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## Housing ownership, incomes, and inequality in China: 2002 - 2007

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**Housing Ownership, Incomes, and  
Inequality in China, 2002-2007**

by

**Hiroshi Sato, Terry Sicular and YUE Ximing**

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## FOUR

### **Housing Ownership, Incomes, and Inequality in China, 2002-2007\***

Hiroshi Sato, Terry Sicular, and YUE Ximing

## I. Introduction

An important feature of the post-Mao period has been the resurrection of private property rights. A variety of inter-related policies, including the lifting of prohibitions on private enterprise, ownership reforms in industry, the development of stock markets, and real estate and housing reforms, have paved the way for the expansion of private property and household wealth, with implications for incomes and inequality. Estimates by Li, Luo, and Sicular in Chapter 2 of this volume, calculated using the China Household Income Project (CHIP) data, show that the share of household income derived from financial assets and housing and their contribution to income inequality has increased, especially in urban China.

In this chapter we examine changes in private ownership of housing and the implications for the distribution of housing wealth and income. We focus on housing wealth rather than total wealth mainly because the CHIP 2007 data do not contain sufficient information to permit an estimation of total wealth. Housing wealth, however, can provide insights into the role of total wealth, because housing is the single most important household asset in China. Past studies of wealth in China have found that privately owned housing constitutes nearly 60 percent of household wealth and accounts for two-thirds of inequality in wealth among the households (Li and Zhao 2008; Zhao and Ding 2008).<sup>1</sup>

Analysis of housing wealth is of interest not only because it influences the distribution of total wealth, but also because it can reveal the distributional implications of China's urban housing reforms. In the late 1990s and early 2000s China carried out privatization of urban housing. As noted by Yemstov (2008) in his study of housing privatization in Eastern Europe and the former Soviet Union, housing reforms in transition economies are important because of the "sheer size" of the wealth transfer. Several studies have examined the effects of China's urban housing reforms on urban wealth, incomes, and poverty (e.g., Meng 2007; Sato 2006; Zax 2003). Our work extends these analyses in two regards. First, we include not only urban but also rural and migrant households so as to understand the broader consequences of housing reform on nationwide patterns of wealth and income. Second, we use more recent 2007 data that reveal the longer-term consequences of the housing reforms.

As discussed elsewhere in this volume, measurement of income should include imputed rental income from owner-occupied housing. Indeed, a distinctive feature of the CHIP studies of Chinese income inequality is that, unlike most other studies of incomes and inequality in China, they include imputed rental income. This chapter provides a reexamination and careful calculation of estimates of housing wealth and imputed rental income. Our estimates of imputed rental income are used to construct estimates of household income used elsewhere in this volume. Our view is that in the future close attention to these variables will be needed, because

homeownership and personal wealth have become significant, long-term features of the Chinese economy.

We begin the chapter with an overview of the policy reforms regarding housing ownership in urban and rural China. We then discuss estimates of housing wealth and imputed rental income for 2002 and 2007.<sup>2</sup> The CHIP data contain some but not all of the variables needed to estimate housing rent and imputed rental income, so we must negotiate around the data constraints. Below we highlight key aspects of the data and the estimation methods. Where possible, we have used information in the datasets to cross-check and identify possible biases in our estimates.

Using these estimates, we measure inequality in the distribution of housing wealth and of income. We present estimates of inequality in housing wealth for China as a whole and for the urban and rural sectors separately. We also present estimates of inequality in the distribution of imputed rental income from owner-occupied housing and its contribution to overall income inequality.

Finally, we analyze the factors associated with housing tenure and with levels of housing wealth. We find significant differences in patterns of housing tenure and wealth between urban and rural areas, as well as changes in these patterns between 2002 and 2007.

## **II. Institutional and Policy Background of the Chinese Housing Reform**

Land ownership is decisively different in the urban and rural areas, and the housing reform policies in the urban and rural areas have developed independently. Although recent new policy experiments have started to bridge the land systems in the rural and urban areas, for the time period covered in this chapter it is appropriate to describe them separately. This we do below, with reference to Table 4.1, which summarizes housing-related regulations and policies in China during the post-Mao period.

[insert about here: Table 4.1]

### **A. Urban Housing Policy**

Urban housing reform in the post-Mao era can be divided into three periods: (1) from the late 1970s to 1998: the period of the dual-track policy with co-existing public and private housing; (2) from 1999 to 2004: the period of complete privatization, and (3) 2005 and thereafter: the period of private housing but with an emphasis on social welfare housing policies (see Chen, Chen, and Liu 2008; Cheng 1999; Jia and Liu 2007; Sato 2006; and Wu, Gyourko, and Deng 2010).

During the 1980s government announcements about urban housing emphasized two basic policies. One was rent reform (*zujin gaige*), which involved raising the rent of publicly owned housing (although it is referred to as public housing, in fact housing was owned mainly by urban work-units, with some ownership also by local governments), while simultaneously adding housing allowances to salaries. The other was the “commercialization of housing” (*zhufang shangpinhua*), that is, selling publicly owned housing to urban residents. The first official

statement advocating the commercialization of housing was the State Council's "Agenda of the National Work Conference on Capital Construction" in June 1980. After carrying out some limited experiments in selling publicly owned housing throughout the 1980s, in 1988 the State Council issued an agenda for housing reform that stressed rent reform. The purpose of rent reform was to create a foundation for the commercialization of housing by making the maintenance costs of publicly owned housing visible.

Despite these announcements, because of the high inflation of the late 1980s it was difficult to implement rent reform. Therefore, rent increases were modest. The 1988 and 1995 CHIP urban data show that rents of publicly owned housing were still quite low. The ratio of annual rent actually paid by renters to annual household food expenditures was only 0.05 in 1988 and 0.07 percent in 1995, indicating that the share of rent in the urban household budget was very small in both years.<sup>3</sup>

In accordance with the doctrine of the "socialist market economy" adopted in 1993, in July 1994 the State Council issued the "Decision on Deepening Urban Housing Reform." This decision called for a transition from the allocation of rental housing by work-units to the commercialization and socialization (*shehuihua*) of housing. Socialization here meant promoting housing-related industries, such as construction, repair, and maintenance. A core policy arrangement for this transition was the housing provident fund (*zhufang gongjijin*) for



urban employees, which was mentioned in the 1994 decision and adopted nationally at the end of the 1990s.

The housing provident fund is an employer-subsidized savings program for the purchase of housing. In principle, the program covers not only employees of publicly owned work-units but also those who are employed in the non-public sector, including foreign-owned enterprises. Although the standard contribution rate for employees has varied over time, by ownership status of the work-units, and across regions (between approximately 2 to 10 percent of salary), the general requirement of one-for-one matching contributions by the employer has not changed. The funds are deposited into the employee's own account in a state-owned commercial bank. Employees own the account but must retain it until they retire or resign from their work-units. Those who have housing provident fund accounts also benefit from low-interest bank loans for housing (*zhufang gongjijin dixi daikuan*) when they purchase housing (Buttimer, Gu, and Yang 2004).

During the 1990s, commercialization of housing co-existed with the continuation of the Mao-era system of allocation of rental housing (*fuli fenfang*) by work-units. The sale of “housing-reform housing” (*fanggai fang*), that is, the sale of publicly owned housing to tenants (employees) at prices below market value, was the dominant channel for commercialization during this period. Purchase of “commodity housing” (*shangpin fang*) accounted for a small proportion of home ownership. According to the 1988 and 1995 CHIP urban samples, the

proportion of homeowners to total households increased from approximately 14 percent to 40 percent. The great majority of homeowners in 1988 were owners of previously owned or inherited old private housing, and those who became homeowners through the housing reform accounted for less than 1 percent of the total households. By 1995, however, the share of owners of housing-reform housing in the total had jumped to approximately 27 percent, whereas the share of households that had purchased commodity housing was still very small (approximately 1.3 percent).<sup>4</sup>

As shown in Figure 4.1, National Bureau of Statistics (NBS) data on housing construction in urban areas increased rapidly in the late 1990s. The sale of commodity housing, however, remained small relative to new housing construction in terms of total square meters, suggesting that most of the new housing was still constructed by work-units and distributed (either sold or rented) to employees. Indeed, the data on sales of commodity housing displayed in Figure 1 include housing purchased by work-units and distributed to employees.

[insert about here: Figure 4.1]

In July 1998, urban housing reform entered a new phase with the State Council's "Directive on the Further Deepening of Urban Housing Reform and Accelerating Housing Construction" (hereafter referred to as the "1998 Directive"). The 1998 Directive terminated the dual-track system in urban housing. It declared that administrative allocations of rental housing through work-units or local governments would be terminated in the latter half of 1998, and that

the privatization of housing would be implemented gradually. The privatization of urban housing was to occur throughout urban areas nationwide, but with the time frame differing among the provinces. Complementary policy arrangements regarding housing financing (through the housing provident fund and private housing loans) and support of the real estate industry were also implemented. The 1998 Directive set the stage for the expansion of private homeownership in urban China, and in its wake inequality of housing wealth began to emerge.

Several features of housing privatization have influenced the distribution of housing wealth. First, as noted above, the major channel of privatization was the sale of housing-reform housing. The 2002 urban data show that the proportion of owners of housing-reform housing to total households increased to approximately 61 percent in 2002 (Table 4.2). These were non-market transactions between work-units and renter-occupants, and the pricing and property rights arrangements varied considerably across work-units. In addition, the quality of housing purchased through this channel was closely related to the work-unit's place in or relationship to the bureaucratic hierarchy as well as its economic performance. Naturally, the difference between the purchase price and the market price tended to be larger for employees of powerful work-units (Ren and Kang 2003; Sato 2006). Although there were constraints on property rights attached to housing-reform housing according to the pricing method (Sato 2006), such housing became a source of inequality.

[insert about here: Table 4.2]

Second, rapid development of the housing market and a surge in housing prices after privatization exacerbated housing inequality. As shown in Figure 4.1, sales of commodity housing began to increase rapidly from the end of the 1990s and, as shown in Figure 4.2, housing prices increased markedly, driven by strong demand and the inflow of speculative money to the immature urban real estate market. As shown in Table 4.2, in 2002 owners of commodity housing reached approximately 7 percent of total households, and by 2007 the share had increased even more to 27 percent.

[insert about here: Figure 4.2]

Third, during this period the main emphasis was on the marketization of housing, and social welfare-oriented housing policies were relatively weak (Chen, Chen, and Liu 2008).<sup>5</sup> The 1998 Directive advocated two types of welfare-oriented housing projects (*anju gongcheng*); first, “economically affordable housing” (*jingji shiyong fang*) for sale to low- and lower-middle-income households, and second, “subsidized rental housing” (*lian zu fang*) for rental to low-income households. In fact, the supply of economically affordable and subsidized rental housing stagnated throughout the 2000s. Although annual sales of commodity housing increased from 340 million square meters in 2004 to 700 million square meters in 2007, the amount of economically affordable housing sold annually remained around 32-35 million square meters (Figure 4.1).

The fiscal incentives of local governments explain this tendency. In the 2000s the sale of the right-of-use for urban land became an increasingly important revenue source for local governments (the so-called “land-dependent local public budget,” or *tudi caizheng*). Local governments therefore welcomed price increases in real estate markets and had an incentive to sell land-use rights at high market prices rather than allocate it for subsidized housing for low-income families.

To cope with the rising inequality in access to housing, in 2005 national housing policy began to emphasize affordable urban housing as a social welfare policy. The State Council’s “Comments on Policies for the Stabilization of Housing Prices,” issued in April 2005, states that speculative transactions in housing should be strictly regulated and that housing construction should focus on affordable, medium-quality housing. In August 2007, the State Council issued “Several Comments on How to Solve Housing Poverty among Low-income Urban Residents,” which emphasized the importance of supplying rent-subsidized housing. According to the Ministry of Housing and Urban–Rural Construction, by the end of 2006 the rent-subsidized housing system covered approximately 80 percent of the country (512 of 657 cities).<sup>6</sup> The Central Work Conference on Economic Policy held in December 2008 reiterated that increasing the supply of reasonably priced housing for low- and middle-income households was critical to stimulate domestic consumer spending. These policy documents indicate a redirection in urban

housing policy, but due to their timing these initiatives may not be captured in the 2007 CHIP data.

### **B. Rural Housing Reform**

Following Xu and Kong (2009), here we distinguish three periods of rural housing policy since 1980. In the first period (1980-85) efforts were made to reorganize the management systems of land used for housing (*zhaijidi*) in light of the institutional changes associated with the expansion of the household contract responsibility system and the subsequent collapse of the commune system. Rapid increases in peasant income in the early 1980s stimulated housing construction in rural areas and caused the diversion of farmland into land used for housing. This became a policy concern, and the government repeatedly issued orders prohibiting the diversion of farmland to housing use (e.g., the State Council's urgent instruction of April 1981). To strengthen control over rural housing construction, in February 1982 the State Council issued the "Regulations on the Administration of Land for Housing in Villages and Rural Townships," followed in October 1985 by a related regulation issued by the Ministry of Construction and the Environment. These regulations required that housing construction in rural areas be reviewed by the villages (the collective owners of the land) and then approved by the township authority.

