

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. It is argued that residential mobility in China is mainly triggered by changes in housing supply and housing qualification, both of which are determined by housing policies. Using a retrospective survey (1949–94) in 20 Chinese cities, it was found 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 marital 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.*

KEY WORDS: Residential mobility, China, housing policies

Introduction

Residential mobility is intricately related to housing markets and urban changes. It has been studied extensively 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.

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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 of housing or neighbourhood and had to wait for flats allocated by their employers (or work units, *danwei*) or the municipal government (through housing bureaus) (Wang & 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 an unprecedented prevalence of residential mobility in Chinese cities. While public housing is being privatized, massive private housing has been available, and more importantly, for the first time in decades households have been given freedom to choose their preferred dwellings and neighbourhoods (Huang, 2003a; Huang & Clark, 2002). Since then residential mobility has increased significantly. According to China's latest 2000 Census, about 15 per cent of all moves between 1995 and 2000 were residential moves or resettlement. These housing-related moves are powerful forces (re)shaping the urban socio-spatial landscape in Chinese cities.

However, compared to the large body of literature on regional migration, especially rural-to-urban migration in China (e.g. Chan, 1988, 1994; Fan, 1999; Fan & Huang, 1998; Liang & White, 1997), there are few studies on intra-city residential mobility. Only recently have scholars begun to study residential mobility, focusing mainly on the reform era (Li, 2004; Li & Siu, 2001a, b; Wu, 2004). Using a retrospective survey dataset, this paper aims to understand the patterns and dynamics of residential mobility in Chinese cities during 1949–94, a period that covers both the socialist era (1949–87) and the early stage of the housing reform era (1988–94).¹ It is hypothesized that overall residential mobility in Chinese cities has been low despite the recent increase induced by the housing reform. It is also hypothesized 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 were more important; however, with ongoing market forces, the conventional housing adjustment thesis becomes more relevant.

After a brief review of literature on residential mobility, the paper describes the history of the housing system in urban China, and the role of the state and housing policies in residential mobility. A retrospective survey dataset is then utilized to understand the patterns and dynamics of residential mobility across time, and a historical residential mobility rate is reconstructed. The paper concludes with major findings and discussions.

Research Context

Residential mobility refers to intra-city moves that are often related to housing (Clarke, 1986). Because it is a manifestation of the housing market and a driving force for socio-spatial sorting, there is a huge 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 & 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. change of marital status and birth of a child) and employment (e.g. job change, promotion) (e.g. Clark *et al.*, 1984; Clark & 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 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 behaviour. 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 (Daniell & Struyk, 1997; Szelenyi, 1987). In transitional economies, while housing markets begin to penetrate, government agencies and other socialist institutions continue to play important roles in housing consumption (Huang & Clark, 2002). Despite recent housing privatization and a sharp increase in mobility, residential mobility rate continues to be low in Moscow (2.5 per cent per annum in 1992) (Daniell & Struyk, 1997) and Slovenia (2.1–3.1 per cent 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 discourages mobility (Bourne, 1981; Burrows, 1999). The recent privatization of social housing in Europe, such as the Right to Buy programme in Britain, has led to an increased mobility especially within the public sector (Burrows, 1999). Yet the mobility rate in Europe (7–9 per cent per annum) is still much lower than that in the US (20 per cent per annum) (Long, 1988, 1992). This empirical evidence demonstrates the important role of the state and government agencies in residential mobility in non-market economies. However, very little is known 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 50 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 renting 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 behaviour, 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 within cities, and between cities and the countryside in the first few years of the socialist regime (1949–55) (Wang & Murie, 1999; Zhang, 1998). Private housing also belonged to just a few landlords with a large number of properties and the majority of the working class were characterized as renters with relatively high mobility, who often suffered from excessively high rents, crowding and poor housing conditions (Wang & Murie, 1999; Zhang, 1998).

Realizing that there were 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, the private housing market was virtually eliminated by the late 1970s. At the same time, with a 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 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 (Bian *et al.*, 1997; Huang & Clark, 2002). This socialist allocation system determined not only households' status in the queue but also the type of dwellings they could obtain (e.g. the amount of floor space, facilities, old bungalows vs. new apartments). Therefore, instead of housing needs, it was households' changed housing qualification that allowed them to move to new dwellings. With public renting 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 was massive construction of public housing in the 1980s and early 1990s. In particular, the reform in the budgetary system gave work units more control over their profits, which in turn allowed them to construct massive public rental housing in the form of work-unit compounds for their employees (Wu, 1996). Thus the housing stock expanded significantly and many households moved into the new apartments in the work-unit compounds. However, 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 moves. 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, which aimed 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 began to generate massive voluntary residential moves, especially from the public to the 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 market reform, the mobility

rate increased dramatically from less than 1 per cent per annum in the early 1980s to more than 10 per cent per annum in the later 1990s (Chai *et al.*, 2002), comparable to that in most West European countries but still lower than mobility rates in the US.

However, most of the new private housing is for sale only. In addition, existing public housing is being sold to sitting tenants with heavy subsidies (Tolley, 1991; Wang & Murie, 1999), 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 per cent of urban households were homeowners in 2000. While housing privatization gives households an opportunity to own their dwellings for the first time in decades, homeownership discourages residential mobility, especially after the initial purchase-related moves. According to a recent survey in Beijing, homeownership has resulted in a significant drop in the mobility rate, from 4 per cent per annum to less than 1 per cent per annum (Li, 2004).

