Residential Mobility in Chinese Cities: A Longitudinal Analysis

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(Abstract)

This paper aims to understand residential mobility in non-market economies by conducting a case study of Chinese cities, a socialist society in transition. We argue that residential mobility in China are mainly triggered by changes in housing supply and housing qualification, both are determined by housing policies. Using a retrospective survey (1949-1994) in 20 Chinese cities, we find that while the overall mobility is low, it has fluctuated significantly over time with a recent rising trend, which corresponds to historical changes in housing policies. The longitudinal models show that while some factors such as change of martial status and work units have consistent effects on mobility over time, indicating the persistency of the socialist housing system, others such as housing tenure have different effects over time, demonstrating changes in the Chinese housing system. The results share some similarities with the Western models; yet, they demonstrate significant differences despite recent market penetrations. A framework that emphasizes the roles of the state and housing policies, and their change over time is needed to better understand residential mobility in China.

Keywords: residential mobility, China, housing policies

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Introduction

Residential mobility is intricately related to housing markets and urban changes. It has been extensively studied by social scientists as an economic, demographic and spatial adjustment process. Yet, the existing literature focuses mainly on residential mobility in market economies where the freedom of housing choice is granted and markets prevail, despite possible "redlining" and discrimination by financial institutions and real estate agents (Bourne, 1981). In contrast, residential mobility in non-market economies such as the socialist and transitional economies is poorly understood. This paper aims to expand our understanding of residential mobility by studying Chinese cities, a former socialist society that is in the process of a profound transition toward a market economy and is experiencing dramatic urban changes.

In socialist Chinese cities, residential mobility was very low because of the welfare-oriented housing system and almost lifetime employment in the public sector. Households had no choice in housing and neighborhood but to wait for flats allocated by their employers (or work units, *danwei*) or the municipal government (through housing bureaus) (Wang and Murie, 1999). The limited residential moves were usually not self-initiated, but often forced by the government and work units. The market transition in China, especially the urban housing reform launched in 1988, has unleashed new forces for profound changes in every aspect of the society including unprecedented prevalence of residential mobility in Chinese cities. While public housing is being privatized, massive private housing has been available, and more importantly households have been for the first time in decades given freedom to choose their preferred dwellings and neighborhoods (Huang and Clark 2002; Huang 2003a). Residential mobility has since been increasing significantly. According to China's latest 2000 Census, about 15% of all

moves between 1995 and 2000 are residential moves or resettlement. These housing related moves are powerful forces (re)shaping the urban socio-spatial landscape in Chinese cities.

Yet, compared to the large body of literature on regional migration especially rural-to-urban migration in China (e.g. Fan 1999; Fan and Huang 1998; Liang and White 1997; Chan 1988; Chan 1994), there are few studies on intra-city residential mobility. Only recently scholars begin to study residential mobility, but focus mainly on the reform era (Li, 2004; Li and Siu 2001; Wu 2004). Using a retrospective survey dataset, this paper aims to understand the patterns and dynamics of residential mobility in Chinese cities during 1949-1994, a period covers both the socialist era (1949-87) and the early stage of the housing reform era (1988-94)[1]. We hypothesize that overall residential mobility in Chinese cities has been low despite the recent increase induced by the housing reform. We also hypothesize that residential mobility has been mainly a response to changes in housing supply and *housing qualification* (instead of housing needs as is the case in the West), both of which are subject to housing policies. Because of constant shifts in housing policies, the dynamics and patterns of residential mobility vary across historical periods. Before the reform, housing eligibility factors are more important; yet, with ongoing market penetrations, the conventional housing adjustment thesis becomes more relevant.

After a brief review of literature on residential mobility, we will describe the history of housing system in urban China, and the role of the state and housing policies in residential mobility. Then we utilize a retrospective survey dataset to understand the patterns and dynamics of residential mobility across time, and reconstruct historical residential mobility rate. The paper concludes with major findings and discussions.

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[1] While the overall economic reform was launched in 1978, the socialist housing system continued and the nationwide housing reform was not launched until 1988. Thus in this paper, the "transitional era" or the "reform era" refers to the period after the housing reform was launched (post-1988).

Research Context

Residential mobility refers to intra-city moves that are often related to housing. Because it is a manifestation of the housing market and a driving force for socio-spatial sorting, there is a voluminous literature mostly on mobility in market economies. While economists argue that a change in residence is an attempt to achieve consumption equilibrium within the constraint of affordability (Hanushek and Quigley, 1978), demographers follow Rossi's (1955) classic conceptualization that moves are processes to adjust the "mismatch" between housing needs and actual housing consumption, which is often a result of changes in life cycle (e.g. marital status change and birth of a child) and employment (e.g. job change, promotion)(e.g. Clark, Dieleman, and Deurloo 1984; Clark and Dieleman, 1996). Thus, in market economies, residential mobility is mainly a result of two sets of factors: household characteristics (demographic and socio-economic status) and housing stock/housing market. While the former determines households' housing needs, housing affordability, and their current housing consumption, the latter shapes the supply of housing and options available to households. Housing needs and affordability change constantly due to changes in the household composition and socio-economic status. When there is a "mismatch" between potential housing needs/affordability and actual housing consumption, households tend to move to adjust their housing consumption within the constraint of housing supply (Rossi, 1955). Thus residential mobility is a demand-oriented spatial adjustment process, which has dominated the mobility literature. While there are forced moves and gatekeepers (e.g. real estate agents) controlling housing accessibility, voluntary move is often assumed in market economies.

As existing literature focuses on the role of housing markets and household characteristics, the role of the state and government agencies in residential mobility is largely unexamined. In non-market economies, the latter shape the housing system and thus housing behavior. For example, in socialist economies where public housing provided by the state and government agencies dominates the stock, housing access is often based on a set of non-market eligibility criteria set up by the government, and residential mobility tends to be very low (Szelenyi, 1987; Daniell and Struyk, 1997). In transitional economies, while housing markets begin to penetrate, government agencies and other socialist institutions continue to play important roles in housing consumption (Huang and Clark, 2002). Despite recent housing privatization and a sharp increase in mobility, residential mobility rate remains to be low in Moscow (2.5% per annum in 1992) (Daniell and Struyk, 1997) and Slovenia (2.1-3.1% per annum during 1990-94) (Mandic, 2001). Even in some European housing systems where social housing comprises a substantial share of the stock, housing access is often defined by various eligibility criteria defined by housing authorities, which discouraged mobility (Burrows 1999; Bourne, 1981). The recent privatization of social housing in Europe such as the "right to buy" program in Britain has led to an increased mobility especially within the public sector (Burrows, 1999). Yet, the mobility rate in Europe (7- 9% per annum) is still much lower than that in the U.S. (20% per annum) (Long, 1988; 1992). These empirical evidences demonstrate the important role of the state and government agencies in residential mobility in non-market economies. Yet, we know very little about the dynamics of residential mobility in these contexts and how they change with the market transition.

As a former socialist country that is experiencing a "gradual" market transition, China represents a unique opportunity to study residential mobility in non-market economies, the role

of the state and government agencies, and their changes over time. The housing system in urban China has experienced several transitions in the last fifty years because of dramatic changes in ideology and the political economy. It has changed from a market-oriented housing system dominated by private housing before the mid-1950s, to a welfare-oriented housing system dominated by public rental in the following three decades, and now to a transitional housing system with a mix of public and private housing since the housing reform launched in 1988. Consequently housing behavior including residential mobility has changed significantly over time.

Before the mid-1950s, the majority of urban housing in Chinese cities was private and there were massive moves both within cities, and between cities and the countryside in the first few years of the socialist regime (1949-55) (Zhang, 1998; Wang and Murie, 1999). Private housing was also concentrated in the hands of a few large landlords, and the majority of the working class were renters with relatively high mobility, who often suffered from excessive high rents, crowding and poor housing condition (Wang and Murie, 1999; Zhang 1998). Realizing severe housing problems, the socialist government launched the Socialist Transformation in 1956 to transform the majority of existing private housing into public housing and construct new public housing (Zhang, 1998). By the mid-1960s, the majority of the housing stock was public housing, while limited remaining private housing was for owners' self-occupancy only. During the following Cultural Revolution (1966-76), a radical political movement, the government continued to eliminate private property and a large amount of the remaining private housing, often owned by professionals and government officials, was impounded and confiscated by the Red Guard and government agencies (Cao, 1982). Thus, a private housing market was virtually

eliminated by the late 1970s. At the same time, with radical political movement and a stagnant urban economy, few state investments went into new housing construction.

In addition to transforming the housing stock, the government determined what kind of housing households were qualified for. While existing homeowners were allowed to own only a certain amount of floor space, renters could only access public rental housing through an administrative point system based on household characteristics such as household size, marital status, and job rank (Huang and Clark, 2002; Bian et al., 1997). This socialist allocation system determined not only households' status in the queue but also the type of dwellings (e.g. the amount of floor space, facilities, old bungalows vs. new apartments) they could obtain. So instead of housing needs, it was households' changed housing qualification that allowed them to move to new dwellings. With public rental as the dominant tenure and strict eligibility criteria for housing access, intra-city residential mobility was relatively low.

Since the economic reform launched in the late 1970s, there has been a massive construction of public housing in the 1980s and early 1990s. In particular, the reform in the budgetary system gives work units more control over their profits, which in turn allows them to construct massive public rental housing in the form of work-unit compounds for their employees (Wu, 1996). Thus the housing stock has been expanded significantly, and many households moved into the new apartments in the work-unit compounds. Yet, the socialist allocation system continued, which gave households few opportunities to choose their preferred dwellings, and housing qualification was still essential in housing access and thus residential move. Because work units were the main housing providers, residential moves were mostly initiated by work-units instead of individual households.