The second stage began in 1986 with enactment of the Land Administration Law. This law established a hierarchical land management system from the national to the township level. With respect to the management of rural land for housing use, the Land Administration Law

allowed each rural household to hold only one house-building plot, the size of which was to be limited to within the provincial standards. Ongoing concern about the preservation of farmland also led to an experimental policy introduced in the latter half of the 1980s -- the introduction of a fee charged for use of rural land for housing. The fee experiment, however, was canceled before being adopted more broadly because it was incompatible with the overall policy of reducing the burden of taxes and fees in rural areas.

The third period, starting from 1997, was benchmarked by several policy documents addressing the rapid development of rural–urban migration and accelerating urbanization. These documents include an official May 1997 notice issued by the Chinese Communist Party (CCP) Central Committee and the State Council on strengthening land management and protecting farmland, an October 2004 decision issued by the State Council on strengthening land management, enactment in March 2007 of the Real Rights Law, and the CCP Central Committee’s decision on rural policies issued at the October 2008 Third Plenum of the Seventeenth Central Committee. This series of policy documents provided measures to address the growing pressure from urban areas to expand suburban housing into rural land and policies to maintain the farmers’ land rights. All these documents repeatedly prohibited the purchase of use rights of rural land for housing by urban residents/work-units. Enforcing the prohibition, however, has been difficult, and the problem of commodity housing built on rural land without a formal deed to use the land (*xiaochanquan zhufang*) has grown. Contemporaneously, rural-

urban migration led to the abandonment of rural land in some areas, pointing to the need to coordinate rural and urban housing policies in step with the reforms of the rural residence (*hukou*) system.

Governments at different levels adopted policy experiments in some rural areas to address migration and urbanization, under the general policy framework of “integrated and balanced urban–rural development” (*tongchou chengxiang*). Examples of such experiments include: the authorization of mortgages on rural housing land for which households have use rights, the exchange of rural housing land-use rights for urban commodity housing (*zhaijidi zhihuan*), and the reallocation and redevelopment of house-building plots through a land shareholding system (*tudi gufen hezuozhi*) at the village level.<sup>7</sup>

Despite such policy experiments, the rural housing system remained at the stage of “individually built, individually owned, individually used, and individually abandoned” (*zijian ziguang ziyong zimie*), and rural housing markets were suppressed and underdeveloped. But rural households expanded and improved their housing; indeed, housing area and quality increased greatly in recent decades, although with regional differences (He and Deng 2009). Moreover, despite government prohibitions, in some areas, especially near the cities, the rental and sale of housing continued (Xin and Zhou 2009; Zhao 2006)

Nevertheless, institutional and policy factors continue to constrain the development of rural housing markets (Qin and Zhong 2009). First, under the Land Administration Law each



rural household is allowed to hold only one house-building plot, and in principle the transfer of house-building plots and housing property is limited to transfers within the village. Second, a registration system for housing property (*fangwu chanquan dengji*) in rural areas has not yet been established. Under these conditions, transfers of rural housing occur mainly due to expropriation of rural land by local governments, reallocation of house-building plots by village authorities, and private underground transfers of housing property to non-villagers (Qin and Zhong 2009).

### **III. Estimation of Housing Wealth and Imputed Rental Income**

#### **A. Methodology and Data Issues**

Housing wealth is equal to owned equity in housing. Housing wealth  $H$  is usually calculated as the difference between the market value of owned housing  $V$  and the amount of any debt or mortgage on the property  $M$ :

$$H = V - M , \quad (1)$$

Calculation of the imputed rent on owner-occupied housing usually takes one of two approaches, the “rate of return” (or “opportunity cost”) approach or the “market rent” approach (Short, O’Hara, and Susin 2007; Smeeding and Weinberg 2001). Here we mainly adopt the rate of return approach, which considers imputed rent to be the income the household would earn if

its equity in the dwelling were invested in an equivalent financial investment. In this case, imputed rent is calculated as

$$R = i(V - M) - C - D - I , \quad (2)$$

that is, imputed rental income  $R$  equals a rate of return  $i$  times the household's equity in the dwelling, minus the costs of ownership  $C$  (maintenance and repair, property taxes, insurance on the property, and so forth), depreciation  $D$ , and interest costs  $I$  associated with any mortgage or loans on the property.

The “market rent” approach considers imputed rent to be the net income that would have been earned if the dwelling had been rented out on the rental market. In this case, imputed rental income is calculated as

$$R = R^m - C - I , \quad (3)$$

with imputed rental income  $R$  equal to estimated market rent on the dwelling  $R^m$ , minus the costs of ownership  $C$  and interest costs  $I$  associated with any mortgage or debt on the property.

Typically, depreciation is not subtracted in the market rent approach. Although we mainly use the rate of return approach, due to the data limitations discussed below we use the market rent approach to estimate imputed rental income for the 2007 migrant sample. Also, we conducted some consistency checks on the data using the market rent approach, i.e., we compared the imputed rents calculated using the rate of return approach with the market rents reported by the

households, when such data were available. In general, these two approaches yielded consistent estimates.

Application of these formulae requires household-level information on the market value of the dwelling, housing debt, estimated market rent, ownership costs, interest paid on any mortgage or housing debt, and depreciation. Typically, complete data are not available and researchers must adapt their calculations accordingly. Such is the case here.

We estimate housing wealth and imputed rents in rural China using the data in the CHIP rural subsample and for urban China using the data in the CHIP urban subsample. So as to capture the increasingly important group of rural-to-urban migrants, in some of our analyses we also include long-term, stable migrant households from the CHIP migrant subsample. To ensure representativeness, we apply weights to the rural, urban, and long-term migrant subgroups based on the rural, urban, and long-term stable migrant populations, by province and by region, in the 2000 census and the 2005 national 1 percent population sample survey. For household-level analyses (e.g., of household housing wealth), we use household-level weights; for individual-level analyses (e.g., of per capita housing wealth or per capita income), we use individual weights. Further discussion of the sample weights can be found in Appendix II to this volume.

The 2002 and 2007 CHIP datasets do not contain all of the variables needed to calculate housing wealth and imputed rents. The Appendix to this chapter contains a discussion of the relevant data issues. Here we limit our discussion to four important issues: (a) identification of

homeowners; (b) lack of information on the value of additional owned residential properties; (c) incomplete information on mortgages; and (d) incomplete information on housing costs.

The first step in our analysis is to identify which households are homeowners and which households are renters. The CHIP datasets contain information on housing tenure for the urban and migrant subsamples for 2002 and 2007, and for the rural subsample for 2002 but not for 2007. In our view, the lack of this information for the 2007 rural subsample does not pose a major problem because rural non-owners are very uncommon. Only 0.8 percent of the households in the 2002 rural subsample reported that they did not own their housing (Table 4.2). Moreover, these non-owners were distributed fairly evenly across the income distribution. Available data on rural housing tenure in other sources are consistent with the CHIP data. Using NBS data, He and Deng (2009, p. 67) report that at year-end 2006 only 0.7 percent of rural households did not own their dwellings. We therefore make the simplifying assumption that in 2007 all rural households were homeowners.

Once we have identified homeowners, we can estimate their housing wealth and imputed rental income from owner-occupied housing. At this step, we encountered the second major data issue. The CHIP data contains information on the value of the dwelling in which the household resides but not for any additional properties owned by the household. We therefore can only estimate the housing wealth of the primary dwelling. The value of any additional owned housing is not included in our estimates. Excluding additional properties undoubtedly causes some

underestimation of the level of and inequality in housing wealth. This appears to be more relevant in 2007 than in 2002 and more in the urban than in rural sample. The CHIP urban dataset contains information on whether the households own additional properties. In 2002 only 1.5 percent of urban homeowners owned additional housing, whereas by 2007 the share had increased to 7.5 percent. We note also that some rural-to-urban migrants living in rental housing may have owned housing in their places of origin, but the migrant survey did not collect any information about this.<sup>8</sup> Our estimates of housing wealth for migrants therefore only include the value of owned housing in their urban place of residence.

The third data issue relates to mortgages. In principle, we need data on mortgage debt, as housing wealth equals the market value of housing minus outstanding housing debt, and mortgage interest costs should be subtracted from the imputed rental income. Unfortunately, the CHIP datasets contain information on mortgage debt only for 2002, and only for the rural and urban (not the migrant) subsamples.

Past CHIP studies ignored housing debt and simply used the reported market value of housing as a proxy for housing wealth. In other words, past CHIP studies essentially assumed that households in China have zero housing debt. Also, they assumed zero mortgage interest costs when calculating imputed rents. Due to the lack of mortgage data for 2007, here we must follow the same approach; however, we use the 2002 data to examine differences between

housing value and housing equity in that year so as to identify biases that may arise from using market value as a proxy for equity.

In 2002 mortgages were more important for urban than for rural households (Table 4.3). Among urban homeowner households, 9 percent had mortgages, and of the households with mortgages, the mortgage was on average equal to 47 percent of the value of the dwelling. Less than 4 percent of rural homeowner households had mortgages, and the mortgage was on average equal to 27 percent of the value of the dwelling. In both urban and rural areas, households with mortgages on average had per capita incomes similar to or higher than, and owned more expensive housing than, households without mortgages. Thus, housing debt was not associated with poorer households.

[insert about here: Table 4.3]

Using this information on mortgages, we calculated estimates of housing equity for 2002. Table 4.4 provides comparisons between market values and equity 2002. Mean equity values are about 4 percent lower than market values nationwide, with a larger difference for urban than for rural households. Inequality in housing wealth as measured by the Gini coefficient is higher for equity than for market value, but the difference is not large when inequality is measured over all households nationwide. Again, the difference is more pronounced for urban than for rural households. We acknowledge, then, that using market value as a proxy for equity will lead to some understatement of the inequality of housing wealth, especially in urban China and among

homeowners. Nevertheless, the understatement of nationwide inequality over all households appears to be fairly small.

[insert about here: Table 4.4]

We also use the 2002 data to calculate estimates of the imputed rental income and of the household per capita income inclusive of the imputed rental income (equal to the NBS income plus imputed rents) first using the market value of housing as a proxy for equity, and then using housing equity. In these calculations, we use the rate of return approach (see below for further discussion).

As shown in Table 4.5, imputed rental income per capita is a bit lower when the calculation is based on equity values, but the mean per capita incomes are very close and the inequality of per capita income is virtually identical for the base and alternative estimates. This is true nationwide as well as for the urban and rural sectors separately. We conclude that we can reasonably use housing values as a proxy for housing equity in our analysis of the impact of imputed rents on incomes and on income inequality.

[insert about here: Table 4.5]

Our fourth data issue is incomplete information about costs of homeownership. As homeowners in China do not pay property taxes or purchase property insurance, we do not need to consider these costs; however, mortgage interest payments, maintenance and repairs, and depreciation are relevant. We carried out several alternative calculations to investigate the

sensitivity of our findings to different assumptions regarding the costs of homeownership (see the Appendix to this chapter). For 2002 we estimated mortgage interest payments by applying an interest rate to the reported household mortgage debt. For depreciation and for maintenance and repairs, we followed the literature and multiplied the market value of the dwelling by an appropriate rate of depreciation. We then compared the levels of income and of income inequality with and without subtracting the mortgage interest costs and depreciation. The results, shown in the Appendix to this chapter, are very similar. We conclude that although, in principle, the costs of house ownership should be subtracted from the imputed rents, ignoring them in our analysis does not substantially affect our results.

Ultimately, then, we follow past CHIP practice and use the market value of housing as a proxy for housing wealth, i.e.,

$$H = V \quad , \quad (4)$$

and we calculate the imputed rental income on owner-occupied housing as equal to a rate of return  $i$  times the market value of housing

$$R = iV \quad . \quad (5)$$

For the rate of return we use the interest rate on 30-year Chinese government bonds, which was 2.9 percent in 2002 and 4.27 percent in 2007. In this regard, we follow common practice in the literature, which typically applies the rate of return on a long-term, safe investment, such as government treasury bonds or municipal bonds, usually in the 4-5 percent interest range.



Note that for migrants in 2007 we have data on market rents but not on market values of owner-occupied housing. For the relatively few homeowners in this group, we set the imputed rents equal to the reported market rents, and we calculate the market value of housing as equal to the reported market rent divided by the rate of return, as implied by Equation (5).