Despite an emerging housing market, the state still plays an important role in shaping housing production and consumption through control of the speed, degree and direction of housing reform (Huang, 2004). Because of the government's drive 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 more diverse housing stock available for households. At the same time, households still face various constraints with regard to 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, the 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 & Clark, 2002). Obviously this 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 the fact that some moved voluntarily to their preferred dwellings. According to a recent survey in Shanghai, 58.3 per cent of all moves are involuntary, of which more than one-third are related to housing allocation from work units, and another 59 per cent are related to infrastructure or real estate development resulting from the urban land reform (Wu, 2004). Second, 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 residential changes in Chinese cities. In contrast, people with political privilege such as those who are members of the 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 moves. This duality shares similarity 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 (Bourne, 1981; Burrows, 1999).

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 has been an emerging literature on residential mobility in Chinese cities (e.g. Li, 2004; Li & Siu, 2001a,b; Wu, 2004; Zhou, 1996). However, they all focus on the reform era, leaving the institutional transition from the socialist to transitional economies and their 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.

This study hopes 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. The paper aims to understand the patterns and dynamics of residential mobility in Chinese cities where the housing system has been in constant transition. It is hypothesized 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 have been less important until recently. Because of shifts in housing policies, the patterns and dynamics of residential mobility vary across historical periods. Only in more market-oriented periods is the conventional housing adjustment thesis more applicable.

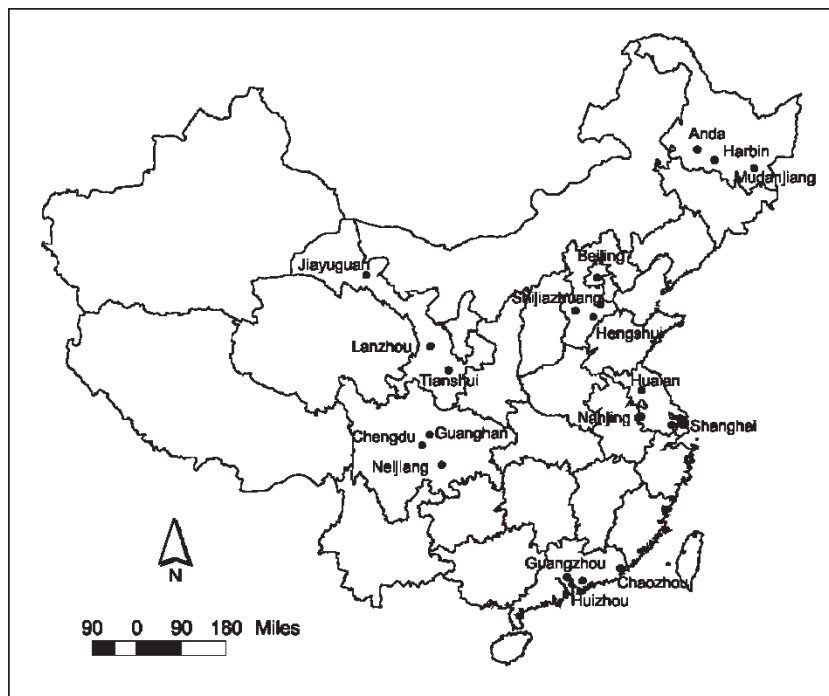


Figure 1. Distribution of surveyed cities

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 multi-stage sampling procedure. First, six provinces (Hebei, Heilongjiang, Gangsu, Guangdong, Jiangsu and 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 a population over 1 million. A medium-size city (population between 200 000 and 1 million) and a small city (population below 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 the 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 the 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 randomly selected and interviewed. In total 4073 residents were interviewed, of which 3724 qualified as 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 a retrospective survey, respondents did not have to recall many moves because residential mobility was fairly low until 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 (Clark, 1992; Davies, 1987; Tuma & Hannan, 1984). In particular, the recent development in the event history analysis and related modelling technique make it easier to study the occurrence and timing of life events such as residential moves. 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 (Davies Withers, 1997).

Because of constantly changing housing policies, five different historical periods will be analysed separately to control for 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 public 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 their housing career for the first time, housing policies are very important in shaping not only his/her housing behaviour initially 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, it should be remembered that the data were collected in 1994 and significant changes in the housing system did not occur until after 1994 when the government decided to make the housing reform even more radical (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, here called 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 it goes back in time. However, 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 moving 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 renting dominated and there were few investments in new housing development. Thus raw mobility rate is an undesirable measure for mobility in history. Second, while it is possible to reconstruct historical mobility rates based on the results from regression models, there are obvious problems too. For example, many require time-varying factors such as housing context and population profile over time that 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, a new approach is proposed based on the repeat measures regression (RMR).⁵ Beginning with the seminal work of Bailey *et al.* (1963), RMR has become a popular technique, especially since Case & Shiller (1970, 1989). As indicated by its name, RMR is based on data that directly measure the variable of interest and has 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 modelled 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 have observations for the same subject (such as a

Table 1. Distribution of residential moves and gross annual mobility rate by cohort and periods

	Number of respondants	Number of moves	Annual mobility rate	Annual mobility rate during each period (%)				
				1949	56	66	78	88
	374	1518	8.82	6.07	14.39	7.00	8.77	6.84
	853	2748	8.26		5.57	10.66	8.30	7.94
	1364	3446	8.71			4.33	14.50	7.96
	935	1470	9.25				6.07	13.78
	198	108	7.79					7.79
				(10.47)	(35.44)	(20.69)	(21.61)	(11.79)
					(17.29)	(39.70)	(25.76)	(17.25)
						(20.55)	(57.40)	(22.05)
							(38.64)	(61.36)
								(100.00)
Total								
Total	3724	9290		6.07	8.26	6.80	10.16	9.29