In 1988, China launched the urban housing reform, aiming to privatize the welfare-oriented housing system and create a housing market.   Private housing newly built by developers, called "commodity housing" (*shangping fang*), has since mushroomed in Chinese cities, and it is accessible mainly through the private housing market. With ongoing market penetrations, housing needs and affordability based on household characteristics begin to generate massive voluntary residential moves, especially from the public to private housing sector for better housing, and there has been a rapid increase in residential mobility. In Shenzhen, one of the first cities that opened up for the market reform, mobility rate has increased dramatically from less than 1% per annum in the early 1980s to more than 10% per annum in the later 1990s (Chai et al. 2002), comparable to that in most West European countries but still lower than mobility rate in the U.S.

Yet, most of these new private housing is for sale only. In addition, existing public housing is being sold to sitting tenants with heavy subsidies (Tolley 1991; Wang and Murie 1996), and the State Council (1998) announced the end of massive public rental housing provision after 1998. Thus there was a rapid increase in homeownership during the 1990s and more than 70% of urban households were homeowners in 2000. While housing privatization grants households an opportunity to own their dwellings the first time in decades, homeownership discourages residential mobility, especially after the initial purchase-related moves. According to a recent survey in Beijing, homeownership results in a significant drop in mobility rate, from 4% per annum to less than 1% per annum (Li, 2004).

Despite an emerging housing market, the state still plays an important role in shaping housing production and consumption through controlling the speed, degree and direction of housing reform (Huang, 2004). Because of the government's encouragement for private housing

and the secondary housing market[2], housing supply now includes not only public rental housing, public housing on sale, but also private housing from both developers and individual households (Huang, 2003a). In other words, with changed housing policies, there has been a much diverse housing stock for households to consume. At the same time, households still face various constraints regarding what kind of housing they are qualified to access. For example, public housing on sale is only available to sitting tenants who have accessed their dwellings through work-units and through the socialist allocation system (State Council, 1998). In addition, housing subsidies they receive are determined by a set of factors similar to those in the socialist housing allocation system, such as job rank and seniority (Huang and Clark, 2002). This obviously will affect households' tenure decision, and thus influence their potential mobility. Even private housing, especially private housing with controlled prices (e.g. affordable housing) is limited to households meeting certain criteria set up by the government (State Council, 1998).

Because of the persistent role of the state and government agencies in the housing system even in the reform era, many households moved involuntarily despite that some moved voluntarily to their preferred dwellings. According to a recent survey in Shanghai, 58.3% of all moves are involuntary, and of which more than one third is related to housing allocation from work-units and another 59% is related to infrastructure or real estate development resulted from the urban land reform (Wu, 2004). Secondly, while some household characteristics such as age tend to have similar effects as in the West, in general the housing adjustment thesis is less applicable in Chinese cities (Li, 2004; Wu, 2004). For example, marital change and birth of a child, the two main trigger events for residential moves in the West, do not necessarily lead to

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[2] For example, at the early stage of housing reform, households who purchase public housing at subsidized prices could not release their flats to the market within the first 5 years (State Council, 1994). But later this constrain was removed as long as households have gained full ownership of their dwellings.

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residential changes in Chinese cities. In contrast, people with political privilege such as those who are members in Chinese Communist Party and those working in state sectors are more likely to move (Li, 2003; 2004). These empirical findings demonstrate that in transitional Chinese cities, while housing needs are becoming more important, housing qualification continues to play a significant role in residential move. This duality shares similarities with Western and Northern European housing systems where social housing comprises a large share of the housing stock, and housing access and residential mobility are often determined by housing qualification (Burrows, 1999; Bourne, 1981).

Thus in the last five decades or so, the housing system in urban China has been in constant transition with very different housing stocks, and different dynamics of housing production and consumption. Recently there is an emerging literature on residential mobility in Chinese cities (e.g. Li, 2004; Li and Siu, 2003; Wu, 2004; Zhou, 1996). Yet, they all focus on the reform era, leaving the institutional transition from the socialist to transitional economies and its impact on residential mobility unexamined. Furthermore, they are based on surveys in specific cities, mostly large coastal cities in China, which might demonstrate different patterns from inland smaller cities. In this study, we hope to contribute to this emerging literature by studying mobility in both the socialist and transitional eras, and by utilizing a national survey of 20 cities of different sizes. We aim to understand the patterns and dynamics of residential mobility in Chinese cities where the housing system has been in constant transition. We hypothesize that residential mobility in Chinese cities has been mainly a response to changes in housing supply and housing qualification, both of which are determined by housing policies, while housing needs is less important until the recent years. Because of shifts in housing

policies, the patterns and dynamics of residential mobility vary across historical periods. Only in more market-oriented periods, the conventional housing adjustment thesis is more applicable.

Empirical Analysis

Data and Methodology

Data   The empirical analyses utilize the survey of "*the state and life chances in urban China*", conducted in 1994 by sociologists Dr. Xueguang Zhou and his associates at Duke University, and their collaborators in three Chinese institutions[3]. The survey adopted a multistage sampling procedure. First, six provinces (Hebei, Heilongjiang, Gangsu, Guangdong, Jiangsu, Sichuan) were selected, each representing a conventional geographic region in China (Zhou, 2000). Second, in each province, the capital city was chosen to represent large cities with population over 1 million. A medium-size city (population between 200,000 and 1 million) and a small city (population under 200,000) were randomly selected based on the *1990 Yearbook of Chinese Cities* (SSB, 1990). In addition, two provincial level municipal cities, Beijing and Shanghai were included. Thus, in total 20 cities were selected, which cover a variety of geographic locations and types of urban economies (Zhou et al., 1997) (Figure 1). The sample size in each city was proportional to the population in *that* size of cities in *that* province. Third, residents in each city were selected based on a stratified random sampling scheme. The primary sampling unit was residents' committee (*juweihui*) – the smallest administrative unit in Chinese cities. In each city, every *n*th residents committee was selected based on the residential statistics provided by the municipal government. A similar sampling scheme was used to select households in each resident committee. Finally, a member of the household aged 25-65 was

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[3] They are the People's University, Tianjing Academy of Social Sciences and Fudan University.

randomly selected and interviewed. There were 4,073 residents interviewed, of which 3,724 are

qualified subjects for this analysis.

The survey collected retrospective information about respondents' socio-economic status

and housing consumption since they started their first jobs. The rich information makes it

possible to conduct longitudinal analysis on residential mobility. While recall errors are

inevitable in retrospective survey, respondents do not have to recall many moves because

residential mobility has been fairly low till the late 1990s. Thus, recall errors are likely to be less

serious in China than in other more mobile societies. Another limitation to the dataset is that

people who died or moved out of the cities before the interview were not sampled.

Longitudinal Analysis   It has been well documented in the literature that

longitudinal methods can provide richer analysis than cross-sectional methods (Tuma and

Hannan 1984; Davies 1987; Clark 1992). In particular, the recent development in the event

history analysis and related modeling technique make it easier to study the occurrence and timing

of life events such as residential move. An important advantage is that it can handle censoring

and time-varying covariates, which are conceptually difficult to deal with in conventional

regression models. Instead of using Cox's proportional hazards model that requires intensive

computing, a discrete-time logit model is applied using the standard logistic regression procedure

after converting the data to the person-year format (Allison, 1984; 2001). This also allows

explanatory variables to be treated as time varying with little inconvenience (Withers, 1997).

Because of constantly changing housing policies, five different historical periods will be

analyzed separately to control institutional and housing context, and comparisons between

periods will be made. The periods include 1949-55, a post-war recovery period with

predominately private housing; 1956-65, the period of the Socialist Transformation with private

housing being converted into the public domain; 1966-77, the Cultural Revolution era with little investment in housing development and continuing confiscation of private housing; 1978-87, a period of rapid economic growth with massive construction of pubic housing; and 1988-94, the early stage of the housing reform. Correspondingly, there are five cohorts with people starting their first housing careers in each of these five periods. When a person enters the housing career for the first time, housing policies are very important to shape not only his/her housing behavior then but also later in his/her life cycle. Thus cohorts are defined based on the period when they begin their housing career instead of by their year of birth. In addition, we need to bear in mind that the data was collected in 1994 and significant changes in the housing system did not happen until after 1994 when the government decided to deepen the housing reform (State Council, 1994). Thus the last period may not be able to fully capture the impact of the housing reform on residential mobility.

Repeat Measures Regression (RMR) To complement the longitudinal analysis of the dynamics of residential mobility, it is necessary to calculate mobility rates over time. There are two conventional methods to calculate historical mobility rates, but both are problematic. First, mobility rates over time can be calculated directly from the survey data, with the number of total moves in a specific year divided by the number of respondents in that year – we call them raw mobility rates. Because the survey is retrospective, the raw mobility rate has obvious limitations. For example, the sample size decreases gradually and the population is composed of younger cohorts as we go back in time. Yet, these changes of the sample are not random and they are directly related to the age of the respondents in history. Therefore, raw mobility rates are increasingly biased toward those for the younger cohorts as we move further back in time. They not only represent a changing sample over time but also mix the effects of age and time. In

addition, the calculated raw mobility rates for this survey (see Figure A.1)[4] appear to be

unreasonably volatile, and they were surprisingly high in the late 1950s and early 1960s when

public rental dominated and there were few investments in new housing development. Thus raw

mobility rate is an undesirable measure for mobility in history. Secondly, while it is possible to

reconstruct historical mobility rates based on the results from regression models, there are

obvious problems too. For example, many required time-varying factors such as housing context

and population profile over time are often not available, and various assumptions about the

relationship between variables and mobility have to be made.

To overcome these problems and to accurately reconstruct residential mobility rates from

this type of retrospective survey, we propose a new approach based on the repeat measures

regression (RMR) [5]. Starting from the seminal work of Bailey, Much and Nourse (1963), RMR

has become a popular technique especially since Case and Shiller (1970, 1989). As indicated by

its name, RMR is based on data that directly measure the variable of interest and have multiple

observations for the same subject (or cohort, in this case). By using a set of time dummy

variables, RMR can directly construct an index of change without resorting to any other

explanatory variable or assumed models. The basic model of RMR is as follows.

Assume the variable of interest (such as house price) P can be modeled by a simple

equation

$$\ln P = X\beta + \sum \beta_i D_i$$

where the vector X includes a constant term and all relevant explanatory variables. D_i is the time

dummy for period i. If the data has observations for the same subject (such as a house) in period

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[4] The raw residential mobility rate in 1994 is only about half of those in the 1990s, because the survey was conducted in 1994 and, hence, only about half of moves are reported for 1994.

