	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	325
19	0.10	0.00	0.01	0.02	0.66	0.00	0.05	0.06	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364
20	0.07	0.00	0.03	0.05	0.65	0.00	0.09	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	514
21	0.04	0.00	0.04	0.08	0.52	0.00	0.11	0.16	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	509
22	0.04	0.00	0.07	0.12	0.36	0.00	0.17	0.20	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	553
23	0.01	0.00	0.05	0.13	0.32	0.00	0.14	0.33	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	430
24	0.01	0.00	0.04	0.21	0.20	0.00	0.13	0.38	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	461
25	0.01	0.00	0.04	0.24	0.10	0.00	0.11	0.47	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	433
26	0.00	0.00	0.04	0.27	0.06	0.01	0.10	0.50	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	347
27	0.00	0.00	0.02	0.33	0.03	0.01	0.06	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	379
28	0.01	0.00	0.01	0.34	0.03	0.01	0.04	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	273
29	0.00	0.00	0.01	0.40	0.01	0.01	0.04	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	136
30	0.00	0.01	0.01	0.35	0.04	0.01	0.02	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	161
Total	0.03	0.00	0.03	0.17	0.32	0.00	0.10	0.30	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4885

Female migrants, 2000

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.07	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2166
19	0.06	0.00	0.01	0.00	0.70	0.00	0.01	0.01	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1885
20	0.07	0.00	0.02	0.01	0.73	0.00	0.04	0.02	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1702
21	0.07	0.00	0.04	0.04	0.65	0.00	0.07	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1815
22	0.05	0.00	0.04	0.07	0.58	0.00	0.11	0.10	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1785
23	0.04	0.00	0.06	0.11	0.46	0.00	0.14	0.17	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1685
24	0.03	0.00	0.06	0.16	0.32	0.00	0.16	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1864
25	0.03	0.00	0.06	0.18	0.20	0.00	0.16	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1943
26	0.01	0.00	0.05	0.22	0.14	0.00	0.16	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2001
27	0.01	0.00	0.04	0.24	0.10	0.00	0.11	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1875
28	0.01	0.00	0.02	0.23	0.07	0.01	0.09	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2010
29	0.01	0.00	0.03	0.23	0.05	0.01	0.06	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1806
30	0.00	0.00	0.02	0.26	0.04	0.01	0.05	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1946
Total	0.04	0.00	0.03	0.14	0.35	0.00	0.09	0.29	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24483

Female migrants, 2005

Age	N	P	M	MP	W	WP	WM	WMP	S	SP	SM	SMP	SW	SWP	SWM	SWMP	Total
18	0.05	0.00	0.01	0.00	0.69	0.00	0.01	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4790
19	0.06	0.00	0.01	0.01	0.75	0.00	0.02	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4869
20	0.06	0.00	0.03	0.03	0.69	0.00	0.05	0.03	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4932
21	0.06	0.00	0.04	0.06	0.60	0.00	0.07	0.05	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4893
22	0.05	0.00	0.05	0.09	0.55	0.00	0.08	0.10	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5121
23	0.05	0.00	0.06	0.12	0.47	0.00	0.10	0.15	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5464
24	0.04	0.00	0.05	0.15	0.39	0.00	0.12	0.22	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4930
25	0.03	0.00	0.05	0.19	0.30	0.00	0.13	0.28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4655
26	0.02	0.00	0.04	0.21	0.20	0.00	0.14	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4809
27	0.02	0.00	0.03	0.23	0.14	0.00	0.14	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4571
28	0.02	0.00	0.04	0.23	0.10	0.00	0.11	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4217
29	0.01	0.00	0.03	0.23	0.07	0.01	0.09	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4513
30	0.01	0.00	0.02	0.25	0.05	0.01	0.07	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4678
Total	0.04	0.00	0.03	0.14	0.39	0.00	0.09	0.24	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62442