### **B. Housing Tenure and Levels of Housing Wealth**

Table 4.2 shows housing tenure patterns among rural, urban, and migrant households. As discussed above, homeownership is nearly universal among rural households. Ownership is also high among non-migrant urban households, rising from nearly 80 percent in 2002 to nearly 90 percent in 2007. More than half of these urban households obtained their housing through housing reform, but housing obtained through market purchases of commodity housing increased substantially, rising from 8 percent of the urban households in 2002 to 27 percent in 2007. Inherited or self-built housing accounted for a small and declining proportion of urban households. This category is largely made up of households that regained ownership of properties that had historically belonged to their families before the nationalization of housing during the Maoist era. Later in this chapter we present the results of a multinomial logit analysis that identifies factors associated with urban housing tenure and discuss in more detail the pattern of housing tenure among the non-migrant urban households.

Homeownership in the city of residence is rare among migrant households. Even for long-term, stable migrant households, the only category of migrants included in our analysis, fewer than 10 percent owned dwellings in the city where they lived, and the share of homeowners actually declined between 2002 and 2007. The majority of migrants live in rented housing in cities; a substantial minority lives in collective housing, which includes housing shared with other migrants and dormitories provided by employers. From 2002 to 2007 the importance of collective housing declined somewhat, whereas that of rented housing increased.

Levels of housing wealth in China appear to be fairly high (Table 4.6). Not surprisingly, housing wealth is substantially higher for urban than for rural households, both in absolute terms and relative to their (higher) incomes. Migrant households that own homes have the highest-value homes, even higher than formal urban residents who own homes. This reflects two underlying factors. First, homeowner migrants are a select, high-income group. Second, homeowner migrants tend to own relatively expensive homes, as reflected in a price-to-income ratio of about ten, i.e., the market value of their housing is about ten times their annual income. For formal urban residents, the price-to-income ratio is about seven, also relatively high by international standards. For rural households, the price-to-income ratio is substantially lower, at close to one.

[insert about here: Tables 4.6]

[insert about here: Tables 4.7]

Housing wealth for all groups increased rapidly between 2002 and 2007 (Table 4.7). In per capita terms, rural housing wealth grew about 7 percent annually, a growth rate similar to that of rural per capita incomes. Growth in urban and migrant housing wealth grew 15 to 20 percent annually for homeowners, outpacing income growth. This growth reflected in part the rapid increases in urban housing prices (Figure 4.2) and in part the expansion of homeownership among formal urban residents (Table 4.2). The growth was also likely due to improvements in housing quality.

Faster growth in urban housing values than in rural housing values led to a widening gap in housing wealth between urban and rural areas (Table 4.8). In 2002 per capita housing wealth for formal urban residents was 4.5 times that for rural residents. By 2007, this ratio had increased to 7.2. These urban-rural gaps in housing wealth exceed China's high urban-rural gap in per capita incomes.

The gap between formal urban and migrant households also widened, reflecting differences between formal urban residents and migrants in terms of their rates of homeownership.

[insert about here: Table 4.8]

### **C. Inequality of Housing Wealth**

Table 4.9 shows the inequality of housing wealth nationally and for the urban and rural areas separately, as measured by the Gini coefficient. Among homeowners (excluding non-owners), inequality of housing wealth per household in China is relatively high, at about 0.60. This compares to Ginis of housing wealth for homeowners of about 0.40-.45 in the OECD countries and also in Russia and Serbia (Sierminska and Garner 2005; Yemstov 2008).

[insert around here: Table 4.9]

Including non-owners increased inequality in housing wealth in China to 0.63 in 2002 and to 0.67 in 2007. The relatively small difference between the Gini for homeownership households and the Gini for all households reflects the high level of homeownership in China. In this regard, China differs from other countries. In the OECD countries, Russia, and Serbia, the rate of homeownership is lower, so that including non-owners increases the Gini coefficient substantially to between 0.6 and 0.8 (Yemstov 2008). Including non-owners, the inequality of housing wealth in China is no higher than that in other countries.

Inequality of housing wealth in per capita terms is higher than in per household terms, reflecting the larger size of rural households. Urban-rural differences in per capita housing wealth contribute substantially to national inequality in housing wealth per capita. Using standard inequality decomposition methods, we find that in 2007 the urban-rural gap in per capita housing wealth contributed roughly 40-50 percent of national inequality in per capita housing wealth, up about 10 percentage points from 2002.<sup>9</sup>

Nationwide, inequality of housing wealth both per household and per capita increased between 2002 and 2007. The increases in inequality nationwide reflect widening differences between urban and rural housing wealth and increases in rural inequality of housing wealth. In urban China, inequality of housing wealth declined.

#### **D. Income Inequality and Housing**

As shown in Table 4.10, households with higher income per capita have more housing wealth per capita. In 2002 households in the top quintile of the income distribution held housing wealth per capita that was, on average, 13 times that of households in the bottom quintile. By 2007 this ratio had risen to 22. The widening gap in housing wealth between low- and high-income households reflects in large part the widening gap between urban and rural housing values. Within sectors, inequality in housing wealth between poor and rich households remained relatively constant between 2002 and 2007.

[insert about here: Table 4.10]

Because urban housing wealth is the result of housing privatization and the related real estate market reforms, one can conclude that China's housing and real estate market reforms have had a dis-equalizing effect. This is true within urban areas as well as in China as a whole. Within urban areas, higher-income households are more likely to have become homeowners, and, on average, higher-income urban households own more valuable housing. Nationwide, in the

wake of the housing reforms, higher-income urban households obtained increasingly valuable urban real estate assets. Lower-income rural households were already homeowners, but rural housing has a lower value and has not appreciated as rapidly as urban housing.

Table 4.11 shows the estimates of imputed rental income per capita. As discussed above, these estimates do not deduct the costs of ownership and mortgage interest payments and thereby overstate the level of imputed rental income but probably do not bias measured income inequality. The level of imputed rental income per capita and its share in household per capita income have increased over time in both rural and urban areas, but especially in the urban areas. In 2002 imputed rents constituted on average 8 percent of household per capita income for all households nationwide; it rose to 14 percent in 2007.

[insert about here: Tables 4.11]

[insert about here: Tables 4.12]

Imputed rents were distributed more unequally than other income, as shown by their relatively high Gini coefficient (Table 4.12). Decomposition of income by source reveals that the contribution of imputed rental income to overall income inequality has been rising (Table 4.12, last row). In 2002 imputed rents contributed 8.4 percent and in 2007 16.5 percent of inequality in per capita incomes. Although these contributions to inequality are not exceedingly high, the marked upward trend is noteworthy.

#### **IV. Determinants of Housing Tenure and Wealth**

In this section we examine the factors that influence housing tenure in urban areas and the determinants of housing wealth in urban and rural areas. Our focus is on changes in the impacts of institutional factors and individual/family characteristics between 2002 and 2007. In view of the regional differences in the adoption of urban housing reforms and in order to assure comparability over time, in our analysis we utilize sample households in the cities (40 cities in 12 provinces) that are covered in both the 2002 and 2007 CHIP urban surveys. Similarly, for the rural analysis we utilize sample households in the 15 provinces that are covered by both the 2002 and 2007 CHIP rural surveys.<sup>10</sup> The analysis does not incorporate rural-urban migrant households from the CHIP migrant surveys, so the findings for the urban households only reflect the situation for formal urban residents.

In the economics literature, household housing choices reflect both consumption and investment demand.<sup>11</sup> Households consume housing, and their consumption of housing will reflect factors such as prices, income, and family size. In principle, consumption demand can be satisfied by either renting or owning, although the two are not perfect substitutes. Households invest in housing as a form of wealth, and housing is often the largest component of households' wealth portfolios. Housing as an investment involves ownership. The demand for housing as a form of wealth is influenced by factors that affect wealth accumulation more generally, such as the stage in the life cycle, risk, risk preferences (which may be a function of education),

inheritances, and the ability to borrow. Some authors point out that special considerations arising from multi-generational families and the need for precautionary savings may apply in the developing countries (Burger et al. 2008; Deaton 1990).

Until the end of the 1970s ownership of housing in China was suppressed in both the urban and rural areas, and housing consumption was met through administrative allocations by urban work-units and rural collectives. The *hukou* system was the underlying institutional basis for these administrative allocations. The role of household demand in housing allocations began to surface with the 1980s market reforms, and especially with the reforms in housing ownership and real estate markets in the mid-1990s. With these reforms, the standard sorts of variables related to consumption and investment demands for housing began to influence housing tenure choice and housing wealth. At the same time, institutional factors such as the *hukou* system, ownership of the work-unit, and the socio-political hierarchy, which influenced the distribution of housing during the process of urban housing privatization, continued to explain observed patterns of housing. Our working hypothesis is that between 2002 and 2007 the influence of institutional factors on housing tenure and wealth persisted, but the impact of individual and family characteristics, such as age, education, and income associated with household consumption and investment demands, increased as well.

### **A. Housing Tenure Choice of Urban Households**



Our analysis of housing tenure for urban households distinguishes three categories: renters (households that do not own housing); owners of housing-reform housing (obtained through the housing reforms); and owners of commodity housing (purchased on the market).<sup>12</sup> Using these three housing ownership types as the categorical dependent variables, we conduct a multinomial logit estimation to analyze the factors that affected housing tenure choice in 2002 and 2007.

Our explanatory variables include variables related to household consumption and investment demands, as well as institutional factors relevant to China's urban housing system. It should be noted that we treat the head of the household as the renter/owner and utilize the household head's attributes for certain variables in the regression equation.<sup>13</sup> Descriptive statistics of the key variables used in these regressions appear in Table 4.13.

[insert about here: Table 4.13]

Age and age squared of the household head are included as indicators of the stage in the family life cycle, and also as a measure of seniority that likely affected the administrative allocation of publicly owned housing in the Mao era as well as housing obtained during the privatization of housing (Sato 2006). To allow for the possibility that young families that were formed after the housing reforms may have moved into housing with their parents who obtained their housing during the housing reforms, we include a dummy for young household heads (i.e., under 30 years old) who live with a parent who has a local urban *hukou*. This variable captures

another aspect of the household life cycle. The proportion of these households is small but increasing (Table 4.13).

A dummy for the *hukou* status of the household head (equal to 1 if the head has a local urban *hukou*, otherwise 0) is the most basic institutional factor, as only those people with a local *hukou* were eligible to buy housing in that city during the urban housing reforms. We expect that having local urban *hukou* status strongly correlates with ownership of housing-reform housing. Because our analysis does not include the migrants from the CHIP migrant subsamples, the number of household heads with a non-local urban *hukou* is small—about 2 percent of the urban subsamples in both years. Nevertheless, the urban subsamples do contain such individuals, primarily urban-to-urban migrants and also some individuals with rural *hukou*, probably integrated migrants who reside in urban neighborhoods or who are from the rural districts of the cities.

We include dummy variables for the occupational status of the household head—employed in publicly owned work-units; employed in non-publicly owned work-units; self-employed/private business owners; retirees; and others (including those reemployed after retirement, those currently unemployed, or those who are ill or disabled). These dummy variables capture several different factors. The ownership status of the employer affects access to and the distribution of housing-reform housing. Retirement reflects the stage in the family life cycle and also may be related to risk preferences. Entrepreneurship is sometimes included as a

variable in studies of the investment demands for housing, as entrepreneurs may have different risk preferences and wealth accumulation patterns.

Income is relevant to both the consumption and investment demands for housing. The measure of income used here is current per capita disposable income, as according to the NBS income definition, that is, excluding imputed rent and in-kind housing subsidies.

To capture the absence or presence of borrowing constraints, we employ a dummy for participation in the housing provident fund (equal to 1 if the household participates, otherwise 0), and a dummy for households that receive minimum living guarantee benefits (*dibao*) or other public assistance (equal to 1 if the household receives such public assistance, otherwise 0).

Finally, the regression includes a dummy variable indicating whether the household owns other housing assets that it rents out (equal to 1 if so, otherwise 0). This is to capture the possibility that beneficiaries of housing-reform housing may have upgraded to commodity housing. In addition, we expect that households that own additional housing assets would be investor households that behave differently from other households. The percentage of such households is relatively small but it increased substantially between 2002 and 2007 (Table 4.13). Such cases of multiple homeownership are potentially important for a study of the long-term inequality of wealth in urban China and may be related to the transfer of housing assets from generation to generation.<sup>14</sup>

Finally, we employ city dummies to control for variations in the implementation of the housing reform policies, the level of development of the housing market, price differences, and other locational factors.

[insert about here: Table 4.14]

Table 4.14 reports the results of the multinomial logit estimation using renter as the omitted reference group. We find that in both years, owners of commodity housing do not differ from renters (the reference group), except with respect to the variables related to income and wealth. Households receiving public assistance are less likely, and those with higher income or additional properties are more likely, to own commodity housing than to rent. In 2007 age also was significant, with older households more likely to own commodity housing than to rent.<sup>15</sup>

Although institutional variables have little impact on the choice to own commodity housing, they significantly influence the probability of owning housing-reform housing. In both years, having a local urban *hukou* increased the probability of owning this type of housing relative to renting. The type of employer also matters, with those with self/private employment less likely and those with a state-owned employer more likely (in 2007) to own housing-reform housing.