[5] Repeat measures regression is often called repeat sales regression as it was first designed to build real estate price index from repeat sales data of properties.

k and j, we can apply the above model to both periods and then get the difference between these two periods. This yields the following:

$$\ln P_k - \ln P_j = \ln\left(P_k \Big/ P_j\right) = \beta_k D_k - \beta_j D_j$$

In order to do regression based on the above equation, the dummy variable for each period takes the value of -1 if it is the first observation, 0 if there is no observation in the period, and 1 if it is the second observation. If an object has more than two observations, we can convert them into records of pairs. For example, if a house has transaction records only in year 1995, 1998 and 2000, then the first record of dummy variables from 1995 to 2000 will be -1, 0, 0, 1, 0, 0, and the second record will be 0, 0, 0, -1, 0, 1. Coefficients for the dummy variables can then be obtained through a simple regression on the paired dataset. Each coefficient for the dummy variable represents the change of P in that particular period relative to the base period. Thus an index for the change of P can be easily constructed.[6]

In the case of residential mobility, we assume that three sets of variables affect each cohort's mobility rate over time: cohort specific variables (such as sex and household composition that may not be available in the dataset), age, and time. It is well documented that age is an important factor in residential mobility. The time variable captures important changes in the society over time, which is especially important in China where dramatic changes took place in the past decades. We define age groups by a five-year cohort and assume time passes by every five years. In other words, the data can be reconstructed in such a way that repeat observations occur every five years. For example, the age group of 25-30 will become group 30-35 five years later. Then, using the same formulation of RMR as discussed above, we have

$$\ln M_i - \ln M_j = \beta_i D_i - \beta_j D_j + \partial_k G_k - \partial_l G_l$$

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[6] See Wang and Zorn (1997) for a good discussion of many fundamental issues about repeat sales regression.

where *M* are residential mobility rates, *D* are time dummies, and *G* are dummy variables for the

cohort's age. When time changes from *j* to *i*, the age of a particular cohort increases from *l* to *k*.

Similar to housing depreciation (Wang and Zorn 1997), each repeat observation of the

mobility rate over time for the same cohort is accompanied by the move to a higher age group.

The matrix for the raw mobility rates over time from the retrospective survey is therefore a

triangular matrix, with more observations for younger age groups and for recent years. We use

these frequency counts as weights for the regression. Finally, because age groups for annual

mobility rates are defined by five-year difference, RMR estimation results generate five indexes

constructed from the coefficients of dummy variables corresponding to five base years (1950-

54). That is, the first index is for 1950, 1955, 1960, …, and the second index is for 1951, 1956,

1961, …, and so on. We then correct for their differences and transform them into one single

series of residential mobility rates (see appendix for more details).

Results

Descriptive Analysis   Because the dataset is retrospective, only 374 out of 3,724

respondents have housing information for all five periods (Table 1). In total, 9,290 moves were

made by all respondents, with less than 2.5 moves per person on average, which is quite low

compared to the Western society. According to the *gross* cohort annual mobility rate which does

not take the age structure of the sample into consideration[7], cohort 1978-87, who started their

housing career when there was a massive construction of public housing, has the highest

mobility rate (9.25% per annum). In contrast, cohort 1988-94, who started their housing career

in the reform era, has the lowest mobility rate (7.79% per annum). Yet, we need to understand

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[7] The gross annual mobility rate is calculated with the total moves for each cohort divided by the total number of people in the same cohort, and the number of years the cohort has been in the housing career.

that this cohort has been in the housing career for a relatively short period, and they have not demonstrated their mobility as fully as previous cohorts. According to the gross annual mobility rate for each historical period, the mobility rate is the highest during 1978-1987 (10.16%), followed by the period of 1988-94 (9.29%), while the mobility rate is the lowest during 1949-1955 (6.07%). Because of the nature of the dataset, only certain age groups are present in the specific historic periods, and thus the above annual mobility rates, for both cohort and period, are not representative to the urban population in China. As we will show later, after taking age into consideration, the story is somewhat different.

The survival curve is a vivid tool to examine mobility over time and between groups. It shows percentages of households who "survived" the event of "move" (or who did not move) over time. According to Figure 2, the survival curve for the sample (ALL) is rather steep in the first 5 years of the housing career and the survival rate decreases from 1 to 0.53 in year 5, meaning only 53% households never moved within the first five years. It is not surprising that mobility varies by marital status. In contrast to the conventional wisdom that single people are more likely to move than married people, there is a tipping point around year 4 or 5. Before that, married people are more likely to move (with a steeper curve), but after that, the pattern reverses with single people more likely to move. This interesting pattern is a result of the socialist housing allocation system which favors married people. Single people are often not qualified for long-term work unit housing. Only when they become married, they are eligible to obtain apartments from their work-units and they can join the housing queue, which often triggers a residential move within a few years. Mobility also varies by housing tenure (Figure 3). Consistent with the conventional wisdom, owners are less likely to move than renters. Public renters (with a higher and flatter survival curve) are much less likely to move than private renters

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due to the *de facto* homeownership for the former. In fact, during the first 4 years, public renters and owners have almost the same survival rates. In addition, residential mobility varies between cohorts especially in the later years of their housing career (Figure 4). Despite few differences between survival curves for different cohorts in the first 4 or 5 years, the cohort 1978-87 is the most likely to move (a steeper curve with lower survival rates), the cohort 1949-55 is the least likely to move, and the cohort 1966-77 and the cohort 1956-65 fall in between. As discussed earlier, there was a massive construction of public housing in the 1980s, which may contribute to the high mobility of the cohort 1978-87. In sum, residential mobility in Chinese cities varies significantly between different groups of people and over time, and it shares some similarities with the Western housing markets, but also demonstrates significant differences. In the following section, we will examine factors contributing to residential mobility.

Modeling Residential Mobility   To test our hypotheses, discrete-time logit models are conducted using the standard logistic regression applied to the person-year data. Because of five historical periods with distinctively different housing policies, five models are conducted for the period 1949-55, 1956-65, 1966-77, 1978-87, and 1988-94, respectively. The dependent variable for all models is a dummy variable indicating whether the person moved or not (yes vs. no). There are four sets of independent variables, most of which are time varying and lagged (previous year) variables (Table 2). The first set includes conventional socio-demographic variables, including cohort as the period of entering housing career and as a proxy for age, marital status, change in marital status since last year, education, and personal income. Household income is conventionally used in housing studies; yet, due to the design of the sample, only annual income for the respondent over time is available. So caution is needed in interpreting the effect of income. In addition, birth of a child, an important trigger event for

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residential mobility, is not available in the dataset, thus we cannot measure its effect. But according to Li (2004), it is not significant, as changing housing due to the addition of a child is still not a common practice in China. The second set includes job related variables. In addition to occupation, respondent's work-unit and change of work-unit are included, because work units have served as a main housing provider in Chinese cities, and it is well documented in the literature that work units play significant roles in housing consumption (e.g. Logan et al., 1999; Huang and Clark, 2002; Huang 2003a, b; Li, 2000a, b). As the rate of multi-generation cohabitation is high (Logan et al. 1999), young adults often live in their parents' dwelling. Thus, parents' especially father's work unit and occupation may affect a person's residential mobility. Yet, due to massive missing values for parents' information, they are not included in models. In addition, household registration status (urban vs. rural, permanent vs. temporary) is important in housing access (Huang and Clark, 2002; Li, 2000a). Yet, the survey is about urban residents only. Thus it is impossible to test the effect of registration status on residential mobility. The third set includes housing related information such as tenure, number of residents and number of rooms in previous dwellings, and duration in the housing career and its squared term. The fourth set is contextual variables, including city size and region, serving as proxies for the housing stock and housing market, which were not collected in the dataset.

All five models are significant, and the results are listed in Table 3. First of all, socio-economic variables are significant in all models. Not surprisingly, people with higher education are more likely to move, except in the post-war period of 1949-56, and men are in general more likely to move than women. However, in contrast to the conventional wisdom in the West, married people are more likely to move in all periods, as indicated by positive and significant coefficients. As mentioned earlier, this is a result of the socialist housing allocation system in

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which only married people are qualified to access long-term housing from work units. Marital status change in the previous year serves as a trigger event for move in all periods. In addition to changed housing needs after marital status change, this is mainly a result of changed housing qualification which allows married couples to move into long-term public housing. Furthermore, older cohorts are in general less likely to move as indicated by negative, although insignificant, coefficients, with the exception of cohort 1978-87 who entered their housing careers when there was a massive construction of public housing. In particular, cohort 1956-65, who entered their housing careers during the Socialist Transformation, are less likely to move than younger cohorts even during the period of 1978-87. This demonstrates that older cohorts are more likely to access long-term housing in the public sector, which discourages mobility. In addition, it shows that people's initial housing experience when they entered their housing careers can significantly affect their residential mobility later in their life cycles.

Secondly, with positive and significant coefficients in all models, work-unit change clearly serves as another trigger event in residential mobility. This shows that housing has always been provided by work units even in the early 1990s. People who change their work-units often have to return their dwellings back to their previous work units and apply for new ones from their current work units. Yet, the nature of work units has different effects over time. It has negative effects in the early periods, indicating people working in the public sectors (including government agencies, public organizations, state and collectively owned enterprises) are less likely to move than those in the private sectors. In the socialist housing system, the former are more likely to access long-term public housing, which usually grants them *de facto* homeownership and thus discourages mobility. Yet, during 1988-94, the pattern changes and people in the public sectors are more likely to move than those in the private sectors,

corresponding to significant changes in the housing system. In the early stage of the housing reform, work units, especially large state-owned work units, are the main consumers of commodity housing, who purchased flats in batch and then sell them to their employees with heavy subsidies (Wu, 1996; Huang and Clark, 2002). This clearly has generated a higher residential mobility into private housing among people working in these work units. This practice was phased out at the end of 1990s, and the effect of the nature of work units can be different after that. Surprisingly, occupation is only significant in the model for 1978-87 and 1988-94, and coefficients are negative. During 1978-87, a period of massive construction of public housing, professionals, cadres, service and industrial workers are less likely to move than others, as the former are more likely to access public housing. But professionals and cadres are no longer significant during 1988-94, which indicates they may take advantage of new housing options resulted from the reform and move to private housing.