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

house) in period k and j , the above model can be applied to both periods and then the difference between these two periods can be found. This yields the following:

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

In order to do regression-based analysis 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, they can be converted 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, it is assumed 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 have taken place in the past decades. Age groups are defined by a five-year cohort and it is assumed that time passes by every five years. In other words, the data can be reconstructed so that repeated 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,

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

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 & Zorn, 1997), each repeated 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. These frequency counts are used 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. Corrections are made for their differences and they are transformed 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 3724 respondents have housing information for all five periods (Table 1). A total of 9290 moves were made by all respondents, with less than 2.5 moves per person on average,

which is quite low compared to Western societies. 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 cent per annum). In contrast, cohort 1988–94, who started their housing career in the reform era, has the lowest mobility rate (7.79 per cent per annum). However, it should be understood that this cohort has had a 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 1978–87 (10.16 per cent), followed by the period of 1988–94 (9.29 per cent), while the mobility rate is the lowest during 1949–55 (6.07 per cent). 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 of the urban population in China. As will be shown 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 five years of the housing career and the survival rate decreases from 1 to 0.53 in year five, meaning only 53 per cent of 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. Previous to 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 favours married people. Often single people do not qualify for long-term work-unit

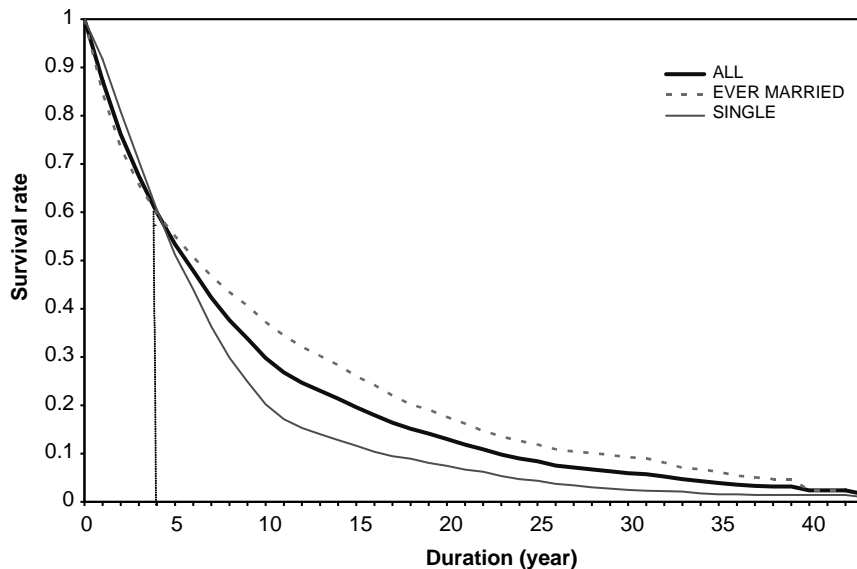


Figure 2. Survival function distribution by marital status

housing. Only when they become married are they eligible to obtain apartments from their work units, and thus 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 due to the *de facto* homeownership of the former. In fact, during the first four years, public renters