The impact of age on owning housing-reform housing changed between 2002 and 2007. In 2002 age increased the probability of owning housing-reform housing versus renting. This probably reflected the fact that older individuals were more likely to be employed at the time of

privatization, and that individuals with seniority in the work-unit typically were given the option to buy better housing, which may have increased the likelihood of their participating in the housing reform. In 2007, however, the coefficient for age squared became negative and significant, so that the relationship between age and ownership of housing-reform housing is nonlinear. For ages greater than 15, the net effect is negative, and increasingly so as age increases. Thus in 2007 households with older heads of household were less likely to own housing-reform housing than to rent. Moreover, as noted above, older households are more likely to own commodity housing than to rent. This change may be explained by trading up, that is, by beneficiaries of housing-reform housing selling their original housing-reform housing in order to buy better-quality commodity housing.

Variables related to income and wealth are relevant to ownership of housing-reform housing versus renting. In 2002 households with higher income were more likely to own housing-reform housing. This makes sense, as purchasers of housing-reform housing had to pay for the housing, albeit at relatively low prices. The coefficient for income in that year is similar to that in the commodity housing regression. In 2007 income continued to be a significant and positive factor in housing-reform housing ownership, although the size of the effect had declined and was by then smaller than that for commodity housing.

Recipients of public assistance are less likely to own housing-reform housing than to rent, although this coefficient was significant only in 2007, and in both years the coefficient was smaller than the coefficient for this variable in the commodity housing regression.

Interestingly, participation in a provident fund is significant and positive for owners of housing-reform housing, perhaps reflecting the fact that households that benefited from the housing reform were more likely to be employed in work-units that participated in these programs. Also, owners of additional properties in 2007 were less likely to own housing-reform housing than to rent. We hypothesize that this reflects the sorting of individuals among tenure types based on their investment demands and willingness to participate in the real estate markets.

One other variable that became significant in 2007 for owners of housing-reform housing is the dummy variable for young household heads living with their parents. This result confirms our hypothesis that as time passed after the housing reform as housing prices increased, the children of the beneficiaries of the housing reform were likely to reside with their parents in their parents' housing.

## **B. Determinants of Housing Wealth in the Urban Areas**

Here we move to an investigation of the determinants of housing wealth in urban areas. We employ an ordinary least squares regression estimation using the log of market value of owner-occupied housing as the dependent variable. The sample used in the regression covers only

homeowner households; renters are dropped. Descriptive statistics for all the variables used in the urban housing wealth regression are shown in Table 4.15.

[insert about here: Table 4.15]

Explanatory variables include many of those used in the above investigation of housing tenure choice, as well as some new variables. We now include dummy variables for the household head's educational attainment: primary school or less; lower middle school (*chuzhong*); upper middle school (*putong gaozhong*) or vocational secondary school (*zhongzhuan, zhiyegaozhong*); junior college (*dazhuan*); and four-year college (*daxue benke*) or above. Educational attainment is an indicator of the security of household income and risk preferences. In addition, in the 2002 regression we include a dummy for Communist Party membership of the household head (this variable is not available for 2007), which may be associated with political status and its attendant privileges.

We introduce dummy variables for family size: one- and two-person family; three-person family; four-person family; and five- or more person family. Family size declined somewhat between 2002 and 2007, reflecting the long-term effects of the one-child policy and the aging of the urban population. All else being equal, we expect larger households will have a higher consumption demand for housing, and so we expect a positive correlation between family size and housing wealth.

To control for factors such as price differentials associated with different categories of housing, we employ a dummy for commodity housing. We expect a positive coefficient on this variable, as housing purchased on the market may be more expensive than that obtained through the housing reform; also, owners of housing-reform housing may underestimate the market value of their housing.

With respect to income, in the housing wealth regressions we disaggregate income between non-asset income and asset income. The regression thus includes two different income variables: per capita non-asset income (disposable income according to the NBS definition minus asset income), and per capita non-housing asset income (the total of asset income minus rent income, and excluding imputed rents). The latter is a proxy for family non-housing wealth. We expect that the coefficient on this variable will reflect the household's investment demand for housing, relative to other (mostly financial) assets. In addition, we retain the dummy variable indicating whether the household owns housing that is rented out. These last two variables capture household investment demand for owner-occupied housing in the context of the household's broader investment portfolio.

[insert about here: Table 4.16]

Table 4.16 reports the regression results. Somewhat surprisingly given the life-cycle considerations emphasized in the literature on wealth accumulation, the effect of age on housing wealth is relatively unimportant. In 2002 age had a positive and significant coefficient, but the



magnitude of the estimated coefficient was fairly small and it became insignificant when the dummy variable for Communist Party membership was included. In 2007 age did not have a significant coefficient. We conclude, then, that although age is associated with housing tenure, it does not influence the level of housing wealth among homeowners. Thus unimportance of age may reflect the fact that homeownership is relatively recent and life cycle patterns have not yet emerged; it may also reflect economic interrelationships between younger and older generations.

Educational attainment had positive and statistically significant coefficients, and the coefficients became larger and more significant from 2002 to 2007. Education here may capture differences in risk attitudes as well as the ability to make choices in the rapidly evolving and complex real estate market and policy environment.

With respect to the occupational status of the household head, those employed in non-public-owned work-units had less housing wealth than those employed in the state sector (the omitted category). This may reflect the fact that state-owned enterprises are better endowed and thus their employees are advantaged both during housing privatization and thereafter. Notably, we do not observe a disadvantage in housing wealth for those who are self-employed and those who are private business owners, possibly due to differences in risk preferences and entrepreneurship that may affect investment demand for housing.

In contrast to the case of housing tenure choice, a local urban *hukou* status did not have a significant effect on housing wealth. As expected, family size is positively and significantly

related to housing wealth, reflecting the larger consumption demand for housing space among bigger households.

The magnitudes and significance of the effects of current household income (positive) and of the dummy for beneficiaries of public assistance (negative) decreased between 2002 and 2007. These results may reflect recent urban housing policies that expanded the supply of low- and medium-priced housing since the mid-2000s. In addition, the development of housing financing and increased access to mortgage loans may have eased credit constraints and so reduced the effects of household income.

Non-housing asset income had an insignificant coefficient in both years, suggesting that holdings of housing assets do not affect and are not affected by the non-housing components of household wealth portfolios. The coefficient on ownership of other, rented housing, however, was positive and significant in 2007. This result reflects the expansion of multiple homeownership among households with higher value homes, perhaps signifying a trading up by households that benefited from the urban housing reform and reflecting the long-term effects of housing privatization on wealth inequality.

### **C. Determinants of Housing Wealth in the Rural Areas**

Since almost all rural households are homeowners, we do not investigate the housing tenure choice of rural households. However, we do estimate the determinants of housing wealth. As

discussed above, in most parts of rural China real estate markets are not well developed, so we expect that the demand for housing in both 2002 and 2007 was primarily due to consumption demand, and investment demand was not yet very relevant.

Our dependent variable is the log of the market value of owner-occupied housing, which we view as a proxy for housing wealth. As in the urban regressions, we treat the household head as the owner and use the household head's characteristics for some explanatory variables. In order to control for regional differences in prices and economic conditions, we include provincial dummy variables. Table 4.17 contains the descriptive statistics for all variables used in the regression.

[insert about here: Table 4.17]

The explanatory variables include age and age squared of the household head, family size (number of household members), and a dummy for a “three-generation family” (*sandai tongtang*), that is, a household consisting of a married couple, their children, and the husband's elderly parent(s). The latter variable can also be a measure of a traditional attitude toward family formation that might influence wealth accumulation. Multi-generational interdependence might also dampen the relationship between age and housing wealth.

In view of the importance of consumption demand for housing in the rural sector, the family life cycle stage and family structure may be correlated with the housing value. Unless offset by multi-generational interdependence, we expect an inverted U-shaped curve for the

relationship between the age of the household head and housing wealth. We expect a positive relationship between housing wealth and the variables that measure family size.

As measures of financial ability and risk preferences, we introduce the educational attainment of the household head, household non-asset income (current per capita disposable non-asset income, based on the NBS definition), and current per capita asset income (a proxy for non-housing family wealth). As for the urban households, we expect a positive relationship between educational attainment and housing wealth. Since rural China does not have either an official housing financing system or commercial housing loans, we expect positive and significant effects of both types of income on housing wealth. Traditional attitudes that regard housing as an important indicator of socioeconomic status may reinforce the relationship between income and housing wealth.

With respect to borrowing constraints, available information on social assistance is not consistent between the 2002 and 2007 datasets. The 2007 rural data contain variables for the five-guarantee assistance program (*wubao*) households and households receiving *dibao*, but do not contain information on the amount of social assistance. The 2002 data include information on the amount of transfer income from social or collective relief programs, but do not identify *wubao* and *dibao* households. To address this inconsistency, for 2007 we employ a dummy variable for *wubao* or *dibao* households, and for 2002 we employ a dummy variable for households that receive any social relief (*jiuji kuan*), subsidies from the collective welfare fund

(*jiti gongyijin*), a subsidy for the elderly (*laonianren butie*), or other public transfers from the state or collective. We expect that these indicators are associated with borrowing constraints and thus will negatively correlate with housing value.

To capture the role of entrepreneurship and out-migration we include dummy variables for the main source of household income (exceeding 50 percent of the total household income), classified as follows: agricultural income (including income from animal husbandry, forestry, and fishery), local wage income (earned within the township), revenue from nonagricultural self-employment/family business, wage income from out-migration (earned outside the township), and multiple income sources (no single income source exceeding 50 percent of the total household income). Households that depend mainly on agricultural income are used as the reference group.

We expect a positive relationship between entrepreneurship and housing wealth, partly because operating a family business can be another measure of risk preferences and partly because rural housing often serves both residential and productive purposes. With respect to migration and housing, de Brauw and Giles (2008), using panel data of 88 villages in 8 provinces from 1986 to 2002, find a causal relationship of out-migration on the building of new housing. Although we are unable to capture such a causal relationship because we have cross-sectional data, we expect households with income mainly from migration to have more housing wealth.

Table 4.18 reports the estimation results. As expected, educational attainment was significantly and positively associated with housing value. Notably, the coefficients of educational attainment increased between 2002 and 2007. This finding is consistent with the urban case and suggests an increasing role of education in household risk-related decision making. Household income was also positively and significantly related to housing wealth. The coefficient of asset income was positive and significant in 2007, but not significant in 2002. This result may reflect the fact that until recently households held very little non-housing wealth, but its importance for consumption increased in recent years.

[insert about here: Table 4.18]

Consistent with consumption demand, family structure and the family life-cycle stage have large and significant coefficients. The relationship between the age of the household head and housing wealth follows an inverted U-shape curve, with a peak slightly lower than 49 years old in 2002 and 47 years old in 2007. Family size has a positive coefficient. Contrary to our expectations, after controlling for family size and other factors the coefficient on the dummy variable for a “three-generation family” is not significant.

The dummy variable for social assistance is negative in both years but significant only in 2007. These results imply that borrowing constraints became increasingly important for rural households between 2002 and 2007. However, it may also reflect differences in the construction of the two variables, in which case it they could be interpreted as an indication that *wubao*

households and *dibao* households have less housing wealth due to credit constraints, but this does not affect other households receiving subsidies (that are included in the 2002 dummy variable).

Finally, we find that the income structure of the household significantly correlates with the housing value. Compared with households with agriculture as the main source of income, households that engage in nonagricultural activities have more housing wealth in both reference years. Moreover, the coefficients of the income structure dummies increased between 2002 and 2007, suggesting a growing influence of nonagricultural activities on household income risks and on attitudes toward housing consumption. Notably, the coefficient on the dummy for out-migration income was positive but insignificant in 2002 and became larger and significant in 2007. This finding is consistent with the causal influence of out-migration on housing consumption, as reported by de Brauw and Giles (2008).

## **V. Concluding Comments**

In this chapter we discuss the estimation of housing wealth and imputed rental income from owner-occupied housing using the CHIP data, and we examine the distribution of household housing wealth and the implications for income inequality. Due to incomplete information, we must rely on estimates of housing wealth and imputed rents that are based on the market value of, rather than the household equity in, housing. Sensitivity analyses using more complete

information from the 2002 CHIP survey and checks against the published NBS data indicate that our estimates are nevertheless informative.

Our analysis reveals that the distribution of housing wealth in China has some unusual characteristics. When measured among homeowners, inequality of housing wealth is relatively high by international standards. When measured among all households including non-owners, however, inequality in the distribution of housing wealth is not high by international standards. This difference reflects the high level of homeownership in China.

Indeed, with a rate of homeownership at or above 80 percent, China has one of the highest rates of homeownership in the world.<sup>16</sup> Although property rights associated with homeownership in China may be weaker than elsewhere, this high rate of homeownership has potentially important implications, both economically and politically. Homeownership affects microeconomic behavior. It also influences the distributional impact of economic policies and macroeconomic fluctuations.