Thirdly, housing factors are important to mobility; yet, some have different effects over time due to changes in the housing system. For example, housing tenure has negative effects in early periods but positive effects in the post-1978 periods, indicating that it is only a recent phenomenon in China that renters are more likely to move than owners. During 1988-94, both public and private renters are more likely to move than owners, not much different from the Western models. However, the negative coefficients of public rental in pre-1978 periods indicate that public renters are less likely to move than owners. The change of the coefficient sign for public rental from negative to positive indicates that the residential stability associated with public rental is no longer the same, and with the ongoing reform, homeownership is becoming a more stable tenure than public rental. In addition, duration in the housing spell also has different effects over time. While it is only significant in some models, duration has positive

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effects in earlier periods and negative effects since 1978, meaning people with longer duration are more likely to move before 1978 but less likely to move after 1978. This change probably is a result of the housing reform that rewards people with longer duration, often high seniority, by giving them more subsidies during the privatization of public housing, which in turn discourages their mobility. Different signs between coefficients for duration and duration^2 indicate a curvilinear relationship between duration and mobility. Not surprisingly, crowded housing condition with more residents living together encourages move, especially since 1978 when there are more hosing options, and living in dwellings with more rooms discourages move in all periods.

Finally, people in large cities tend to be more likely to move than those in small cities before 1978, possibly because of massive construction of public housing in large cities on the one hand and radical political campaigns and housing re-allocation on the other hand. After 1978, people in both large- and medium-size cities are less likely to move than those in small cities, indicating the importance of emerging housing markets. In addition, people in eastern regions are less likely to move than those in the western regions especially during 1988-94. Case studies of cities are needed to better understand the role of local housing context on residential mobility.

In summary, the above five models demonstrate the persistency of the socialist housing system on the one hand, and changes in the housing system over time on the other hand. For example, the consistent effects of marital status, change in marital status, and change of work-unit over time demonstrate the persistent roles of work-unit based housing provision and the socialist housing allocation system, even during the reform period of 1988-94. Yet, changing effects of variables such as the nature of work units, housing tenure and duration clearly reflect

the withering of the socialist housing system and the emergence of a housing market. It is also

clear that residential move is a result of changes in housing qualification and housing supply.

The importance of marital status and change in marital status indicates that only qualified people

can access housing and thus make the move, while the significance of variable such as work unit

change shows changes in housing supply trigger residential moves.

Historical Residential Mobility Rate The above survival curves show different

mobility rates between groups, and the logit models identify factors contributing to residential

moves. Yet, neither of them can give us an overall picture of the mobility in Chinese cities and

its change over time. We then use the RMR-based model to reconstruct historical residential

mobility rate.

The estimation results for our RMR model are included in Table A.1 (Appendix). Based

on the coefficients for both time dummies (t55 - t93) and age dummies (g5 - g12), we

constructed mobility rates over time and by age group (Figure 5 and 6). In general, residential

mobility rate over time has a widened V-shaped curve. It was relatively high in the early 1950s

with about 9-11% per annum.[8] It decreased gradually to below 6% during the late 1960s and

early 1970s, the era of the Cultural Revolution. In the late 1970s, mobility rate increased rapidly

from 5.7% in 1973 to 8.0% in 1980, and since it has been increasing gradually, reaching 9.9% in

1993. Compared to raw mobility rates (Figure A.1), the reconstructed mobility rates are lower

and more realistic. It also reflects changes in Chinese cities in general and in the housing system

in particular. For example, the high mobility rate in the early 1950s was a result of the post-war

economic recovery and a housing system still dominated by private rental housing. The

declining mobility rate during the late 1950s and early 1960s was a result of the Socialist

Transformation in the housing system that converted most private housing into public rental,

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[8] The spike at the beginning of the curve is because less than five series are available within the first five years.

which obviously discouraged mobility. The low and stagnant mobility during the late 1960s and early 1970s reflected a disrupted urban economy and limited housing construction during the Cultural Revolution, while the increasing mobility since the late 1970s corresponded to the massive construction of new housing in both public and private sector resulted from phenomenal economic growth and later the housing reform. It should be noted that a rapid increase in residential mobility since the late 1990s is expected due to the recent housing reform; yet, this latest trend was not picked up as the survey was conducted in 1994.

The curve for mobility rate by age shows that young adults have the highest mobility rate (Figure 6). The mobility rate increases sharply from about 6.9% for age group 15-19 to 24.1% for age group 25-30. It then falls to about 8.9% for age group 40-44. After a slight rise to 11.5% for the age group 50-54, it decreases to about 7% for the age group 59-60. While the pattern of mobility rate is similar to that in the Western society (Clark and Dieleman, 1996), the underlying dynamics are probably different. For example, high mobility rate for those in their late 20s is probably a result of moving into long-term public housing in addition to leaving home for work and education to start their own housing career. The lower mobility rate for those in their 30s and 40s is mainly because by then they have accessed long-term public housing from their work-units, in contrast to moving into homeownership as is the case in the West. The slight increase for those in their late 40s and early 50s is probably not a result of retirement move, but rather it may be a result of occupational promotion that qualifies them for better housing. It is obvious that the reconstructed residential mobility rates based on the RMR is much less smooth and more realistic than those derived from statistical models (compared to Li, 2004). They also preserve important turning points in history that may not be well captured by models.

Conclusions and Discussions

As former socialist countries are experiencing the unprecedented institutional transition toward market economies, residential mobility has changed significantly, and it is a powerful force (re)shaping the urban socio-spatial structure. As most of the existing literature on residential mobility focuses on Western cities where private housing dominates and market mechanisms prevail, we know relatively little about residential mobility in socialist cities where public housing dominates and in transitional cities where significant changes are taking place. We know even less about the temporal changes in residential mobility in cities that experienced these two distinctive political economies. This paper aims to understand the patterns and dynamics of residential mobility in Chinese cities, and their changes over time during 1949-1994, a period covering both the socialist and transitional era.

We argue that changes in housing supply and housing qualification, instead of housing needs and affordability as is the case in the West, trigger residential moves in Chinese cities. We further argue that housing policies have been essential in shaping the housing supply and determining housing qualification. For the most part of the post-1949 period, the housing system in Chinese cities was dominated by public rental housing provided by the government and government agencies, whose allocation was based on a set of eligibility criteria. Thus Chinese urban households have had little freedom choosing their preferred dwellings and neighborhoods, and few made voluntary moves. Instead, they often moved as a result of their changed housing qualifications (e.g. martial status change) and changed housing supply (e.g. new housing construction by their work units). Since the housing reform, households are granted the freedom of residential mobility and they begin to enjoy more housing options with an increasingly large stock of private housing, both of which are results of significantly changed housing policies that

now aim to create a dynamic housing market. Changes in housing needs and affordability begin to trigger residential moves. Yet, housing qualification continues to shape households' access to housing, especially subsidized housing in both the public and private sector, and consequently their residential moves. Thus both changed housing needs and housing qualification contribute to residential mobility in the transitional era. A longitudinal analysis of the changing roles of the socialist institutions and housing markets is needed to better understand the dynamics of residential mobility in China.

Using a survey of the life history of more than 4000 households in 20 cities and the method of repeated measures regression, we reconstructed residential mobility rate over time, which is about 6-10% per annum during 1949-94. It is relatively low compared to that in the United States, but is probably not very different from some European countries where public housing constitutes a large share of the housing stock. Yet, because of dramatic changes in housing policies and consequently changes in the housing stock and housing qualification criteria, residential mobility has fluctuated significantly over time. With a predominately private housing stock and a market-based allocation system in the early 1950s, the mobility rate was relatively high. Yet, during the Socialist Transformation and the following Cultural Revolution when most private housing was converted into public rental and the socialist allocation system was implemented, mobility rate decreased significantly. However, since the late 1970s, mobility rate has been increasing steadily as a result of the massive new housing construction in both the public and private sector on the one hand, and an emerging housing market and the market-based allocation system on the other hand. Mobility rate also changes with age in a similar pattern as in the West; yet probably with quite different dynamics. People in their late 20s have the highest mobility rate, which is mainly a result of their eligibility for long-term public housing and

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consequent residential moves. Mobility rate declines later in the life cycle mainly because people have settled down in public housing instead of having moved into homeownership as is the case in the West.

Using the same dataset and the method of longitudinal analysis, five logistic models corresponding to five different historical periods are conducted to examine factors contributing to residential mobility. The results show that in addition to common socio-economic factors (e.g. cohort, marital status and education), job and work-unit related factors, previous housing conditions and regional contexts are important to residential mobility. First of all, the dynamics of residential mobility demonstrate both similarities with and differences from Western models. For example, men, educated people, people with marital status change and people living in crowded housing are more likely to move, which is consistent with findings in the West. Yet, professionals and cadres are less likely to move, mainly because they are more likely to access long-term public housing from their work units in the socialist housing allocation system, which discourages mobility. Also in contrast to the conventional wisdom, married people are more likely to move than single people, because only the former are eligible to access long-term public housing and they usually move within a relatively short period after being married. These unique findings clearly demonstrate the impact of housing policies on housing access thus residential mobility. Secondly, while some factors have consistent effects over time, indicating the persistency of the socialist housing supply and allocation system, others have different effects, demonstrating changes in the housing system. For example, work-unit change serves as a trigger event to residential move in all periods, which shows that work units have always been the main housing provider despite changes in the housing system. Yet, the nature of work units has different effects over time. People working in government agencies and the state sector are

less likely to move in the socialist periods, yet more likely to move in the transitional era than those in the private sector. The former are more likely to access public rental housing, which discourages mobility. In the early stage of the transitional era, work-units in government and the state sector are the main consumers of new private housing, who then allocate housing among their employees with subsidies. This process of transforming private housing into subsidized housing generated massive yet often one-time residential moves, as households take advantage of possibly the last chance of housing subsidies before it ends – the so-called "catching the last train" phenomenon (Huang and Clark, 2002). These work-unit related variables and their changing effects over time demonstrate the importance of work units, one of the most important socialist institutions, as housing providers on the one hand, and different effects on mobility due to different types of housing they provide. Housing tenure also has different effects over time. Public renters were not necessarily more mobile than homeowners because of their *de facto* homeownership in the socialist housing system, and only in the transitional era with addition of private housing and an emerging housing market, they are more likely to move than homeowners. These changing effects of housing tenure and work units again show the importance of housing policy and its change on residential mobility. In summary, the dynamics of residential mobility in Chinese cities are quite complex and unique compared to Western models, and they change over time as a result of the changing housing policies and housing system. Thus to better understand residential mobility in China, we not only should adopt a different conceptualization from that in the market-oriented housing system by studying the role of the state and government agencies, but also need to study specific housing policies and their changes with a longitudinal approach.