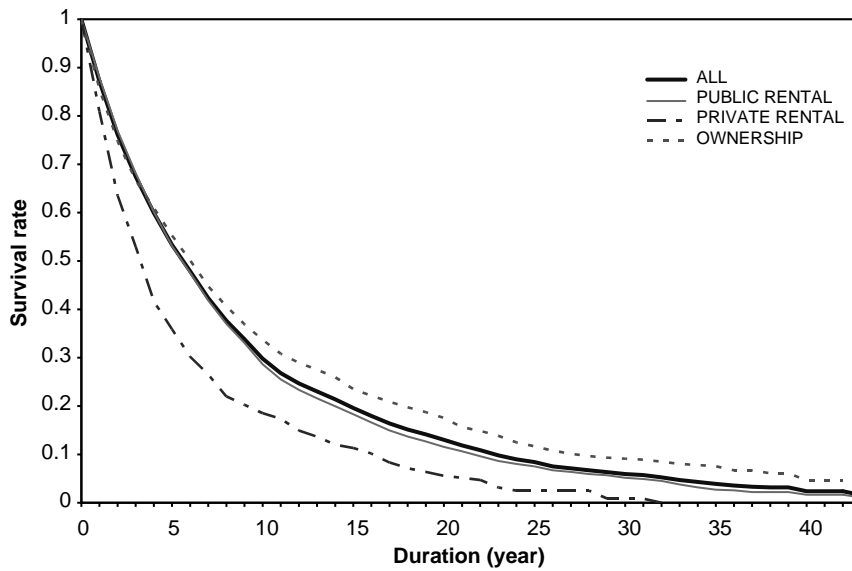


Figure 3. Survival function distribution by housing tenure

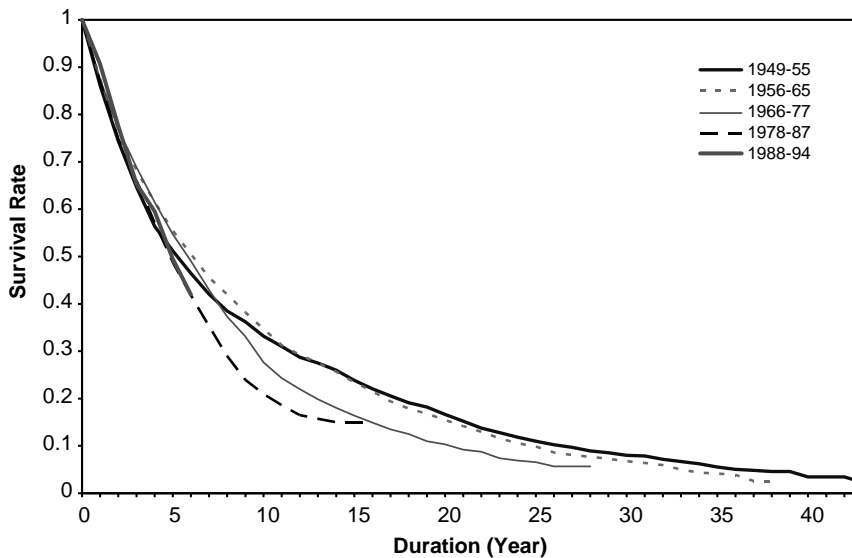


Figure 4. Survival function distribution by cohort

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 four or five 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 falls 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. The following section examines factors that contribute to residential mobility.

Modelling residential mobility. To test the hypotheses, discrete-time logit models were conducted using the standard logistic regression which were applied to the person-year data. Because of five historical periods with distinctively different housing policies, five models were conducted for the periods 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, but due to the design of the sample, only annual income for the respondent over time was available. Therefore caution is needed in interpreting the effect of income. In addition, birth of a child, an important trigger event for residential mobility, was not available in the dataset, thus its effect could not be measured. However, according to Li (2004), it is not significant because 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, respondents' work unit and change of work unit were 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 a significant role in housing consumption (e.g. Huang, 2003a, 2003b; Huang & Clark, 2002; Li, 2000a, 2000b; Logan *et al.*, 1999). As the rate of multi-generation cohabitation is high (Logan *et al.*, 1999), young adults often live in their parents' dwelling. Thus, parents', and especially father's, work unit and occupation may affect a person's residential mobility, but due to large numbers of missing values for parents' information, they were not included in the models. In addition, household registration status (urban vs. rural, permanent vs. temporary) is important in housing access (Huang & Clark, 2002; Li, 2000a). However, the survey was about urban residents only, so it was impossible to test the effect of registration status on residential mobility. The third set included 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 shows 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 shown in Table 3. First, socio-economic variables are significant in all models. Not surprisingly, people with higher

Table 2. Variables used in the discrete-time logit model

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

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

education were more likely to move, except those from the post-war period of 1949–56, and in general men were more likely to move than women. However, in contrast to the conventional wisdom in the West, married people in all periods were more likely to move, as indicated by positive and significant coefficients. As mentioned earlier, this is a result of the socialist housing allocation system in which only married people are qualified to access long-term housing from work units. Marital status change in the previous year served as a trigger event for move in all periods. In addition to changing housing needs after marital status change, this is mainly a result of changed housing qualification that allows married couples to move into long-term public housing. Furthermore, older cohorts were 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 massive construction of public housing. In particular, cohort 1956–65, who entered their housing careers during the Socialist Transformation, were less likely to move than younger cohorts, even during the period 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 start their housing careers can significantly affect their residential mobility later in their life cycles.

Second, 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 to their previous work units and apply for new ones from their current work units. However, 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. However, during 1988–94, the pattern changed and people in the public sectors were more likely to move than those in the private sectors, corresponding to significant changes in the housing system. In the early stage of housing reform, work units, especially large state-owned work units, were the main consumers of commodity housing, who purchased flats in batches and then sold them to their employees with heavy subsidies (Huang & Clark, 2002; Wu, 1996). This has clearly 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 has been different since then. Surprisingly, occupation was only significant in the models for 1978–87 and 1988–94, and coefficients were negative. During 1978–87, a period of massive construction of public housing, professionals, cadres, service and industrial workers were less likely to move than others, as the former were more likely to access public housing. However, professionals and cadres were no longer significant during 1988–94, which indicates they may have taken advantage of new housing options resulting from the reform and moved to private housing.

Third, housing factors are important to mobility, yet, some have different effects over time due to changes in the housing system. For example, housing tenure had negative effects in early periods but positive effects in the post-1978 periods, indicating that it is

Table 3. Estimate results for residential mobility by period

Independent variables		Estimated coefficients									
		49–55	56–65	66–77	78–87	88 +					
<i>Socio-demographic</i>											
Cohort (ref. the youngest cohort in the period)	1949–55		0.108	–0.076	–0.159	–0.062					
	1956–65			–0.054	–0.434	***	–0.006				
	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 (<i>yuan</i>)		–0.006	–0.001	0.001	–0.001	***	1.4E-05				
<i>Job</i>											
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 (ref. Private and other firms)	Government agencies	–1.000	*	–0.310	–0.009	–0.069		0.327	**		
	Public organizations	–1.218		–0.256	0.063	0.029		0.356	**		
	State owned enter- prises	–0.518		–0.242	–0.017	–0.073		0.139			
Work-unit change (ref. No)	Collective enterprises	–0.349		–0.132	–0.196	–0.278	**	0.145			
	Yes	3.381	***	2.211	***	2.976	***	1.921	***	1.275	***
<i>Housing</i>											
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
<i>Context</i>										
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		4411		1,902		17 974		12 558
- 2 Log Likelihood with intercept and covariates		329		3576		8736		14 807		11 210
Likelihood Ratio Chi-square test		160	***	835	***	2166	***	3167	***	1347
D.F.		26		27		28		29		30