We find that the inequality of housing wealth nationwide, among all households including migrants and non-owners, increased between 2002 and 2007. This increase in inequality reflected increased inequality within the rural areas and the widening gap between the urban and rural areas. Within the urban areas inequality of housing wealth declined due to a rise in the rate of homeownership. In addition, imputed rental income is unequally distributed and its contribution to inequality of per capita household income showed a marked increase between



2002 and 2007. These trends reflect that China's recent urban housing and real estate market reforms have disproportionately benefited higher-income residents, and also that urban-rural differences are a key feature of the inequality in housing wealth as well as income.

Using multinomial logit and regression analyses we examine the factors associated with homeownership and housing wealth for urban (non-migrant) and rural households. As expected, in urban areas institutional factors such as *hukou* and type of employer affect the likelihood of owning housing-reform housing versus having other forms of housing as well as the value of owned housing. This reflects the legacy of the urban housing reforms.

We also find that variables commonly associated with consumption demands for housing—income and family size—are significant. Some variables associated with investment demands for housing are also significant. Borrowing constraints, captured by the proxy for social welfare assistance, is negatively correlated with housing wealth, and the variables associated with risk preferences such as education and entrepreneurship are positively correlated with housing wealth.

Life-cycle effects do not follow the usual pattern of increasing housing wealth through middle age and then declining in old age. Among urban homeowners, we find little relationship between housing wealth and age; among rural homeowners, housing wealth, on balance, declines with age. Since we employ cross-sectional data, these results might reflect differences across

cohorts because of the relatively recent housing privatization and also because housing choices and investments have taken place in a rapidly changing institutional and economic environment.

It remains unclear how patterns of housing wealth will play out in the future. Without policy interventions, inequality related to housing is likely to increase because of the strong urban-rural division and also because younger and migrant households may be unable to afford to buy into urban housing. Recent measures to expand the supply of low-cost urban housing may help these groups, but these measures do not address the underlying distortions in land management and real estate markets. As housing is a form of investment as well as of consumption, the distribution of housing is also affected by China's underdeveloped financial system and the lack of investment vehicles available to households.

Regardless, ownership of housing will remain an important factor in personal welfare and inequality in China. We therefore hope that future surveys will place a priority on collecting good-quality housing-related statistics and that future studies of inequality will pay close attention to the role of housing wealth.

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## Appendix

### Housing Data in the CHIP 2002 and 2007 Surveys

As discussed in the text, calculation of housing equity and imputed rental income on owner-occupied housing requires information on ownership status, the market value of housing, mortgage amounts, and the costs of ownership. Table 4A.1 shows the relevant variables that are present in the 2002 and 2007 CHIP datasets. Since different information is available for the rural, urban, and migrant subsamples, the table shows each separately. In the table “CHIP” refers to variables collected through interviews of households using the independent CHIP questionnaires. “NBS” refers to variables collected by the NBS in its annual household survey that have been provided to the CHIP and are available in the CHIP datasets. A few variables are available from both sources. All these variables are self-reported by the households.

Table 4A.1 about here

Since some relevant variables are not available for all subsamples in all years, estimates of housing wealth and imputed rental income presented in the body of this chapter are based on several simplifying assumptions. For some subsamples in some years, however, most or all of the relevant variables are available, and thus we can calculate alternative estimates that are based on fuller information. In the text we have reported some comparisons of alternative estimates (Tables 4.4 and 4.5). In this Appendix we present some additional alternative estimates of



imputed rental income that incorporate the costs of ownership calculated using different assumptions. We also discuss several issues regarding the mortgage data and urban rental values.

### **A. Mortgage Data and Treatment of Negative Equity**

Mortgage data are available only for 2002. We carried out a variety of checks on the 2002 mortgage data, for example, we compared the size of the mortgage to the market value of the housing, checked whether households with mortgages have any particular characteristics, and so on. Based on these checks and examination of the data, we conclude that the 2002 housing data appear to be of good quality.

One issue with the 2002 mortgage data is that a small number of homeowner households reported mortgage debt that exceeded the market value of their housing, implying negative equity (less than 1 percent of the households in the rural sample and less than 2 percent of the households in the urban sample). We checked the market value per square meter of housing for these households, and found it reasonable and similar to that for households with positive equity. This suggests that the negative equity was not due to unusually low market values of housing, but instead to unusually high mortgage levels.

Our view is that it is unlikely that households in fact had negative housing equity. Chinese households do not have easy access to credit and so they typically pay substantial

portions of the purchase price in cash. Moreover, negative equity is usually associated with falling housing prices, which did not occur in 2002.

It is possible that the housing debt reported by households includes borrowing for purposes other than the purchase of their dwelling. Data errors may also be present. In view of these considerations, in analyses that use mortgage data from the 2002 CHIP survey, we assume that the true mortgage debt does not exceed the market value of the housing, i.e., we set a minimum equity value of zero.

#### **B. Inconsistent 2002 NBS and CHIP Data on Urban Rental Values of Housing**

For the 2002 urban sample we have two sets of data on market values and rents for owner-occupied housing, one from the CHIP questionnaire and the other provided by the NBS. The information on the market housing values from these two sources is fairly consistent, but the information on rental values is not.

Information from the two sources on housing market values (unweighted) is summarized in Table 4A.2. Note that this table includes information only for those urban households that own their dwellings and report a non-zero market value of housing. The lower panel of Table 4A.2 shows information for homeowner households that report non-zero housing value in both data sources, so the statistics are calculated over the same subsample of households.<sup>17</sup> For this

common sample, the average market value from the CHIP data is 91,763 yuan and from the NBS data 90,105 yuan. These numbers differ by less than 2 percent.

Insert Table 4A.2 about here

Table 4A.3 gives the same comparison for market rents from the two data sources (again, unweighted). The mean rent from the CHIP is markedly higher than that from the NBS. For the same subsample of households (lower panel), the CHIP rent is 3.5 times that of the NBS rent. The difference in the reported rental value of housing between the two data sources is so large that one must make a judgment about which source is more reliable.

Insert Table 4A.3 about here

We carried out several checks to identify which source provides more reasonable values of housing rents. Useful here was an analysis of the rent-price ratio, that is, the ratio of the rent to the market value of the dwelling. The rent-price ratio is a crude measure of the rate of return to housing assets.

As shown in Table 4A.4, the average rent-price ratio (unweighted) is much higher for the CHIP data than for the NBS data. The CHIP data yield a ratio of 15, that is, the average market rent is 15 percent of the housing value; the NBS data yield a ratio of only 2.25. Available data for other countries typically reveal national average rent-price ratios for private housing in the range of 3 to 10, although within countries the ratio in particular cities or local markets may be higher.<sup>18</sup> Reports on the rent-price ratio for urban China give numbers below 6.<sup>19</sup> Such

evidence suggests that the rent data from the NBS may be more reasonable than the rent data from the CHIP.

Insert Table 4A.4 about here

Also, the CHIP rental data appear to be noisier than the NBS rental data. The maximum value of the rent-price ratio in the CHIP data is 14423, too high to be regarded as believable. The 99<sup>th</sup> percentile for the CHIP rent-price ratio is 171, a much lower number. Still, it seems unlikely that 1 percent of the urban households truly have rent-price ratios exceeding 171. Calculated using the NBS data, the maximum rent-price ratio is 240, still high but not so stratospheric, and the 99<sup>th</sup> percentile is 12, a more believable number.

We compared the CHIP and NBS market rent and housing value data for all households with rent-price ratios greater than 50. We found that for most of these households the market value from the CHIP is one digit less than that from the NBS, and in most cases the missing digit is 0. Moreover, for some of these observations the reported mortgage exceeded the value of the house. This leads us to believe that the CHIP interviewers copied the NBS data onto the CHIP questionnaire, but with some transcription errors.

Based on the above, we conclude that the 2002 NBS data on housing rents and housing values are more reliable than those from the CHIP. Consequently, we use the NBS data on market rent and housing value for our analyses. This choice is also advantageous because in

2007 we have only NBS data on housing rents and housing values, and use of the NBS data for both years allows for consistent comparisons over time.

A minor drawback of the NBS data is that they contain more missing values than the CHIP data. For 2002 housing market values, which are fairly consistent between the NBS and CHIP sources, where the NBS value is missing we use the CHIP value. However, even after these replacements, market values are still missing for a few households. For these households, we estimate the market value by multiplying the area of the dwelling by the average NBS market value per square meter for all households in the same urban district.

### **C. Costs of Ownership and Alternative Estimates of Imputed Rents**

We carried out alternative estimates of imputed rental income from owner-occupied housing. Table 4A.5 summarizes the alternative calculations. The base estimates (A) are simply equal to the market value of the housing times the rate of return. We follow standard practice in the housing literature and set the rate of return equal to the interest rate on long-term government bonds. The base estimates can be calculated for all subsamples in all years, except for the 2007 migrant subsample. We use these base estimates for our analyses in the main body of this chapter, except for migrants in 2007, for whom we use the reported market rents.

Table 4A.5 about here

Where possible, given data availability, we have also calculated alternative estimates of imputed rents that deduct the costs of ownership, such as depreciation and interest payments on housing debt. These alternative estimates allow us to evaluate possible biases in our base estimates.

Studies of imputed rents on owner-occupied housing typically estimate depreciation by multiplying the housing value by a depreciation rate. It is also possible to incorporate costs of maintenance and repairs as part of depreciation costs. Household spending on repairs and maintenance affects the rate of economic depreciation—the rate of depreciation is higher for housing that is not maintained or repaired—so in fact these two types of costs are closely related (Wilhelmsson 2008). For our calculations, we use a rate of depreciation that reflects the depreciation of housing that is not well maintained or repaired.<sup>20</sup> Thus, our depreciation rate includes both standard depreciation and also the costs of maintenance and repair.

For 2002, we have data on mortgages; therefore we can estimate interest costs associated with housing mortgages. We follow common practice in the literature and assume that the mortgage interest rate is equal to the rate of interest on long-term government bonds plus two percentage points.

Our main concern is how these alternative assumptions for calculating imputed rents affect the measured inequality of income. Table 4A.6 shows estimates of the Gini coefficient for household per capita incomes calculated using each of the four alternative estimates of imputed

rental income. In estimate (A) we use our base estimate, i.e., the rate of return times the market value of housing. In estimate (B) we subtract depreciation and maintenance/repair costs.

Estimate (C) is calculated using the rate of return approach applied to the housing equity rather than to the market value. Estimate (D) subtracts the mortgage interest costs from estimate (C).

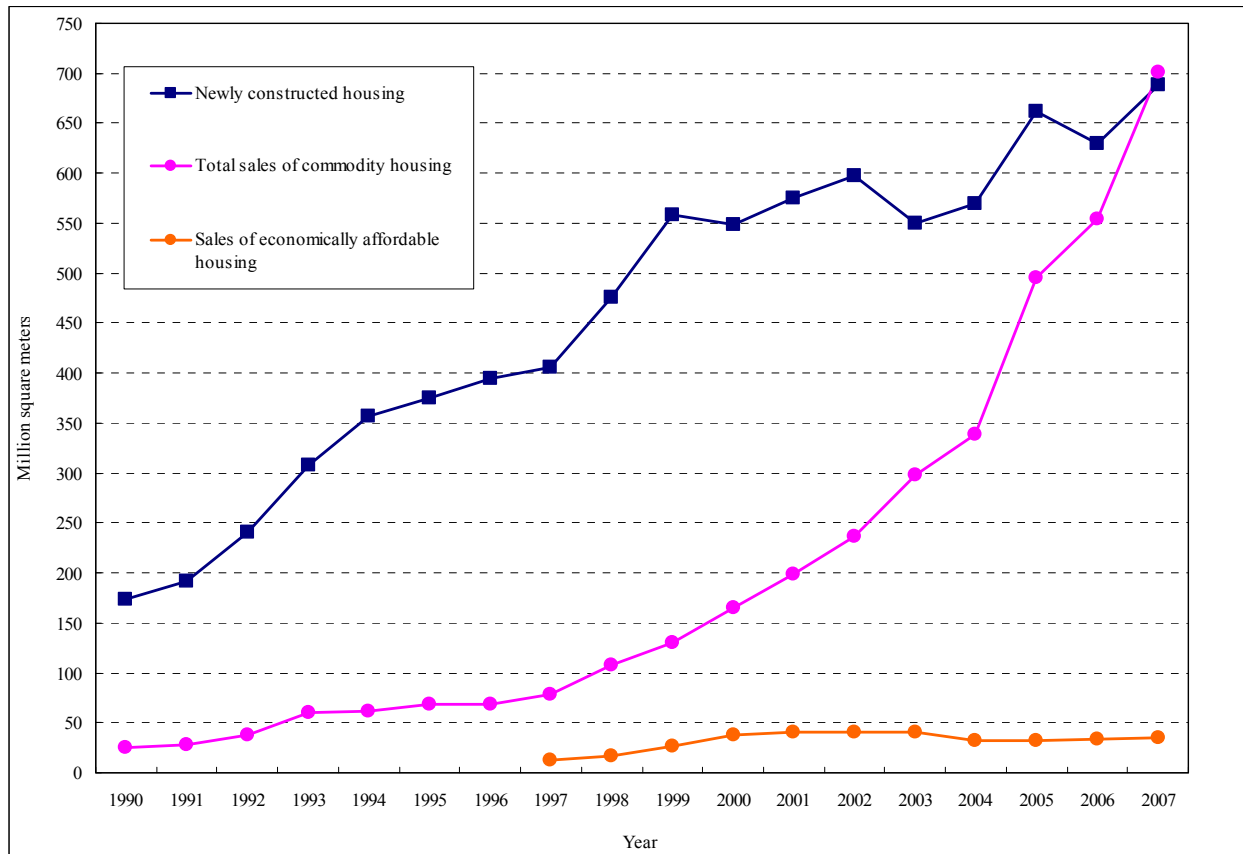
The latter two estimates can only be calculated for 2002.