Because the data was collected in 1994 and major reforms did not happen until the late 1990s, this study cannot fully capture the impact of the latest housing reform on residential mobility. A higher mobility rate is expected since the late 1990s with a booming and increasingly mature housing market. Yet, the rate of homeownership in Chinese cities is more than 70%, which probably will have a negative impact on residential mobility in the near future. In addition, local housing context, measured in city size and region in this analysis, is important to residential mobility. Because of data limitation, we cannot examine the role of the specific local housing stock, housing market and housing policies on mobility. Case studies of cities are needed to better understand these contextual factors. Furthermore, with increasingly high mobility especially voluntary moves in recent years, the socio-spatial structure in Chinese cities is undergoing significant transformation. An urban society with significant spatial inequality and residential segregation is emerging, in sharp contrast to the relatively homogeneous socialist cities. The spatial pattern of residential mobility in Chinese cities and its spatial and socio-political ramifications deserve another study.

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Figure 1 Distribution of Surveyed Cities
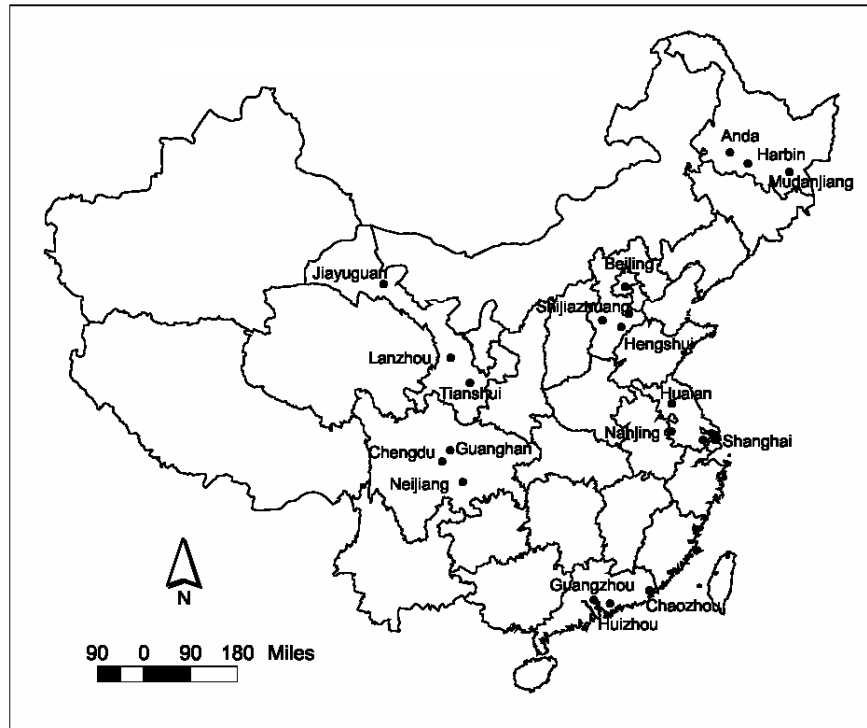
Figure 2 Survival Function Distribution by Marital Status
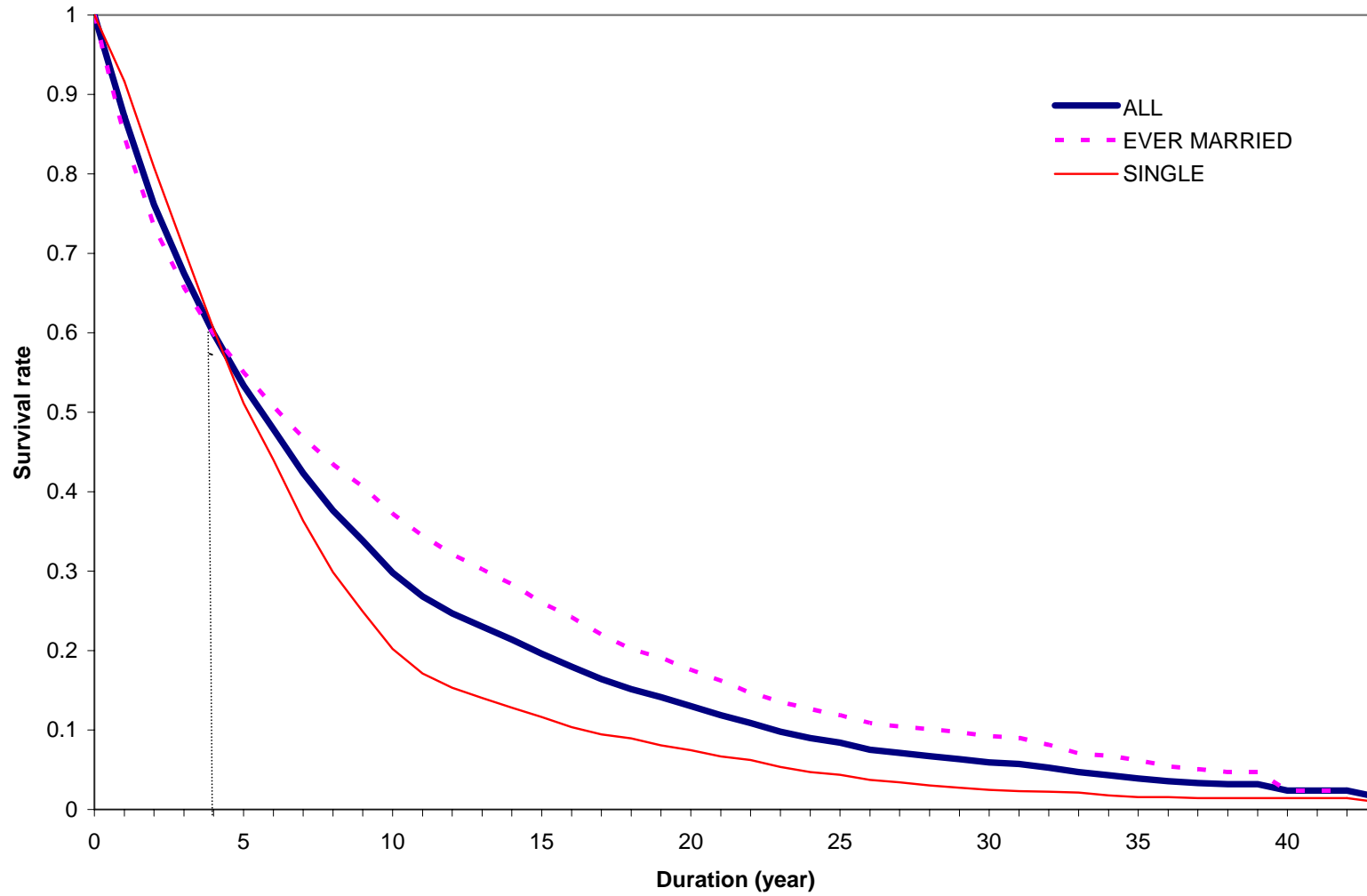
Figure 3 Survival Function Distribution by Housing Tenure
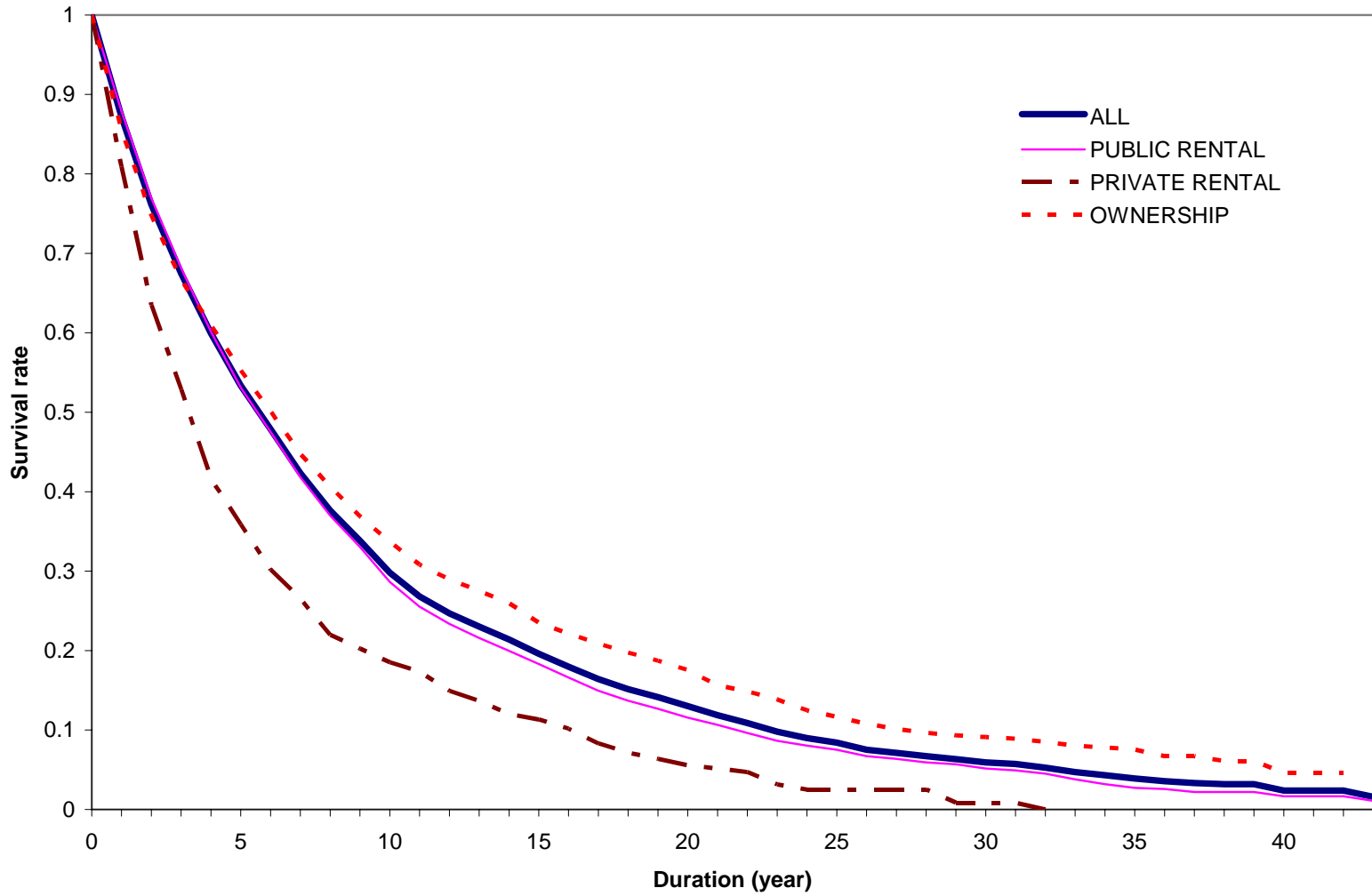
Figure 4 Survival Function Distribution by Cohort
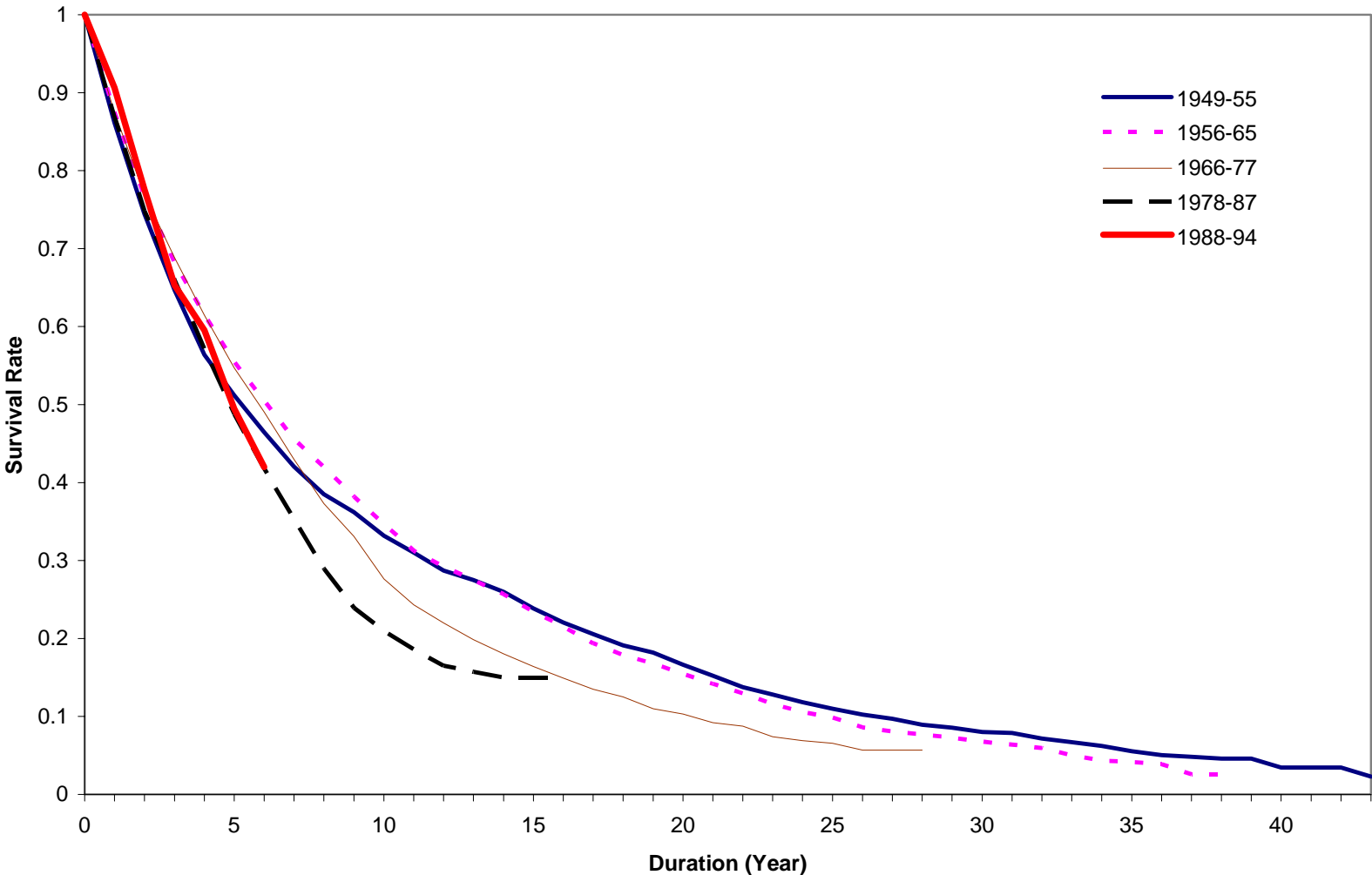
Figure 5: Reconstructed Residential Mobility Rates in Chinese Cities
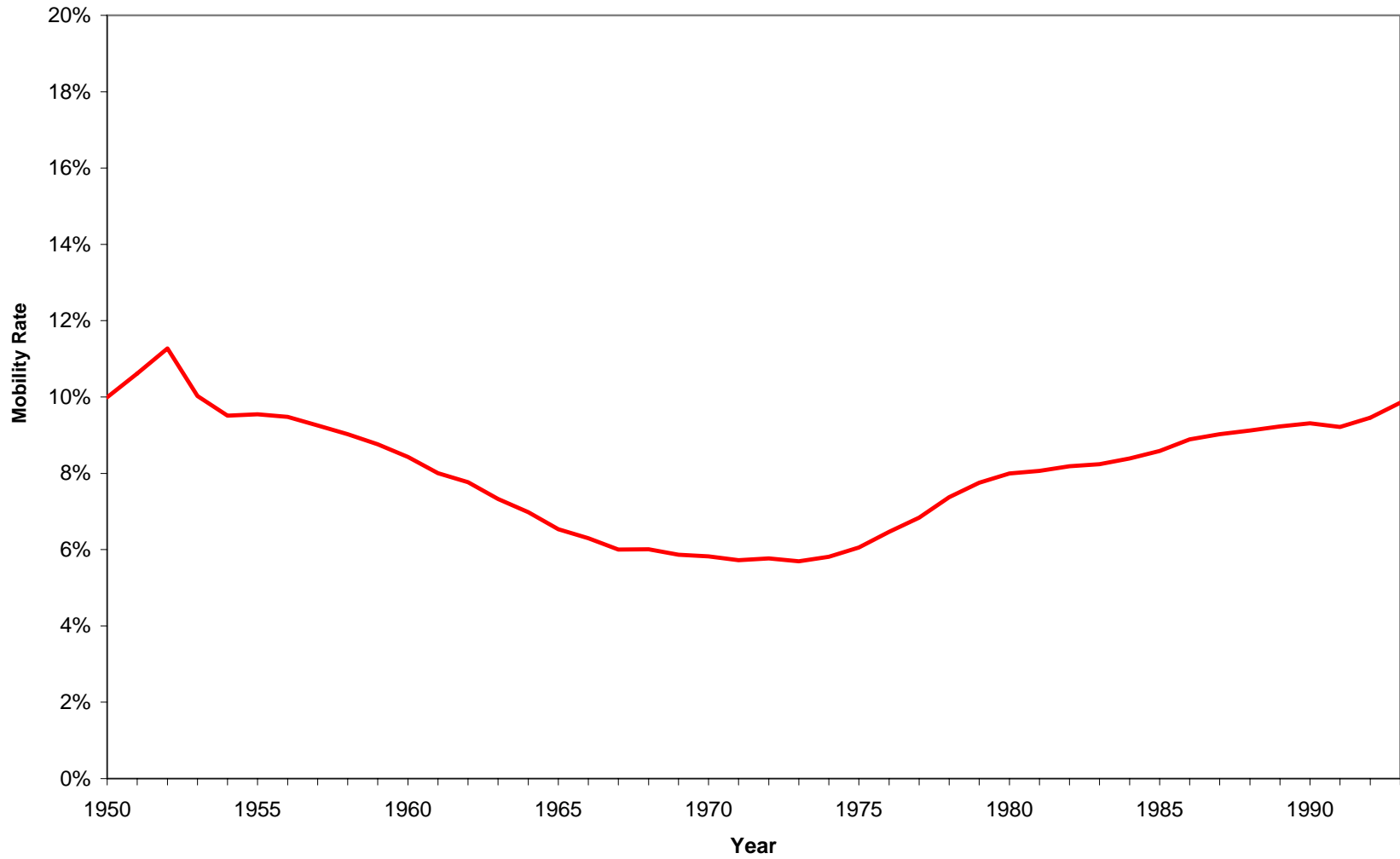
Figure 6: Reconstructed Residential Mobility Rates by Age Groups
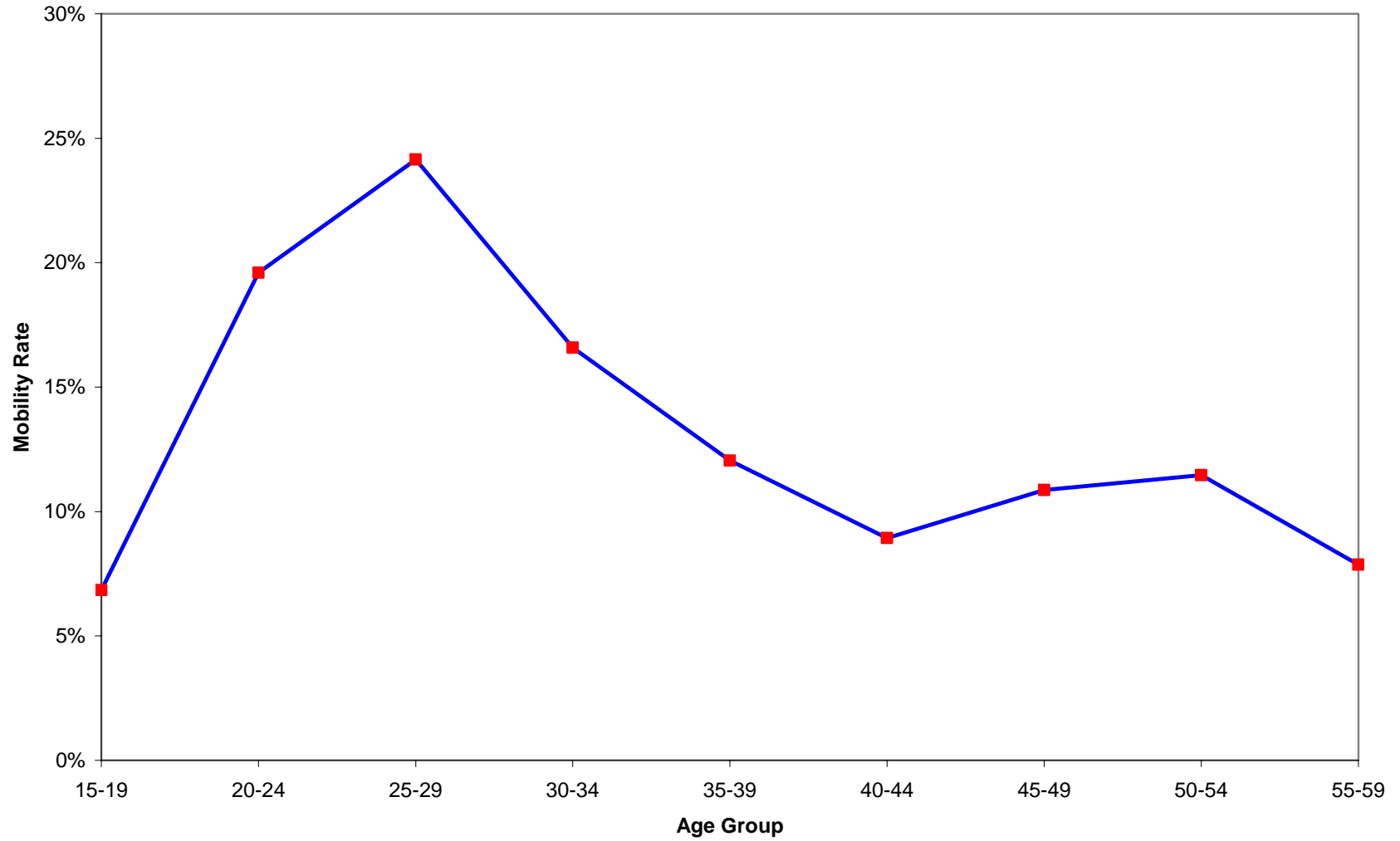
Table 1 Distribution of Residential Moves and Gross Annual Mobility Rate by Cohort and Periods