only a recent phenomenon in China that renters are more likely to move than owners. During 1988–94, both public and private renters were more likely to move than owners, therefore showing little difference from the Western models. However, the negative coefficients of public renting in pre-1978 periods indicated that public renters were less likely to move than owners. The change of the coefficient sign for public renting from negative to positive indicates that the residential stability associated with public renting is no longer the same, and with the ongoing reform, homeownership is becoming a more stable tenure than public renting. In addition, duration in the housing period also has different effects over time. While it is only significant in some models, duration had positive effects in earlier periods but negative effects after 1978, meaning that people with longer duration were more likely to move before 1978 but less likely to move after 1978. This change is probably a result of the housing reform that rewards people with longer duration, often those with 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 duration² indicate a curvilinear relationship between duration and mobility. Not surprisingly, crowded housing conditions with more residents living together has encouraged a move, especially since 1978 when there have been more housing options, and living in dwellings with more rooms has discouraged a move in all periods.

Finally, people in large cities tended to be more likely to move than those in small cities before 1978, possibly because of the 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 were less likely to move than those in small cities, indicating the importance of emerging housing markets. In addition, people in eastern regions were 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 the 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 continuing roles of work unit-based housing provision and the socialist housing allocation system, even during the reform period of 1988–94. However, the changing effects of variables such as the nature of work units, housing tenure and duration clearly reflect the decline of the socialist housing system and the emergence of a housing market. It is also clear that residential moves are 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 move, while the significance of variables 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. However, neither of them shows an overall picture of the mobility in Chinese cities and its change over time. The RMR-based model was then used to reconstruct the historical residential mobility rate.

The estimation results for the RMR model are shown in Table A1 (Appendix). Based on the coefficients for both time dummies (t55–t93) and age dummies (g5–g12), mobility

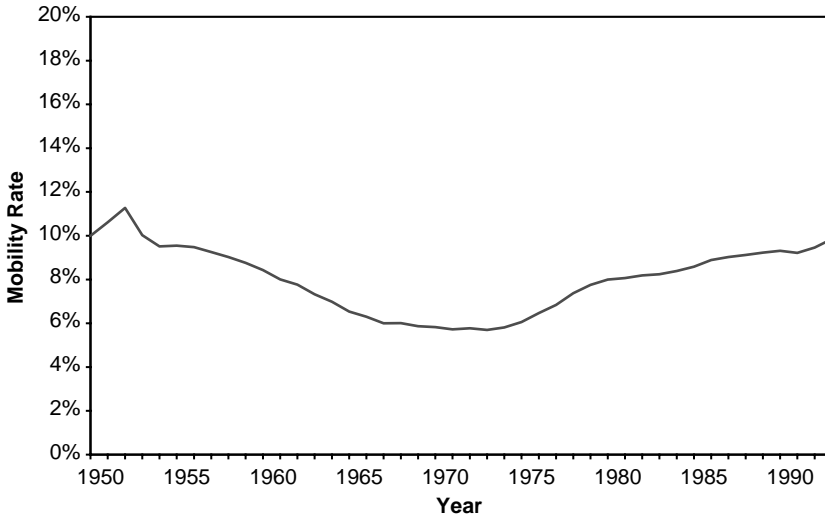


Figure 5. Reconstructed residential mobility rates in Chinese cities

rates over time and by age group were constructed (Figures 5 and 6). In general, the residential mobility rate over time has a widened V-shaped curve. It was relatively high in the early 1950s with approximately 9–11 per cent per annum.⁸ It decreased gradually to below 6 per cent during the late 1960s and early 1970s, the era of the Cultural Revolution. In the late 1970s, the mobility rate increased rapidly from 5.7 per cent in 1973 to 8.0 per cent in 1980 and since then it has been gradually increasing, reaching 9.9 per cent in 1993. Compared to raw mobility rates (Figure A1), the reconstructed mobility rates are lower and more realistic. It also reflects changes in Chinese cities in general and in the housing