Table 4A.6 about here

We find that inequality of household per capita income as measured by the Gini coefficient is little affected by the method used to estimate the imputed rents. This is true for both the urban and rural sectors and nationwide. For both the individual sectors and nationwide, using alternative estimates of the imputed rents changes the Gini coefficient for household income per capita by less than 1 percent from its value calculated using our base estimate (A).

We therefore conclude that we can use the base estimate for the purpose of analyzing income inequality.

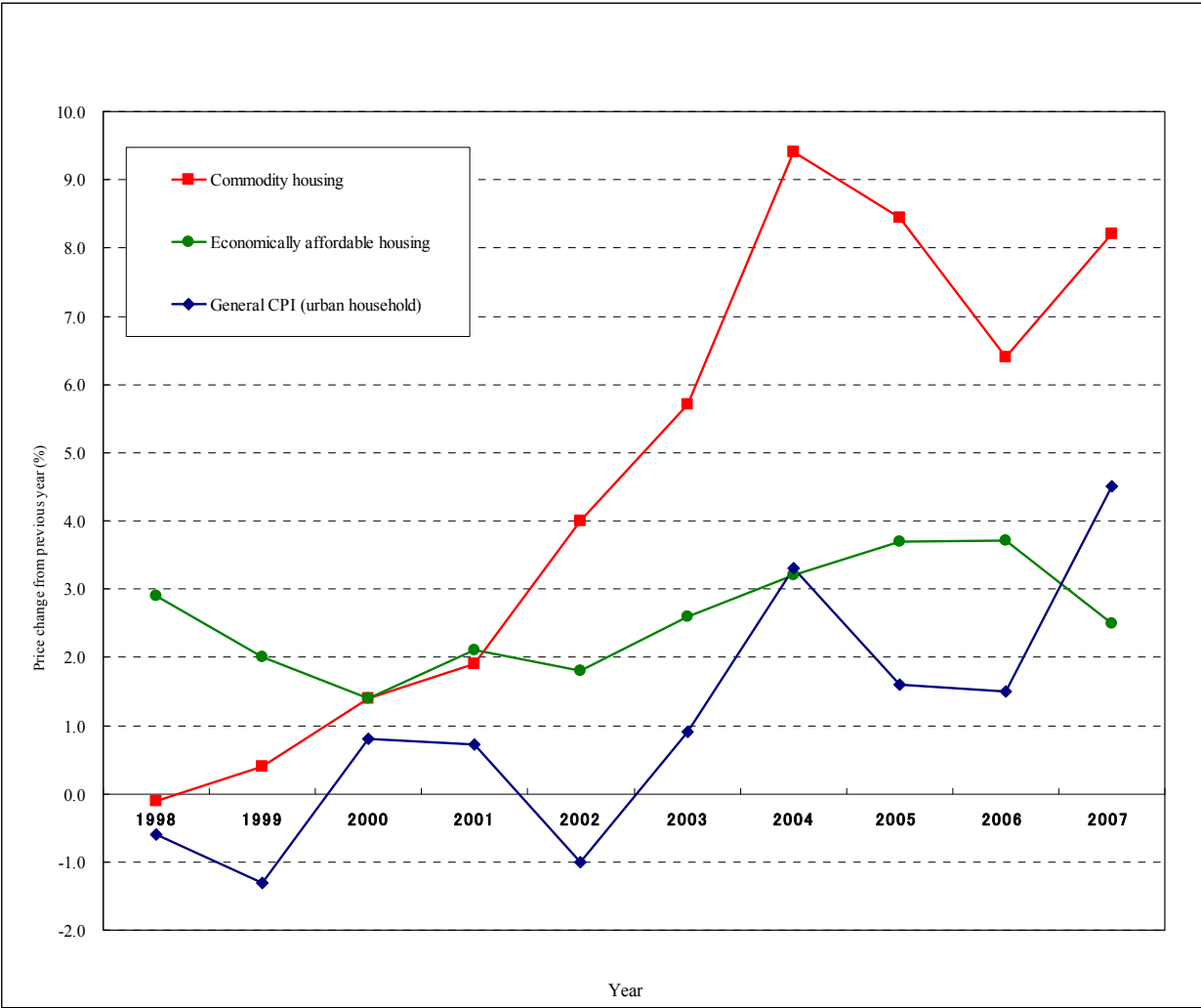
Figure 4.1 Floor Area of Urban Housing, 1990-2007



Source: NBS, *Zhongguo tongji nianjian*, various years. These numbers represent annual flows.



Figure 4.2 Changes in Urban Housing Prices, 1998-2007



Source: NBS, *Zhongguo tongji nianjian*, various years.

Table 4.1. *Chronology of housing reform*

**A: Urban**

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**June 1980** The State Council officially refers to “commercialization of housing” (*zhufang shangpinhua*) for the first time.

**April 1988** A constitutional amendment gives legal foundation to the transfer of the right-of-use of land.

**October 1991** The State Council’s “Directive on the Promotion of Urban Housing Reform” refers to privatization of housing, increase of rent of publicly-owned housing, and establishment of a housing construction fund as the main policy arrangements.

**July 1994** The State Council’s “Decision on Deepening Urban Housing Reform” advocates a transition from in-kind allocation of publicly owned housing to “commercialization” (*shangpinhua*) and “socialization” (*shehuihua*) of urban housing in the direction of a “socialist market economy.” As a core policy for the transition, the housing provident fund (*zhufang gongjijin*) for urban employees is adopted nationally at the end of 1990s.

**July 1998** The State Council’s “Directive on the Further Deepening of Urban Housing Reform and Accelerating Housing Construction” (Document No. 23 of 1998) announces the official termination of in-kind allocations of publicly-owned housing in the latter half of 1998.

**August 2003** The State Council’s “Directive to Promote Continuous Development of the Real Estate Market” emphasizes the role of markets in guaranteeing an adequate supply of housing for the urban population.

**April 2005** The State Council’s “Comments on Policies for the Stabilization of Housing Prices” prohibits “speculative” trade in housing and increases the supply of economically affordable housing, low-rental housing, and medium-quality commodity housing.

**August 2007** The State Council’s “Several Comments on How to Solve Housing Poverty among Low-income Urban Residents” focuses on the development of a “low-rent housing” (*lianzu fang*) program to alleviate housing poverty.

**October 2007** Hu Jintao refers to the promotion of a low-rent housing policy program at the Seventeenth National Congress of the CCP.

**December 2008** The Central Working Conference on Economic Policy of the CCP emphasizes the critical importance of alleviating housing poverty and developing the real estate market.

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## B: Rural

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**April 1981** The State Council issues an urgent instruction to prohibit the diversion of farmland to housing use.

**February 1982** The State Council issues the “Regulations on the Administration of Land for Housing in Villages and Rural Townships.”

**October 1985** The Ministry of Construction and the Environment issues the “Regulations on the Administration of Construction in Villages and Rural Townships.”

**June 1986** Enactment of the Land Administration Law, based on the principle of “only a one-house building plot per rural household.”

**May 1997** The CCP Central Committee and State Council circulate an official notice strengthening land management and protection of farmland.

**May 1999** The State Council issues an instruction to prohibit transactions between rural and urban residents on the right of use of rural land for housing.

**October 2004** The State Council issues the “Decision on Strengthening Land Management,” emphasizing again the principle of “only a one-house building plot per rural household” and prohibiting the purchase by urban residents/work-units of the right of use of rural land for housing.

**March 2007** Enactment of the Real Rights Law, ensuring that rural households given the right of use of land for housing are allowed to possess the land and to build their own houses on it.

**January 2008** The Tenth “Document Number One” emphasizes that urban residents are not allowed to purchase right-of-use rural land for housing or rural residents’ housing.

**October 2008** The Third Plenum of the Seventeenth CCP Central Committee emphasizes strengthening rural land management to protect the peasants’ right of use of farmland and land for housing.

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*Sources:* Chen, Chen, and Liu (2008); Jia and Liu (2007); Luo (2009); Sato (2006); Xu and Kong (2009); the Official Web site of the Central People’s Government of PRC, at <http://www.gov.cn/>, accessed July 28, 2011; the China Real Estate Law and Regulation Data Base, at <http://www.law110.com/law>, accessed July 28, 2011.

Table 4.2. *Housing tenure for rural, urban, and migrant households, 2002 and 2007 (% of households)*

	2002			2007		
	Rural	Urban	Migrant	Rural	Urban	Migrant
Renters	0.8	18.2	58.1	n.a.	9.8	74.5
Owners	98.8	77.8	7.2	n.a.	88.7	3.9
Of which: “housing-reform housing”		60.7			54.9	
“commodity housing”		7.4			27.0	
inherited, self-built, and other		9.7			6.8	
Other/missing	0.3	4.0	34.7	n.a.	1.5	21.6

*Note:* Calculated using data from the CHIP surveys, with weights. Urban refers to households in the CHIP urban subsample, and migrant refers to long-term, stable urban-to-rural migrant households in the CHIP migrant subsample. For migrant households, these statistics refer to whether they rent or own housing in their urban place of residence. Information on rural housing tenure is not available for 2007 (see text). “Other/missing” includes collective housing arrangements, such as shared housing and dormitories.

Table 4.3. *Mortgage debt among homeowner households, 2002*

	Urban (excluding migrants)			Rural		
	No Mortgage	Mortgage	All	No Mortgage	Mortgage	All
Percentage of households	91.0%	9.0%	100%	96.2%	3.8%	100%
Average size of mortgage (yuan)	0	51643	4634	0	10055	385
Average market value of dwelling (yuan)	101950	110099	102681	23114	36932	23644
Average equity in dwelling (yuan)	101950	58456	98048	23114	26877	23245
Average household income (NBS income definition)	8516	8859	8547	2772	2595	2757

*Note:* Calculated using data from the CHIP urban and rural samples, with weights; migrants are not included in the urban sample. Only homeowner households are included in this table. The size of the 2002 urban sample used for these calculations is 5,343 households and the size of the rural sample is 9,092 households.

Table 4.4. Comparisons of housing market value and equity per capita, 2002

	Mean (yuan)		Gini coefficient	
	Homeowners	All	Homeowners	All
<b>Rural</b>				
A. Market value	5824	5759	0.528	0.534
B. Equity	5730	5665	0.551	0.538
C. Market value/equity (B/A)	.984	.984	1.044	1.007
<b>Urban (excluding migrants)</b>				
A. Market value	33418	26172	0.430	0.553
B. Equity	31895	24980	0.464	0.581
C. Market value/equity (B/A)	0.954	0.954	1.079	1.051
<b>National (excluding migrants)</b>				
A. Market value	13872	12740	0.629	0.660
B. Equity	13361	12271	0.664	0.677
C. Market value/equity (B/A)	0.963	0.963	1.056	1.026

*Note:* Calculated using data from the CHIP urban and rural samples, with weights. Urban and national numbers in this table do not include long-term stable migrants.

Table 4.5. *Alternative estimates of imputed rental income and income per capita, 2002*

Rural			Urban (excluding migrants)			National (excluding migrants)		
Imputed rent per capita (yuan)	Income per capita (yuan)	Gini of income per capita	Imputed rent per capita (yuan)	Income per capita (yuan)	Gini of income per capita	Imputed rent per capita (yuan)	Income per capita (yuan)	Gini of income per capita
<b>A. Calculated using Market Value of Owner-Occupied Housing</b>								
167	2797	0.365	759	8637	0.322	369	4794	0.455
<b>B. Calculated using Equity Value of Owner-Occupied Housing</b>								
164	2795	0.365	724	8602	0.322	356	4781	0.455
<b>C. Ratio: B/A</b>								
0.982	0.999	1.000	0.954	0.996	1.000	0.965	0.997	1.000

*Note:* Calculated from data in the CHIP urban and rural samples, with individual-level weights using the rate of return approach. The rate of return is set equal to the interest rate on long-term (30-year) Chinese government bonds in 2002 (0.029). Housing costs (depreciation, mortgage interest costs, and so forth) are not subtracted. Urban data in this table do not include long-term stable migrants from the CHIP migrant sample.