## Appendix B

Stata code to calculate entropy index

```
program lcentropy, rclass byable(recall)

    version 10.0

    syntax varlist(min=2 max=2 numeric) [if] [in][, noPRINT FORmat(passthru)
MATrix(string)]

    marksample touse, strok

    quietly count if `touse'

    if `r(N)' == 0 {

        error 2000

    }

    tokenize `varlist'

    ***** entropy: absolute value *****

    local matA matA          /*original frequency table*/

    local mat_rownames mat_rownames

    local mat_colnames mat_colnames

    quietly tab `varlist' if `touse', matcell(`matA')

    local colsum colsum      /*calculate sum(freq) by age*/

    matrix `colsum' = (`matA')' * J(r(r),1,1)
```

```

local matP matP          /*matT = matP*(element)* matlog1P*/

local matlog1P matlog1P

local matT matT

matrix `matP' = J(r(r), r(c), 0)

matrix `matlog1P' = J(r(r), r(c), 0)

matrix `matT' = J(r(r), r(c), 0)

forvalues j = 1/`r(c)' {

    forvalues i = 1/`r(r)' {

        matrix `matP'[`i',`j'] = `matA'[`i',`j']/`colsum'[`j',1]

        if `matP'[`i',`j']==0 {

/*change zero cell to cell=1, otherwise log will get missing info*/

            matrix `matP'[`i',`j']==1

        }

        matrix `matlog1P'[`i',`j'] = log10(1/`matP'[`i',`j'])

        matrix `matT'[`i',`j'] = `matP'[`i',`j'] * `matlog1P'[`i',`j']

    }

}

local entropy entropy    /*entropy = sum(matT) by age */

```

```

matrix `entropy' = (`matT') * J(r(r),1,1)

matrix rownames `entropy' = 18 19 20 21 22 23 24 25 26 27 28 29 30

matrix colnames `entropy' = entropy

***** entrper: % to max entropy index *****

local max max                                /*# status*/

local maxentr maxentr

quietly sum `1' if `touse'

scalar `max' = length(string(r(max)))

/*!!The max number in status MUST have same digits as statuses*/

scalar `maxentr' = log10(1/(1/2^(`max')))

local entrper entrper                        /*entrper: % to max*/

matrix `entrper' = `entropy' / `maxentr' *100

matrix colnames `entrper' = percent

***** output: combine entropy and entrper *****

local output output

matrix `output' = `entropy', `entrper'

***** Print results *****

if "`print'" != "noprint" {

    display as txt "number of status: " `max' "; max entropy: " `maxentr'

```

```
local form ", noheader"  
  
if "`format'" != "" {  
    local form "`from" `format"  
}  
  
matrix list `output' `form'  
}  
  
end
```

## Appendix C

Using Principal Component Analysis to Construct a Development Scale.

Table 1 shows the correlation matrix of the seven provincial-level variables.

Except for FDI performance and unemployment rate, the rest five variables are highly correlated.

**Table 1: Correlation matrix of provincial-level variables.**

		1	2	3	4	5	6	7
1	Non-state employment	1.0000						
2	FDI performance	0.2138	1.0000					
3	% associated degree	0.7770	0.0619	1.0000				
4	Unemployment rate	0.1446	-0.2341	0.1088	1.0000			
5	GDP per capita	0.8518	0.2422	0.7415	0.0187	1.0000		
6	Migration ratio	0.7449	0.2978	0.5730	-0.0299	0.8591	1.0000	
7	Resident disposable income	0.8997	0.1024	0.8689	0.1943	0.8623	0.7731	1.0000

Thus, the five highly correlated variables (i.e. non-state employment, % associated degree, GDP per capita, migration ratio, and resident disposable income) can put into a development scale by principal component analysis. It is a statistical technique that reduces the dimensionality of a dataset consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the

dataset (Jolliffe, Principal Component Analysis, 2nd edition). Results of 1-5 components are presented in Table 2. The first component explained 84% of the variation, and is the only one with eigenvalues larger than 1. The results suggests one component is sufficient.

**Table 2: Results of 1-5 components from principal component analysis of non-state employment, % associated degree, GDP per capita, migration ratio, and resident disposable income.**

Component	Eigenvalue	Proportion variation explained	Cumulative variation explained
1	4.18931	0.8379	0.8379
2	.465228	0.0930	0.9309
3	.17235	0.0345	0.9654
4	.109401	0.0219	0.9873
5	.0637072	0.0127	1.0000

Thus, a development scale is created with the following weights (Table 3):

**Table 3: Weights of selected provincial-level variables in constructing the development scale.**

Component	Weights
Non-state employment	0.4574
% associated degree	0.4227
GDP per capita	0.4613
Migration ratio	0.4212
Resident disposable income	0.4710

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## Biography

Feng Tian was born in Urumqi, Xinjiang, China, on July 26, 1985. She attended Renmin University of China in 2003 and received her bachelor's degree in Information Management and Systems and Sociology in 2007. She received her master's degree in Sociology in University of Wisconsin-Madison in September 2009. She began her graduate studies at Duke University in the fall of 2009, receiving her master's degree in Sociology in May 2012. She will receive her Ph.D in Sociology from Duke University in May 2014.

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Tian, Felicia Feng. 2013. "Transition to First Marriage in Reform-era Urban China: The Persistent Effect of Education in a Period of Rapid Social Change". *Population Research and Policy Review*. 32(4): 529-552.

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