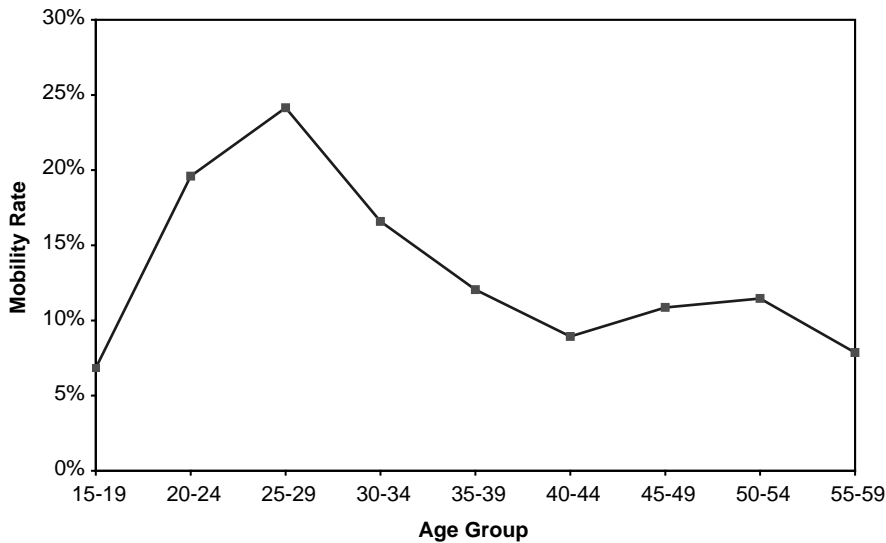


Figure 6. Reconstructed residential mobility rates by age groups

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 renting, 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 the public and private sector that 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, however, this latest trend was not found 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 per cent for the 15–19 age group to 24.1 per cent for 25–30 age group. It then falls to about 8.9 per cent for 40–44 age group. After a slight rise to 11.5 per cent for the 50–54 age group, it decreases to about 7 per cent for the 59–60 age group. While the patterns of mobility rate are similar to those in Western societies (Clark & Dieleman, 1996), the underlying dynamics are probably different. For example, a 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 a 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 are 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, relatively little is known about residential mobility in socialist cities where public housing dominates and in transitional cities where significant changes are taking place. Even less is known 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 1949–94, a period covering both the socialist and transitional era.

It is argued 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. It is further argued that housing policies have been essential in shaping the housing supply and determining housing qualification. For the majority 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 had little freedom in choosing their preferred dwellings and neighbourhoods, and few made voluntary moves. Instead, they often moved as a result of their changed housing qualifications (e.g. marital status change) and changed housing supply (e.g. new housing construction by their work units). Since the housing reform, households have been granted the freedom of residential mobility and they are beginning to enjoy more housing options with an increasingly large stock of private housing, both of which are the 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. However, 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, the study reconstructed the residential mobility rate over time, approximately 6–10 per cent per annum during 1949–94. It is relatively low compared to that in the USA, but is probably not very different from some European countries where public housing constitutes a large share of the housing stock. However, because of dramatic changes in housing policies and consequent 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. 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, the mobility rate decreased significantly. However, since the late 1970s, the 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. The mobility rate also changes with age in a similar pattern as in the West, but 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 consequent residential moves. The 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 were 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, the dynamics of residential mobility demonstrate both similarities 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. However, 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 conventions, 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 and thus residential mobility.

Second, while some factors have consistent effects over time, indicating the persistence 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 moves 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 had different effects over time. People working in government agencies and the state sector were 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 have been more likely to access public rental housing, which discourages mobility. In the early stages of the transitional era, work units in government and the state sector were the main consumers of new private housing, who allocated subsidized housing among their employees. This process of transforming private housing into subsidized housing has generated a massive number of, often one-time only, residential moves as households have taken advantage of possibly the last chance of subsidized housing before it ends — the so-called ‘catching the last train’ phenomenon (Huang & 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 and the various effects they have on mobility due to different types of housing they provide.

Housing tenure has also had 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 the addition of private housing and an emerging housing market, were they 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, not only should a different conceptualization be adopted from that in the market-oriented housing system by studying the role of the state and government agencies, but specific housing policies and their changes should also be studied with a longitudinal approach.

Because the data were 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. It is expected that a higher mobility rate has occurred since the late 1990s with a booming and increasingly mature housing market. Yet the rate of homeownership in Chinese cities is more than 70 per cent, which will probably 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 limitations the study could not examine the role of specific local housing stock and the effect of the 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 (Huang, 2005). The spatial pattern of residential mobility in Chinese cities and its spatial and socio-political ramifications deserve further study.

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Notes

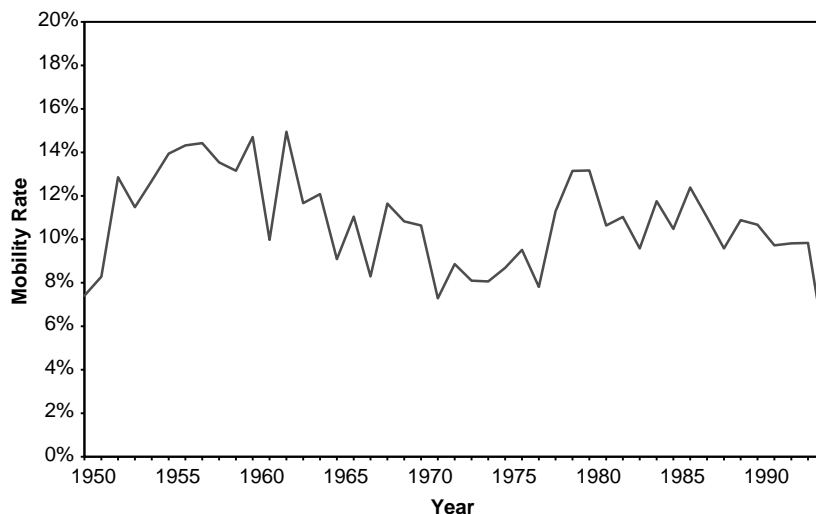
- ¹ While the overall economic reform was launched in 1978, the socialist housing system continued and the nation-wide housing reform was not launched until 1988. Thus in this paper, the 'transitional era' or the 'reform era' refers to the period after the housing reform was launched (post-1988).
- ² For example, at the early stage of housing reform, households who purchased public housing at subsidized prices could not release their flats to the market within the first five years (State Council, 1994). This constraint was later removed for households who gain full ownership of their dwellings.
- ³ They are the People's University, Tianjing Academy of Social Sciences and Fudan University.
- ⁴ The raw residential mobility rate in 1994 is only about half of that 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 because it was first designed to build a real estate price index from repeat sales data of properties.
- ⁶ See Wang & Zorn (1997) for an excellent discussion of the many fundamental issues about repeat sales regression.
- 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.
- ⁸ The spike at the beginning of the curve is because less than five series are available within the first five years.
- 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.