Table 4.6. *Mean housing wealth per capita, 2002 and 2007 (in yuan and as a percentage of income per capita)*

	Homeowner households		All households	
	2002	2007	2002	2007
Rural	5824 (125%)	9456 (95%)	5759 (119%)	9456 (92%)
Urban w/out migrants	33418 (720%)	76258 (765%)	26172 (540%)	68391 (665%)
Migrants	44285 (954%)	130521 (1310%)	4017 (83%)	5494 (53%)
Urban w/ migrants	33510 (722%)	76453 (767%)	24646 (508%)	63907 (621%)

*Note:* The market value of housing is used as a proxy for housing wealth (see text). Weighted; in current prices.



Table 4.7. *Average annual increases in per capita housing wealth, 2002 to 2007 (percent, constant prices)*

	<b>Homeowner households</b>	<b>All households</b>
Rural	6.9	7.1
Urban w/out migrants	15.2	18.4
Migrants	21.3	4.0
Urban w/ migrants	15.2	18.2

*Note:* Weighted. Calculated using constant 2002 prices; urban and migrant values are deflated using the NBS urban consumer price index and rural values are deflated using the NBS rural consumer price index.

Table 4.8. *Ratios of per capita housing wealth between urban, rural, and migrant households, 2002 and 2007*

	<b>2002</b>	<b>2007</b>
Urban/rural	4.5	7.2
Urban/migrant	6.5	12.5
Migrant/rural	0.7	0.6

*Note:* Calculated over all households, including non-owners; weighted. Urban does not include migrants.

Table 4.9. *Inequality of housing wealth, 2002 and 2007 (Gini coefficients)*

	2002				2007			
	All	Rural	Urban, w/out migrants	Urban, w/ migrants	All	Rural	Urban, w/out migrants	Urban, w/ migrants
Homeowners, per household	0.59	0.51	0.42	0.55	0.63	0.56	0.45	0.52
All, per household	0.63	0.52	0.55	0.58	0.67	0.56	0.52	0.56
All, per capita	0.67	0.53	0.55	0.58	0.69	0.55	0.52	0.56

*Note:* Calculated with weights.

Table 4.10. *Distribution of housing wealth across income quintiles, 2002 and 2007*

Per Capita Income Quintiles	2002		2007	
	Housing value per capita (yuan)	% of non-owners	Housing value per capita (yuan)	% of non-owners
1 (lowest)	2742	2.2	4600	0.7
2	4360	4.3	7818	2.6
3	6872	9.7	15690	7.2
4	13317	18.0	36760	13.7
5 (highest)	35336	16.8	101386	11.7
Ratio of top/bottom quintile, (all households)	12.9		22.0	
Ratio of top/bottom quintile, by housing wealth quintiles (homeowner households only)	31.1		56.2	

*Note:* Calculated with weights; in current prices. Includes rural, urban, and long-term stable migrant households. Calculated over all households except for the last row.

Table 4.11. *Mean imputed rental income from owner-occupied housing, 2002 and 2007 (per capita)*

	Homeowner households		All households	
	2002	2007	2002	2007
<b>Rural</b>				
Yuan	169	404	167	404
% of income	3.6	4.1	3.4	3.9
<b>Urban, including migrants</b>				
Yuan	972	3265	715	2729
% of income	20.9	32.8	14.7	26.5
<b>National</b>				
Yuan	404	1529	363	1420
% of income	8.7	15.3	7.5	13.8

*Note:* Weighted; in current prices. Income is the sum of the NBS income plus our estimates of the imputed rental income from owner-occupied housing.

Table 4.12. *Imputed rents and income inequality, 2002 and 2007*

	<b>Gini coefficient</b>	<b>Contribution to income inequality (%)</b>
<b>2002</b>		
Income per capita	0.454	100.0
NBS income per capita	0.451	91.6
Imputed rents per capita	0.668	8.4
<b>2007</b>		
Income per capita	0.484	100.0
NBS income per capita	0.474	83.5
Imputed rents per capita	0.689	16.5

*Note:* Weighted; includes rural, urban, and long-term migrant households. Contributions to income inequality are calculated using income decomposition of the Gini coefficient by source of income.

Table 4.13. *Characteristics of urban households used in the analysis of urban housing tenure choice, 2002 and 2007*

	2002				2007			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
<i>Dependent variables: Housing tenure categories</i>								
Renter	.198	.399	0	1	.158	.365	0	1
Housing-reform housing owner	.699	.459	0	1	.662	.473	0	1
Commodity housing owner	.103	.304	0	1	.180	.385	0	1
<i>Characteristics of household heads</i>								
Age	48.430	10.838	19	84	50.865	11.879	22	98
Local urban <i>hukou</i>	.985	.122	0	1	.979	.142	0	1
Employed in state-owned or urban collective work-units	.549	.498	0	1	.423	.494	0	1
Employed in non-public-owned work-units	.098	.298	0	1	.163	.370	0	1
Self-employment/private business owner	.047	.213	0	1	.038	.190	0	1
Retired	.239	.426	0	1	.290	.454	0	1
Others	.067	.249	0	1	.086	.281	0	1
<i>Characteristics of households</i>								
Young household head (age<30) living with parents	.004	.064	0	1	.010	.100	0	1
Participating in housing provident fund	.517	.500	0	1	.493	.500	0	1
Receiving public assistance	.036	.187	0	1	.031	.173	0	1
Current household income (per capita, by 1000 yuan)	9.156	5.875	0.690	71.906	16.871	12.127	1.068	234.164
Having other housing assets that rent out	.015	.122	0	1	.075	.264	0	1
<i>Cities (number)</i>	40				40			

*Note:* Weighted. The sample size used in the 2002 analysis is 3,818 and in the 2007 analysis 4,428.

Table 4.14. *Multinomial logit analysis of housing tenure choice in the urban areas, 2002 and 2007*

**A: 2002**

Reference category: Renter	Owner of housing-reform housing	Owner of commodity housing
<i>Characteristics of household head</i>		
Age	0.072** (0.031)	-0.041 (0.049)
Age squared	-0.0004 (0.0003)	0.0001 (0.0005)
Local urban <i>hukou</i>	1.879*** (0.352)	0.664 (0.465)
Employed in non-public-owned work-units	-0.019 (0.154)	-0.284 (0.244)
Self-employment/private business owner	-0.439** (0.204)	-0.151 (0.300)
Retired	-0.013 (0.149)	-0.083 (0.265)
Others	-0.024 (0.174)	-0.086 (0.310)
<i>Characteristics of household</i>		
Young household head (age<30) living with parents	1.006 (0.727)	-16.316 (2,684.579)
Participating in housing provident fund	0.329*** (0.098)	-0.074 (0.161)
Receiving public assistance	-0.276 (0.208)	-1.700*** (0.553)
Current household income (per capita, by 1000 yuan)	0.110*** (0.012)	0.119*** (0.016)
Having other housing assets that rent out	-0.030 (0.377)	1.275*** (0.465)
<i>City dummies</i>	Yes	Yes
Constant	-6.299*** (0.949)	-19.269 (2,824.981)
Observations	3,818	
Pseudo R-squared	0.216	
LR chi-squared	1403.58 (p>0.000)	



**B: 2007**

<b>Reference category: Renter</b>	<b>Owner of housing-reform housing</b>	<b>Owner of commodity housing</b>
<i>Characteristics of household head</i>		
Age	0.103*** (0.030)	-0.096*** (0.036)
Age squared	-0.0007** (0.0003)	0.0006* (0.0004)
Local urban <i>hukou</i>	1.582*** (0.314)	-0.068 (0.287)
Employed in non-public-owned work-units	-0.364*** (0.135)	0.066 (0.158)
Self-employment/private business owner	-0.734*** (0.237)	0.160 (0.257)
Retired	0.131 (0.165)	0.337 (0.217)
Others	-0.391** (0.165)	-0.187 (0.208)
<i>Characteristics of household</i>		
Young household head (age<30) living with parents	1.171** (0.569)	-0.101 (0.579)
Participating in housing provident fund	0.361*** (0.107)	0.196 (0.132)
Receiving public assistance	-0.533** (0.220)	-0.863** (0.333)
Current household income (per capita, by 1000 yuan)	0.022*** (0.005)	0.041*** (0.006)
Having other housing assets that rent out	-0.447** (0.173)	0.526*** (0.190)
<i>City dummies</i>	Yes	Yes
Constant	-6.531*** (0.885)	0.595 (0.976)
Number of observations	4,428	
Pseudo R-squared	0.169	
LR chi-squared	1323.02 (p>0.000)	

*Notes:* 1. Multinomial logit estimation results for households living in 40 cities covered by both the 2002 and 2007 data. 2. Dependent variables are renters, owners of housing-reform housing, and owners of commodity housing. The omitted category is renters. 3. The omitted category in occupational status is employed in state-owned or urban collective work-units. 4. City dummies

are included in the estimation but are not reported in the table. 5. Standard errors in parentheses. \*\*\* denotes statistically significant at the 1 percent level, \*\* at the 5 percent level, and \* at the 10 percent level.

Table 4.15. *Characteristics of urban households in the analysis of urban housing wealth, 2002 and 2007*

	2002				2007			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
<i>Dependent variable</i>								
Market value of housing (yuan)	114,296	96,803	2,400	1,020,000	274,699	270,118	5,000	7,000,000
<i>Characteristics of household head</i>								
Age	48.689	10.832	19	83	51.267	12.030	22	98
Local urban hukou	.992	.089	0	1	.983	.128	0	1
Employed in state-owned or urban collective work-units	.563	.496	0	1	.423	.494	0	1
Employed in non-public-owned work-units	.094	.292	0	1	.159	.366	0	1
Self-employment/private business owner	.042	.200	0	1	.035	.183	0	1
Retired	.240	.427	0	1	.304	.460	0	1
Others	.061	.239	0	1	.079	.270	0	1
Primary school or below	.050	.218	0	1	.056	.229	0	1
Lower middle school	.279	.449	0	1	.242	.428	0	1
Upper middle/vocational school	.380	.485	0	1	.363	.481	0	1
Junior college	.198	.399	0	1	.211	.408	0	1
Four-year college or above	.093	.290	0	1	.128	.334	0	1
Communist Party member	.408	.491	0	1	na	na	na	na
<i>Characteristics of household</i>								
Single or two persons	.204	.403	0	1	.293	.455	0	1
Three persons	.634	.482	0	1	.554	.497	0	1
Four persons	.117	.321	0	1	.092	.289	0	1
Five or more persons	.045	.206	0	1	.061	.239	0	1
Current household non-asset income (per capita, 1000 yuan)	9.577	6.096	0.833	71.906	16.836	10.998	1.068	132.164
Participating in	.541	.498	0	1	.497	.500	0	1

housing provident fund								
Receiving public assistance	.029	.168	0	1	.026	.161	0	1
Current household non-housing asset income (per capita, 1000 yuan)	.0388	.2948	0	6.667	0.233	2.170	0	75.000
Having other housing assets that rent out	.015	.122	0	1	.075	.263	0	1
Commodity housing owner	.129	.335	0	1	.214	.410	0	1
<i>Cities (number)</i>	<i>40</i>				<i>40</i>			

*Note:* Weighted. The sample size used in the 2002 analysis is 2,762 and in the 2007 analysis 3,945.