1949	56	66	78	88	1994	Number of respondants	Number of moves	Annual mobility rate	Annual mobility rate during each period (%)				
									1949-55	1956-65	1966-77	1978-87	1988-94
(10.47)	(35.44)	(20.69)	(21.61)	(11.79)		374	1,518	**8.82**	6.07	14.39	7.00	8.77	6.84
	(17.29)	(39.70)	(25.76)	(17.25)		853	2,748	**8.26**		5.57	10.66	8.30	7.94
		(20.55)	(57.40)	(22.05)		1,364	3,446	**8.71**			4.33	14.50	7.96
			(38.64)	(61.36)		935	1,470	**9.25**				6.07	13.78
				(100.00)		198	108	**7.79**					7.79
				Total		3,724	9,290		**6.07**	**8.26**	**6.80**	**10.16**	**9.29**

Note: Number in parenthsis indicates the percentage of moves during that time period.

Table 2 Variables Used in the Discrete-Time Logit Model

Variables	Definition and Coding	Baseline	Time-varying	Lagged
Socio-demographic				
Cohort	1949-55			
	1956-65			
	1966-77			
	1978-87			
	1988-94	see note		
Sex	Male			
	Female	*		
Marital status	Ever married		yes	yes
	Single	*		
Marital status change in last year	Yes		yes	yes
	No	*		
Education	College +		yes	
	High school			
	Elementary or junior high			
	Illiterate	*		
Income (*yuan*)	Annual income		yes	yes
Job				
Occupation	Professionals		yes	yes
	Cadres			
	Service workers			
	Industrial workers			
	Others	*		
Work-unit	Government agencies		yes	yes
	Public organizations			
	State Owned Enterprises			
	Collective enterprises			
	Private and other firms	*		
Change of work-unit	Yes		yes	
	No	*		
Housing				
Tenure	Public rental		yes	yes
	Private rental			
	Own	*		
Number of residents			yes	yes
Number of rooms			yes	yes
Duration	Years since the beginning of housing spell		yes	
Duration^2	Square of duration		yes	
Context				
City size	Large city		yes	yes
	Medium city			
	Small city	*		
Region	Eastern		yes	yes
	Central			
	Western	*		

Note: The baseline for cohort varies with model. The youngest cohort for a specific period serves as the baseline.

Table 3 Estimate Results for Residential Mobility by Period

Independent Variables		Estimated Coefficients									
Socio-demographic		49-55		56-65		66-77		78-87		88+	
Cohort	1949-55			0.108		-0.076		-0.159		-0.062	
(ref. The youngest cohort	1956-65					-0.054		-0.434	***	-0.006	
in the period)	1966-77							-0.090		-0.196	
	1978-87									0.156	
Sex (ref. Female)	Male	0.678	**	-0.119		-0.099		0.043		0.020	
Marital status (ref. Single)	Ever married	2.123	***	1.154	***	1.177	***	1.138	***	0.369	***
Marital status change (ref. No)	Yes	3.542	***	3.217	***	3.460	***	3.738	***	3.094	***
Education (ref. Illiterate)	College or above	1.014		0.639	**	0.596	***	0.450	**	0.468	*
	High school	0.053		0.643	***	0.538	***	0.346	**	0.462	**
	Elementary/junior high	-0.587		0.422	***	0.357	***	0.220		0.363	
Income (*yuan*)		-0.006		-0.001		0.001		-0.001	***	1.4E-05	
Job											
Occupation (ref. Others)	Professionals	0.122		-0.115		-0.174		-0.237	*	-0.227	
	Cadres	-0.619		-0.261		0.002		-0.315	**	-0.089	
	Service workers	-0.074		-0.099		0.043		-0.261	**	-0.253	*
	Industrial workers	-0.342		-0.035		0.075		-0.216	*	-0.233	*
Work-unit	Government agencies	-1.000	*	-0.310		-0.009		-0.069		0.327	**
(ref. Private and other firms)	Public organizations	-1.218		-0.256		0.063		0.029		0.356	**
	State Owned Enterprises	-0.518		-0.242		-0.017		-0.073		0.139	
	Collective enterprises	-0.349		-0.132		-0.196		-0.278	**	0.145	
Work-unit change (ref. No)	Yes	3.381	***	2.211	***	2.976	***	1.921	***	1.275	***
Housing											
Tenure (ref. Ownership)	Public rental	-0.075		-0.108		-0.188	**	0.093		0.308	***
	Private rental	-0.850		-0.005		0.458	***	0.323	**	1.000	***
Number of residents		0.001		0.002		-0.002		0.076	***	0.121	***
Number of rooms		-0.330	**	-0.148	***	-0.130	***	-0.168	***	-0.082	***
Duration in the housing spell		0.350		0.080	*	0.025		-0.030	**	-0.009	
Duration^2		-0.054		-0.007	**	-0.003	***	0.000		0.000	
Context											
City size (ref. Small city)	Large city	0.406		0.280	**	0.083		-0.099	*	-0.107	
	Medium city	-0.609		-0.054		-0.022		-0.208	***	-0.112	
Region (ref. Western)	Eastern	0.071		-0.087		-0.009		-0.006		-0.234	***
	Central	0.326		-0.072		0.343	***	-0.042		-0.063	
Intercept		-2.755	***	-3.130	***	-3.444	***	-2.654	***	-3.290	***
-2 Log Likelihood with intercept only		489		4,411		10,902		17,974		12,558	
-2 Log Likelihood with intercept and covariates		329		3,576		8,736		14,807		11,210	
Likelihood Ratio Chi-square test		160	***	835	***	2,166	***	3,167	***	1,347	***
D.F.		26		27		28		29		30	

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Appendix

The RMR model results in five indexes directly constructed from the coefficients of dummy variables corresponding to the five base years (1950-54). For example, the first series of index is for 1950, 55, 60, …, the second index is for 1951, 56, 61, …, and so on. For our purpose here, we need to correct their differences and combine them into one single series.

There are two steps in transforming the five series into one single index. First, since the results from RMR model are indexes rather than mobility rates, we calculate the last five years' gross mobility rates given that the sample is most representative of the population in the last five years. But, these five mobility rates are not directly comparable because they are for different samples. For example, the mobility rate in 1993 is based on a sample that includes not only people from the 1992 sample but also young people who started their housing career in 1993, and excludes those who became older than the survey age limit (65) in 1994. Because we have relatively representative data for all age groups in these last five years, we can adjust for their differences based on their age structure.

