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PUBLIC HOUSING AND UNEMPLOYMENT: SKILLS AND SPATIAL MISMATCH IN POSTINDUSTRIAL HONG KONG

By

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Public Housing and Unemployment:
Skills and Spatial Mismatch in Postindustrial Hong Kong

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Abstract

The impact of living in public rental housing on employment has been the subject of much debate internationally. Theory suggests that restrictions on residential mobility, neighborhood effects, and the place-based housing subsidy itself contribute to the higher rates of unemployment often observed among public housing tenants. However, recent evidence from Europe and Australia show that when proper consideration is given to the endogeneity of housing tenure and employment, the effect of living in public housing on employment loses significance. This paper examines the employment outcomes of Hong Kong's public housing tenants. Hypothesis tests using simultaneous probit models find that it continues to have a statistically significant and large positive impact on the probability of being unemployed. Yet, a high rate of unemployment among public housing residents in Hong Kong is a relatively recent phenomenon, thus the paper also examines changes in the characteristics of public housing residents and the spatial connection between housing and employment in the city, using one percent sample datasets of Hong Kong population censuses from 1986 to 2006. The location of public rental housing is found to have a strong influence on the employment outcomes of residents.

1. Introduction

The large public housing system of Hong Kong has often served as evidence of the positive potential of public housing, in contrast to that of the United States and many countries in Europe, where public rental housing has long been connected to concentrated poverty, social stigmatization, and negative social outcomes such as crime, unemployment, and disadvantage for children (Blanc, 1993; Massey and Kanaiaupuni, 1993; Schill, 1993). Although the Hong Kong system has generally been considered a successful tool for providing to provide a decent standard of living for the lower-income residents of a city with high levels of inequality and high relative housing costs (Lee and Yip, 2006), problems of high unemployment and other social issues have arisen in recent years, especially in estates located far from the center of the city.

Hong Kong's public housing system began in the early 1950s as squatter resettlement, though it has been argued that its true purpose was to subsidize the British colony's industrial development by subsidizing worker housing (Castells, Goh, and Kwok, 1990; Smart, 2006). The Hong Kong government began using the construction of public housing estates to develop areas at the urban edge in a new town model as early as the 1960s. New towns were conceived as self-sufficient sub-centers that would contain both housing and jobs, principally in manufacturing (Wang and Yeh, 1987). Thus, there was a government-planned spatial allocation of tertiary sector jobs to the central urban area and secondary sector jobs to new towns (Sui, 1995).

The new town model of housing development continued into the end of the 20th century, in spite of dramatic changes in the city's economic geography during the 1980s and 1990s. The city de-industrialized rapidly after China's economic opening in 1978 with Hong Kong's industries moving to cities in the nearby Pearl River Delta region (Tao and Wong, 2002), and the city's population decentralized into outlying areas of Hong Kong's territory (Loo and Chow, 2011). Deindustrialization was different from the European or US experience in that there was a increase in low-skilled employment in producer services concurrent with the decline in manufacturing jobs. However, public rental housing tenants were more likely to be employed in manufacturing, thus were disproportionately affected. Moreover, manufacturing jobs were located further from the city center than service jobs, thus, it is perhaps not a surprise that when they disappeared, unemployment rates among public rental housing tenants, especially those in outlying areas, increased.

In addition to increased unemployment, social problems have begun to appear in public housing estates, especially in the outlying areas of the city (Lau, 2010). One of these estates, Tin Shui Wai, became known popularly as the "city of sadness" due to a series of cases of violent crime, suicide and child abuse (Associated Press, 2007). Stylized facts support assertions that residents of public housing estates in outlying areas of Hong Kong suffer from spatial mismatch - unemployment is often higher than eight percent while in inner-urban areas it is as low as four percent. Nevertheless, it is equally possible that the residents of the newer public housing estates located far from the city center suffer from a skills mismatch rather than a spatial mismatch. The overall education level of public

housing residents has been increasing at a slower rate than that of the rest of Hong Kong's population.

In response to this growing concern over the aforementioned problems among public housing tenants in Hong Kong, this paper addresses two questions. First, to what extent can the observed difference in unemployment between residents of public rental housing and other types of housing in Hong Kong be attributed to their housing tenure? Secondly, among tenants of public rental housing, is there a connection between unemployment and residential location when controlling for other characteristics that are associated with unemployment?

The first question is answered with a simultaneous probit model that accounts for the endogeneity of public housing tenancy in a model of unemployment with instrumental variables that describe the number, age and gender composition of children. In contrast to similar analyses in Europe and Australia, the effect of public housing on unemployment is significant and large in a model that accounts for endogeneity. The second question is addressed by testing hypotheses using a simple probit that includes district-level data on location. By limiting the sample to residents of public housing, who have strict limitations on residential location choice, the importance of spatial mismatch can be observed. The impacts of having moved to a new district and living far from the city center are strong – public rental tenants are three percent more likely to be unemployed if they have moved to a new district, and three percent more likely to be unemployed for each 10 percent farther from the city center they live.