Table 4.16. *Determinants of housing wealth in the urban areas, 2002 and 2007*

	(1) 2002	(2) 2002	(3) 2007
<i>Characteristics of household head</i>			
Age	0.012* (0.007)	0.008 (0.007)	0.002 (0.005)
Age squared	-0.00007 (0.00007)	-0.00004 (0.00007)	0.00002 (0.00005)
Lower middle school education	0.032 (0.050)	0.020 (0.050)	0.091** (0.040)
Upper middle school/professional school education	0.095* (0.050)	0.074 (0.050)	0.139*** (0.040)
Junior college education	0.194*** (0.054)	0.144*** (0.054)	0.234*** (0.043)
Four-year college education or above	0.282*** (0.060)	0.224*** (0.061)	0.309*** (0.046)
Employed in non-public owned work units	-0.076** (0.036)	-0.069* (0.035)	-0.052** (0.026)
Self-employment/private business owner	-0.003 (0.053)	0.018 (0.053)	0.084* (0.048)
Retired	-0.005 (0.035)	-0.009 (0.034)	-0.040 (0.030)
Others	-0.013 (0.044)	-0.004 (0.044)	0.0007 (0.034)
Local urban <i>hukou</i>	0.134 (0.115)	0.147 (0.115)	-0.043 (0.066)
Communist Party member		0.116*** (0.022)	

Table 4.16. continued

<i>Characteristics of household</i>			
Three-persons family	0.113*** (0.029)	0.109*** (0.029)	0.050** (0.022)
Four-persons family	0.174*** (0.039)	0.170*** (0.039)	0.115*** (0.033)
Five or more persons family	0.180*** (0.054)	0.177*** (0.053)	0.235*** (0.039)
Current household non-asset income (per capita, 1000 yuan)	0.021*** (0.002)	0.021*** (0.002)	0.013*** (0.0009)
Participating in housing provident fund	0.035 (0.023)	0.031 (0.023)	0.039* (0.020)
Receiving public assistance	-0.156*** (0.060)	-0.147** (0.059)	-0.076 (0.053)
Non-housing asset income (per capita, 1000 yuan)	0.032 (0.034)	0.035 (0.034)	-0.0005 (0.004)
Having other housing assets that rent out	-0.026 (0.081)	0.032 (0.081)	0.071** (0.032)
Owner of commodity housing	0.442*** (0.035)	0.437*** (0.034)	0.349*** (0.023)
<i>City dummies</i>	Yes	Yes	Yes
Constant	11.331*** (0.549)	11.403*** (0.546)	12.537*** (0.173)
Observations	2,762	2,762	3,945
Adjusted R-squared	0.547	0.551	0.597

*Notes:* 1. OLS regression results for households in 40 cities covered by both 2002 and 2007 data. 2. The dependent variable is the log of the current value of owner-occupied housing (yuan). 3. Omitted categories are as follows: primary school education or below; state-owned and urban collective work-units; single-person or two-person families. 4. Standard errors in parentheses. \*\*\* denotes statistically significant at the 1 percent level, \*\* at the 5 percent level, and \* at the 10 percent level.

Table 4.17. *Characteristics of rural households in the analysis of rural housing wealth, 2002 and 2007*

	2002				2007			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
<i>Dependent variable</i>								
Market value of housing (yuan)	24537	30727	200	360000	38428	67062	150	2500000
<i>Characteristics of household head</i>								
Age	46.267	10.269	16	88	48.615	10.209	17	99
Primary school or below	.336	.472	0	1	.340	.474	0	1
Lower middle school	.474	.499	0	1	.494	.500	0	1
Upper middle/vocational school	.180	.385	0	1	.154	.361	0	1
College level	.010	.010	0	1	.013	.114	0	1
<i>Characteristics of household</i>								
Household size	4.022	1.202	1	11	3.998	1.368	1	18
Three-generation family	.146	.353	0	1	.129	.335	0	1
Current household non-asset income (per capita, 1000 yuan)	2.838	2.308	0	34.865	4.470	3.663	0	74.729
Current household asset income (per capita, 1000 yuan)	.0201	.249	0	15.103	.152	1.004	0	75.100
Receiving social assistance	.011	.104	0	1	.026	.158	0	1
<i>Main income source (&gt;50%)</i>								
Agricultural income	.479	.500	0	1	.419	.493	0	1
Local wage income	.173	.379	0	1	.168	.374	0	1
Nonagricultural self employment	.072	.259	0	1	.067	.251	0	1
Migrant wage income	.123	.329	0	1	.161	.368	0	1
Multiple income sources	.152	.360	0	1	.185	.388	0	1
<i>Provinces (number)</i>	15				15			

*Note:* Weighted. The sample size used in the 2002 analysis is 6,076 and in the 2007 analysis 12,176.

Table 4.18. *Determinants of housing wealth in the rural areas, 2002 and 2007*

	(1) 2002	(2) 2007
Age	0.035*** (0.008)	0.034*** (0.006)
Age squared	-0.0004*** (0.00008)	-0.0004*** (0.00006)
Lower middle school education	0.127*** (0.027)	0.138*** (0.020)
Upper middle school/vocational secondary school education	0.142*** (0.035)	0.184*** (0.028)
College education or above	0.117 (0.115)	0.417*** (0.077)
Number of household members	0.161*** (0.011)	0.127*** (0.007)
“Three-generations family”	0.024 (0.036)	0.009 (0.028)
Main source of household income (> 50 % of total income)		
Local wage income	0.271*** (0.034)	0.362*** (0.027)
Revenue from nonagricultural self-employment/family business	0.113** (0.047)	0.387*** (0.037)
Wage income from out-migration	0.014 (0.037)	0.119*** (0.026)
Multiple income sources	0.102*** (0.034)	0.186*** (0.024)
Current household non-asset income (per capita, 1000 yuan)	0.110*** (0.006)	0.050*** (0.003)
Current household asset income (per capita, 1000 yuan)	0.105** (0.046)	0.091*** (0.009)
Receiving social assistance	-0.006 (0.108)	-0.429*** (0.055)
Province dummies	Yes	Yes
Constant	8.333*** (0.221)	9.159*** (0.171)
Number of observations	6,076	12,176
Adjusted R-squared	0.271	0.273

*Notes:* 1. OLS regression results for households living in 15 provinces covered by both the 2002 and 2007 NBS data. 2. Dependent variable is the log of the current value of owner-occupied housing (yuan). 3. Omitted categories are “primary school or below” for education and “agriculture” for the main source of income. 4. Main source of income is defined as the relevant income source that exceeds 50 percent of the total household income by the NBS definition. 5. Standard errors in parentheses. \*\*\* denotes statistically significant at the 1 percent level, \*\* at the 5 percent level, and \* at the 10 percent level.



Table 4A.1. *Relevant housing variables in the 2002 and 2007 CHIP datasets*

Variable	Rural		Urban		Migrant	
	2002 (CHIP)	2007 (NBS)	2002 (CHIP & NBS)	2007 (NBS)	2002 (CHIP)	2007 (CHIP)
Ownership status of the dwelling	87		b24(NBS)	b24	401	i114
Market rent			503(CHIP); b210(NBS) <sup>a</sup>	b210		i119
Market value	704	x134	503a(CHIP); b28(NBS) <sup>b</sup>	b28	209	
Outstanding mortgage	708a		417(CHIP)			
Maintenance costs	610b					
Interest payments on mortgage						
Depreciation						
Year in which house was built or bought			b211(NBS)	b211	410	

*Notes:* The table gives the question number/code for the variable in the questionnaires and the dataset. “CHIP” refers to data collected using the independent CHIP survey questionnaires; “NBS” refers to data provided to the CHIP by the NBS from its household survey. All variables are self-reported by the households.

<sup>a</sup>The CHIP and NBS data give very different market rents, on average.

<sup>b</sup>The CHIP and NBS data give very similar market values, on average.

Table 4A.2. Comparison of urban housing market values from the CHIP and the NBS, 2002

Source of Data	Number of households	Mean	Minimum	Maximum
Households with non-missing market values in either the CHIP or the NBS				
CHIP	5290	96701	100	1010000
NBS	5112	90104	1500	1020000
For households with non-missing market values in both the CHIP and the NBS				
CHIP	5062	91763	100	980000
NBS		90105	200	1020000

Note: Unweighted.

Table 4A.3. *Comparison of urban market rental values of housing from the CHIP and the NBS, 2002*

<b>Source of Data</b>	<b>Number of households</b>	<b>Mean</b>	<b>Minimum</b>	<b>Maximum</b>
Households with non-missing values in either the CHIP or the NBS				
CHIP	5266	5344	240	60000
NBS	4985	1396	120	48000
Households with non-missing values in both the CHIP and the NBS				
CHIP	4909	4864	240	60000
NBS		1402	120	48000

*Note:* Unweighted. Rents are for twelve months.

Table 4A.4. Comparison of the urban rent-price ratio from the CHIP versus that from the NBS, 2002

Source of Data	Number of households	Mean	Minimum	Maximum
Households with non-missing values in either the CHIP or the NBS				
CHIP	5251	14.89	.45	14423.08
NBS	4906	2.24	.0975	240
Households with non-missing values in both the CHIP and the NBS				
CHIP	4820	15.41	.45	14423.08
NBS		2.25	.0975	240

*Note:* Unweighted. Rents are for twelve months.

Table 4A.5. *Formulae for alternative estimates of imputed rental income on owner-occupied housing, 2002 and 2007*

	<b>2002</b>	<b>2007</b>
A. Base estimate	$R = .029V$	$R = .0427V$
B. Base minus depreciation	$R = .029V - .01V$	$R = .0427V - .01V$
C. Equity estimate	$R = .029(V - M)$	<i>na</i>
D. Equity minus depreciation and mortgage interest	$R = .029(V - M) - .01V - .049M$	<i>na</i>

*Notes:* These estimates set the rate of return equal to the interest rate on long-term (30-year) Chinese government bonds in 2002 and 2007, 0.029 and 0.0427 respectively. Interest on housing debt is set equal to the interest on long-term Chinese government bonds plus two percentage points. Depreciation (inclusive of repairs and maintenance costs) is calculated using a depreciation rate of 1.0 percent.

Table 4A.6. *Gini coefficients of household per capita income, calculated using different estimates of imputed rental income, 2002 and 2007*

<b>Formula used for estimation of imputed rents</b>	<b>Sector</b>	<b>2002</b>	<b>2007</b>
A	rural	0.36503	0.36705
A	urban	0.32185	0.33919
A	national	0.45390	0.48426
B	rural	0.36584	0.36754
B	urban	0.32117	0.33757
B	national	0.45254	0.48152
C	rural	0.36516	na
C	urban	0.32198	na
C	national	0.45373	na
D	rural	0.36637	na
D	urban	0.3232	na
D	national	0.45292	na

*Notes:* Formulae for calculating the different estimates of imputed rents at the household level are given in Table 4A.5; these values are divided by household size to obtain the per capita values of imputed rents and are added to the household per capita income. The Gini coefficients are calculated with weights and for both homeowner and renter households. Negative equity values are set to zero. Includes long-term rural-to-urban migrants. For migrants, we do not have mortgage values for 2002, so in 2002 the migrants' imputed rent estimates A and B are used to calculate the income Gini for estimates C and D, respectively. Since the proportion of long-term migrants in the national population is relatively small, and since very few migrant households are homeowners, this assumption should not have much effect on the Gini coefficients.

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<sup>1</sup> These sources use the 2002 CHIP data.

<sup>2</sup> We examine only owner-occupied housing, as information on other real estate holdings of households is incomplete in the CHIP data.

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<sup>3</sup> Comparison of the unweighted averages for the 10 provincial-level administrative units covered in both the 1988 and 1995 CHIP surveys (Beijing, Shanxi, Liaoning, Jiangsu, Henan, Anhui, Hubei, Guangdong, Yunnan, and Gansu). Food expenditures include both in-kind and cash expenditures. Since data on household expenditures are not complete in the 1988 data, we utilize this ratio as an indicator of the weight of rent in the budget of urban households. We use unweighted figures for the comparisons of 1988 and 1995 because we do not have appropriate population weights for the 1995 and 1988 data.

<sup>4</sup> Comparison of the unweighted averages for the 10 provincial-level administrative units covered in both the 1988 and 1995 CHIP surveys.

<sup>5</sup> For example, the directive of the State Council on the development of the real estate market in August 2003 emphasized the role of the market in guaranteeing an adequate supply of housing for the urban populace.

<sup>6</sup> Official report of the Ministry of Housing and Urban–Rural Development, February 14, 2007 (*Zhongguo jianshebao*, February 16, 2007).

<sup>7</sup> See, for example, the cases in Chongqing and Zhejiang described by Qin and Zhong (2009); Ruo (2009); Chongqing Fuling Municipal Bureau of Land and Resources (2009); and Sun and Hua (2009).

<sup>8</sup> Huang and Yi (2010) report that in 2005 6 percent of urban households, including both formal urban residents and migrants, who lived in owned housing owned additional homes, and 5 percent of urban households who rented their dwellings owned additional homes (this latter group included rural-to-urban migrants who rented in the city and owned a home in their hometowns).

<sup>9</sup> We calculate the contribution of the urban-rural gap to national inequality of per capita housing wealth using inequality decomposition by group of the Theil (GE 1) and mean logarithmic deviation (GE 0) inequality indices.

<sup>10</sup> Provinces (provincial-level administrative units) included in the analysis in this section are Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Hubei, Guangdong, Chongqing, Sichuan, Yunnan, and Gansu for the urban areas, and Beijing, Hebei, Shanxi, Liaoning, Jiangsu, Zhejiang, Anhui, Henan, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Yunnan, and Gansu for the rural areas.

<sup>11</sup> The discussion here draws from Arrondel and Lefebvre (2001); Cagetti and De Nardi (2008); Campbell (2006); Davies and Shorrocks (2000); Ioannides and Rosenthal (1994); and Quadrini and Ríos-Rull (1997).

<sup>12</sup> A fourth category identified in the CHIP urban dataset is self-built/inherited older housing. We exclude this group partly because it is largely the result of a historical legacy rather than an