As Table A.2 shows, we first calculate the last five years' gross mobility rates for different age groups.[9] Then using the age structure in 1993, we calculate the age structures of the same sample in all other years during the study period. For example, assuming each age-year has one fifth of the whole 5-year age group, then only 80% of people in the 20-25 age group in 1993 are included in the same age group in 1992. In this way, we can construct age structures in 1992 to 1989 for the same people included in 1993. Based on these computed age structures and the gross mobility rates, we obtain adjusted average mobility rates that are comparable across the last five years.

Second, with the mobility rates for the last five years, we can transform the five indexes into five series of mobility rates. However, as explained earlier, these five series of mobility rates do not represent the exactly same cohort; there is a one-year difference in the age-group composition between two adjacent series.[10] We linearly interpolate the values within each five-year for all five indexes and then average them to obtain the final residential mobility rates.

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[9] 1994 is excluded because the survey only covers half the year.

[10] Although the first step (correcting the ending values of the five series) makes the five series more comparable to some extent, it is only based on the last few years' difference and hence the five series are still different due to the nature of cohorts they represent.

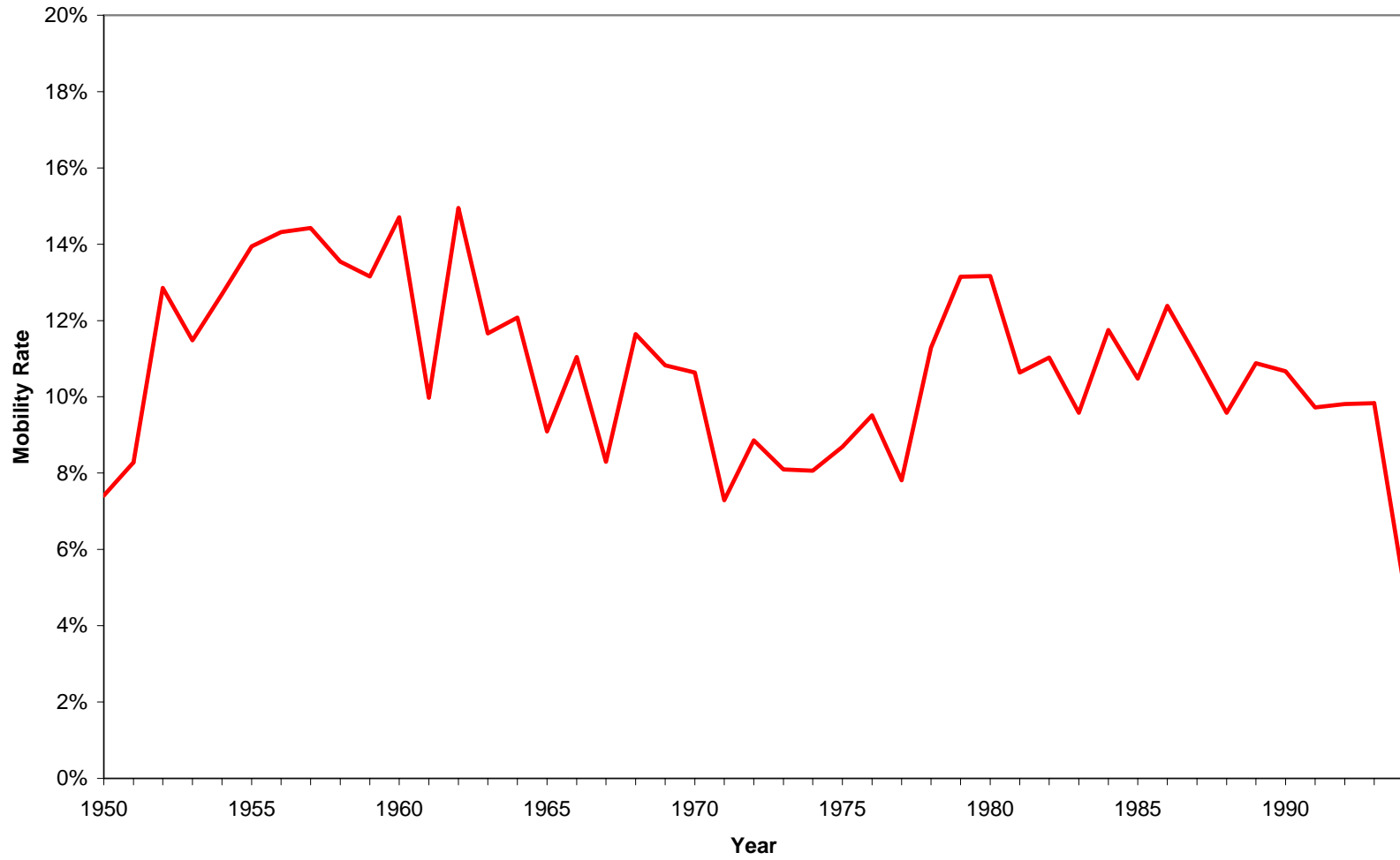**Figure A.1: Historical Raw Mobility Rates in Chinese Cities**

Table A.1: RMR Estimation Results

Dummy Variable	Coefficients	Std. Err.	t	P>t
t55	0.0644	0.1883	0.34	0.733
t56	-0.0432	0.1883	-0.23	0.819
t57	-0.0676	0.1883	-0.36	0.720
t58	0.0054	0.1883	0.03	0.977
t59	0.1724	0.1859	0.93	0.355
t60	-0.1205	0.2724	-0.44	0.659
t61	-0.5881	0.2724	-2.16	0.032
t62	-0.1532	0.2724	-0.56	0.574
t63	-0.1157	0.2724	-0.42	0.671
t64	0.1407	0.2654	0.53	0.597
t65	-0.7674	0.3363	-2.28	0.024
t66	-0.5653	0.3363	-1.68	0.095
t67	-0.9455	0.3363	-2.81	0.006
t68	0.1326	0.3363	0.39	0.694
t69	-0.2428	0.3248	-0.75	0.456
t70	-0.5581	0.3876	-1.44	0.152
t71	-0.8486	0.3876	-2.19	0.030
t72	-0.6300	0.3876	-1.63	0.106
t73	-0.2029	0.3876	-0.52	0.601
t74	-0.2711	0.3715	-0.73	0.467
t75	-0.6519	0.4290	-1.52	0.131
t76	-0.4980	0.4290	-1.16	0.247
t77	-0.7983	0.4290	-1.86	0.064
t78	0.1972	0.4290	0.46	0.646
t79	0.1644	0.4079	0.40	0.687
t80	-0.1344	0.4615	-0.29	0.771
t81	-0.3371	0.4615	-0.73	0.466
t82	-0.3978	0.4615	-0.86	0.390
t83	0.0498	0.4615	0.11	0.914
t84	0.1308	0.4345	0.30	0.764
t85	-0.2515	0.4849	-0.52	0.605
t86	-0.0501	0.4849	-0.10	0.918
t87	-0.2812	0.4849	-0.58	0.563
t88	0.2321	0.4849	0.48	0.633
t89	0.2082	0.4496	0.46	0.644
t90	-0.0341	0.4970	-0.07	0.945
t91	-0.2039	0.4970	-0.41	0.682
t92	-0.2866	0.4970	-0.58	0.565
t93	0.4292	0.4970	0.86	0.389
g5 (20-24)	1.0516	0.0680	15.46	0.000
g6 (25-29)	1.2604	0.1079	11.68	0.000
g7 (30-34)	0.8849	0.1372	6.45	0.000
g8 (35-39)	0.5652	0.1571	3.60	0.000
g9 (40-44)	0.2660	0.1680	1.58	0.115
g10 (45-49)	0.4622	0.1693	2.73	0.007
g11 (50-54)	0.5151	0.1584	3.25	0.001
g12 (55-59)	0.1391	0.1283	1.08	0.280
# of observations:	218		R-squared:	0.7435
F(47, 171):	10.54		Adj. R-squared:	0.673

Table A.2. Adjusting for Last Five Years' Mobility Rates

Year	Raw Mobility Rate by Age Cohort									
	20-24	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60-64**	**Average**
93	16.57%	18.85%	9.87%	7.32%	6.79%	8.98%	7.58%	7.87%	8.30%	**9.85%**
92	15.25%	12.98%	9.71%	8.04%	9.45%	6.85%	10.83%	8.49%	6.56%	**9.42%**
91	11.08%	16.46%	7.81%	9.49%	9.51%	9.18%	6.87%	6.09%	6.11%	**9.06%**
90	11.68%	18.58%	10.00%	7.69%	8.57%	10.44%	10.51%	6.73%	6.33%	**9.66%**
89	14.15%	19.06%	8.54%	9.02%	7.57%	11.97%	7.32%	7.69%	5.41%	**9.33%**
	Age Structure in 1993									Total
# of people	175	504	557	628	560	412	396	394	241	3867
Weights:										
93	0.0453	0.1303	0.1440	0.1624	0.1448	0.1065	0.1024	0.1019	0.0623	1.0000
92	0.0362	0.1133	0.1413	0.1587	0.1483	0.1142	0.1032	0.1020	0.0702	0.9875
91	0.0290	0.0979	0.1357	0.1552	0.1504	0.1210	0.1054	0.1022	0.0766	0.9735
90	0.0232	0.0841	0.1281	0.1513	0.1514	0.1269	0.1085	0.1029	0.0817	0.9582
89	0.0185	0.0719	0.1193	0.1467	0.1514	0.1318	0.1122	0.1040	0.0859	0.9418
	After Normalization:									
93	4.53%	13.03%	14.40%	16.24%	14.48%	10.65%	10.24%	10.19%	6.23%	100%
92	3.67%	11.47%	14.31%	16.07%	15.02%	11.56%	10.45%	10.33%	7.11%	100%
91	2.98%	10.06%	13.94%	15.95%	15.45%	12.43%	10.83%	10.50%	7.87%	100%
90	2.42%	8.78%	13.37%	15.79%	15.80%	13.24%	11.33%	10.74%	8.53%	100%
89	1.97%	7.64%	12.67%	15.58%	16.07%	13.99%	11.91%	11.04%	9.13%	100%