References

- Allison, P. D. (1984) *Event History Analysis: Regression for Longitudinal Event Data* (Beverly Hills: SAGE publications).
- Allison, P. D. (2001) *Survival Analysis Using the SAS System: A Practical Guide* (Cary, NC: SAS Institute Inc).
- Bian, Y., Logan, J. R., Lu, H., Pan, Y. & Guan, Y. (1997) 'Working units' and the commodification of housing: observations on the transition to a market economy with Chinese characteristics, *Social Sciences in China*, XVIII(4), pp. 28–35.
- Bailey, M., Muth, R. & Nourse, H. (1963) A regression method for real estate price index construction, *Journal of the American Statistical Association*, 58, pp. 933–942.
- Bourne, L. S. (1981) *The Geography of Housing* (London: Edward Arnold).
- Burrows, R. (1999) Residential mobility and residualisation in social housing in England, *Journal of Social Policy*, 28, pp. 27–52.
- Cao, H. T. (1982) Speech at the conference of the returning of private housing owned by overseas Chinese, *Collection of Documents on Housing and Property Management in Xian*, Housing and Property Management Department of Xian (Eds), Vol. 3 (Xian).
- Case, K. & Shiller, R. (1970) Prices of single-family homes since 1970: new indexes for four cities, *New England Economic Review*, Sep/Oct, pp. 45–56.
- Case, K. & Shiller, R. (1989) The efficiency of the market for single-family homes, *The American Economic Review*, 79, pp. 125–137.

- Chai, Y., Liu, Z., Li, Z., Gong, H., Shi, Z. & Wu, Z. (2002) *Zhongguo chengshi de shikongjian jiekou (The Temporal–Spatial Structure of Chinese Cities)* (Beijing: Peking University Press).
- Chan, K. W. (1988) Rural–urban migration in China, 1950–1982: estimates and analysis, *Urban Geography*, 9, pp. 53–84.
- Chan, K. W. (1994) Urbanization and rural-urban migration in China since 1982: a new baseline, *Modern China*, 20(3), pp. 243–281.
- Clark, W. A. V. (1986) *Human Migration* (Beverly Hills, CA: SAGE Publications).
- Clark, W. A. V. (1992) Comparing cross-sectional and longitudinal analyses of residential mobility and migration, *Environment and Planning A*, 24, pp. 1291–1302.
- Clark, W. A. V., Dieleman, F. M. & Deurloo, M. C. (1984) Housing consumption and residential mobility, *Annals of the Association of American Geographers*, 74, pp. 29–43.
- Clark, W. A. V. & Dieleman, F. (1996) *Households and Housing: Choice and Outcomes in the Housing Market* (New Brunswick, NJ: Rutgers, State University of New Jersey, Center for Urban Policy Research).
- Daniell, J. & Struyk, R. (1997) The evolving housing market in Moscow: indicators of housing reform, *Urban Studies*, 34, pp. 235–254.
- Davies, R. B. (1987) The limitation of cross-sectional analysis, in: R. Crouchley (Ed.) *Longitudinal Data Analysis: Survey Conference on Sociological Theory and Method 4*, pp. 1–15 (Aldershot: Avebury (Gower)).
- Davies Withers, S. (1997) Methodological considerations in the analysis of residential mobility: a test of duration, state dependence and associated events, *Geographical Analysis*, 29, pp. 354–372.
- Fan, C. C. (1999) Migration in a socialist transitional economy: heterogeneity, socio-economic and spatial characteristics of migrants in China and Guangdong Province, *International Migration Review*, pp. 954–987.
- Fan, C. C. & Huang, Y. (1998) Waves of rural brides: female marriage migration in China, *Annals of the Association of American Geographers*, 88(2), pp. 227–251.
- Hanushek, J. & Quigley, J. M. (1978) An explicit model of intra-metropolitan mobility, *Land Economics*, 54, pp. 411–429.
- Huang, Y. (2003a) Renters' housing behaviour in transitional urban China, *Housing Studies*, 18, pp. 103–126.
- Huang, Y. (2003b) A room of one's own: housing consumption and residential crowding in transitional urban China, *Environment and Planning A*, 35, pp. 591–614.
- Huang, Y. (2004) Housing markets, government behaviors, and housing choice: a case study of three cities in China, *Environment and Planning A*, 36, pp. 45–68.
- Huang, Y. (2005) From work-unit compounds to gated communities: housing inequality and residential segregation in transitional Beijing, in: L. J. Ma & F. Wu (Eds) *Restructuring the Chinese Cities: Changing Society, Economy and Space*, pp. 192–221 (London and New York: Routledge).
- Huang, Y. & Clark, W. A. V. (2002) Housing tenure choice in transitional urban China: a multilevel analysis, *Urban Studies*, 39, pp. 7–32.
- Li, S. (2000a) The housing market and tenure decision in Chinese cities: a multivariate analysis of the case of Guangzhou, *Housing Studies*, 15, pp. 213–236.
- Li, S. (2000b) Housing consumption in urban China: a comparative study of Beijing and Guangzhou, *Environment and Planning A*, 32, pp. 1115–1134.
- Li, S. (2003) Housing tenure and residential mobility in urban China: a study of commodity housing development in Beijing and Guangzhou, *Urban Affairs Review*, 38, pp. 510–534.
- Li, S. (2004) Life course and residential mobility in Beijing, *China, Environment and Planning A*, 36, pp. 27–43.
- Li, S. & Siu, Y. (2001a) Commodity housing construction and intra-urban migration in Beijing: an analysis of survey data, *Third World Planning Review*, 23, pp. 39–60.
- Li, S. & Siu, Y. (2001b) Residential mobility and urban restructuring under market transition: a case study of Guangzhou, China, *Professional Geographer*, 53, pp. 219–229.
- Liang, Zai & White, M. J. (1997) Internal migration in China, 1950–1988, *Demography*, 33, pp. 375–384.
- Long, L. (1988) *Migration and Residential Mobility in the United States* (New York: Russell Sage Foundation).
- Long, L. (1992) Changing residence: comparative perspectives on its relationship to age, sex and marital status, *Population Studies*, 46, pp. 141–158.
- Logan, J., Bian, Y. & Bian, F. (1999) Housing inequality in urban China in the 1990s, *International Journal of Urban and Regional Development*, 23, pp. 7–25.
- Mandic, S. (2001) Residential mobility versus 'in-place' adjustments in Slovenia: viewpoint from a society 'in transition', *Housing Studies*, 16, pp. 53–73.

- Rossi, P. (1955) *Why Families Move* (New York: Macmillan).
- State Council (1994) Guowuyuan guanyu shenhua chengzhen zuhfang zhidu gaige de jue ding (The State Council's decision on deepening the reform of urban housing system), No. 43.
- State Council (1998) Guowuyuan guanyu jingyibu shenhua chengzhen zhufang zhidu gaige jiakuai zhufang jianshe de tongzhi (A notice from the State Council on further deepening the reform of urban housing system and accelerating housing construction), No. 23.
- State Statistics Bureau (SSB) (1990) *Zhongguo chengshi nianjie 1990 (1990 Yearbook of Chinese Cities)* (Beijing: China Statistics Press).
- Szelenyi, I. (1987) Housing inequality and housing segregation in state socialist countries, *International Journal of Urban and Regional Research*, 11, pp. 1–8.
- Tolley, G. S. (1991) *Urban Housing Reform in China: An Economic Analysis* (Washington DC: The International Bank for Reconstruction and Development/The World Bank).
- Tuma, N. B. & Hannan, M. T. (1984) *Social Dynamics: Models and Methods* (New York: Academic Press).
- Wang, F. T. & Zorn, P. M. (1997) Estimating house price growth with repeat sales data: what's the aim of the game? *Journal of Housing Economics*, 6, pp. 93–118.
- Wang, Y. P. & Murie, A. (1999) *Housing Policy and Practice in China* (London/New York: Macmillan Press Ltd).
- Wu, F. (1996) Changes in the structure of public housing provision in urban China, *Urban studies*, 33(9), pp. 1601–1627.
- Wu, F. (2004) Intra-urban residential relocation in Shanghai: modes and stratification, *Environment and Planning A*, 36, pp. 7–25.
- Zhang, X. Q. (1998) *Privatization: a Study of Housing Policy in Urban* (New York: Nova Science Publishers).
- Zhou, C. (1996) *Geige kaifang yilia dadushi renkou fenbu yu qianyi yanjiu: yi Guangzhou shi weili (A Study on Population Distribution and Mobility in Large Chinese Cities: The Case of Guangzhou City)* (Guangzhou: Guangdong Province High Education Press).
- Zhou, X. (2000) Economic transformation and income inequality in urban China: evidence from panel data, *American Journal of Sociology*, 105, pp. 1135–1174.
- Zhou, X., Tuma, N. B. & Moen, P. (1997) Institutional change and job-shift patterns in urban China, 1949 to 1994, *American Sociological Review*, 62, pp. 339–365.

Appendix**Figure A1.** Historical raw mobility rates in Chinese cities

The RMR model (Table A1) 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, . . . , etc. For the purposes here, it is necessary 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, the last five years' gross mobility rates are calculated given that the sample is most representative of the population in the last five years. However, 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 the study has relatively representative data for all age groups in these last five years, adjustments can be made for their differences based on their age structure.

As Table A2 shows, first the last five years' gross mobility rates were calculated for different age groups.⁹ Then, using the age structure in 1993, the age structures of the same sample were calculated 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 were included in the same age group in 1992. In this way, age structures in 1992 to 1989 were constructed for the same people included in 1993. Based on these computed age structures and the gross mobility rates, adjusted average mobility rates were obtained that were comparable across the last five years.

Second, with the mobility rates for the last five years, the five indexes were transformed into five sets of mobility rates. However, as explained earlier, these five sets 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 The values within each five years were linearly interpolated for all five indexes and then averaged to obtain the final residential mobility rates.

Table A1. 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
No. of observations:	218		R-squared:	0.7435
F(47, 171):	10.54		Adj. R-squared:	0.673

Table A2. Adjusting for last five years' mobility rates

Year	Raw mobility rate by age cohort									Average
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	
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%
										Total
	Age structure in 1993									
No. of people weights:	175	504	557	628	560	412	396	394	241	3867
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%