The paper contributes to two lines of academic inquiry focused on the connection housing and labor markets. The first examines the relationship between residential mobility and employment (Oswald, 1996; Dohmen, 2005; Wasmer and Zenou, 2006). Although this work began with empirical testing of between-market associations between high unemployment rates and the prevalence of certain types of housing tenure, the basic theoretical argument – that job search efficiency is reduced by limitations in residential mobility – applies within markets as well.

Hong Kong is an ideal case for a within-market analysis of residential mobility and employment as migration into and out of the city is quite costly. Since 1997, Hong Kong has been a Special Administrative Region (SAR) of China, but the extent to which it should be considered as being located within a system of cities is debatable given the difficulties of migration between Hong Kong and mainland China. This is especially true for middle- and low-skilled workers. Moreover, it has been demonstrated that a large proportion of the population – residents of public rental housing – have significant restrictions in their residential mobility (Lui and Suen, 2010).

The second area of research addresses the connection between residential location and employment outcomes, through the effects of neighborhood characteristics such as the concentration of poverty (Fieldhouse, and Tranmer, 2001; Dujardin, Selod, and Thomas, 2008), as well as the effects of a spatial mismatch between jobs and housing (Kain 1968; Fieldhouse, E.A. 1999; Houston, 2005; Gobillon, L., Selod, H., Zenou, Y., 2007; Suárez-

Lastra and Delgado-Campos, 2007). As described above, the decentralization of Hong Kong's population and changes in the city's internal economic geography have led to arguments of spatial mismatch and the concentration of poverty in outlying new towns. Housing tenure is often used as an analytical tool with which to examine these two areas of connection relationships as it influences the cost of moving in the case of renting versus owning as well as the choice of residential location in the case of public housing (Battu, Ma, and Phimister 2008; Dujardin and Goffette-Nagot 2009).

The paper is organized as follows. The next section is a review of international literature on the connections between public housing and employment. Then, data on employment outcomes and public housing are presented for different housing tenures and residential locations in Hong Kong are presented. The fourth section describes the empirical estimation strategy and results. The paper concludes with policy implications for Hong Kong and China.

2. Research on Public Housing and Employment

There are two broad ways in which housing can be connected to employment outcomes. First, restrictions to residential mobility are posited to negatively impact labor market outcomes through reductions in the efficiency of the job search and increases in transportation costs. Additionally, certain residential locations can lead to a disadvantage for job seekers. There are two different reasons for this; a large distance to jobs, or spatial mismatch, or neighborhood effects related to a concentration of poverty or unemployed individuals. Living in a neighborhood with a concentration of poverty and unemployment is argued to reduce employment prospects as it limits informal networks for job seekers and possibly leads to a stigma when searching for work.

All of these mechanisms of disadvantage can be exacerbated for residents of public rental housing, as their ability to move is generally restricted, public rental housing estates tend to be badly located vis-à-vis employment, and frequently there is a concentration of low-income households in public housing. Additionally, due to the large subsidy obtained through lowered rent, there is the potential for residents of public housing to have less incentive to work. In the United States, it was these connections that in part led to the Moving to Opportunities program, which facilitated recipients of subsidies for housing to move into neighborhoods with lower rates of unemployment (Feins and Shroder, 2005).

Research on mobility and employment tends to focus on market level characteristics. It began with empirical observation that regions with higher homeownership rates or more strictly regulated rental markets had higher rates of unemployment *ceteris paribus* (Oswald, 1996) More recent theoretical work has formally modeled the seeming paradox between the above findings and the observation that at a household level, renters are more mobile and more likely than homeowners to be unemployed, by how expected wages after a move and foregone wages due to unemployment affect households of different skill levels (Dohmen 2005).

The second area of research posits a reduction in employment opportunities in certain neighborhoods for certain groups. The spatial mismatch hypothesis was first proposed by Kain (1968) to explain the employment disadvantages of inner-city African-American youth as jobs suburbanized. Since then, however, the phenomenon has been observed to exist in many countries (Fieldhouse, 1999; Fieldhouse, and Tranmer, 2001; Suárez-Lastra and Delgado-Campos, 2007; Dujardin, Selod, and Thomas, 2008). In most other places, however, such as Paris or Mexico City, spatial mismatch is found in an inverted pattern from that of the United States, with low-skilled individuals living in suburban areas distant from centrally located jobs. This is the shape of spatial mismatch found in Hong Kong (Lau 2010) and as in some European cities public housing is one reason low-skilled workers live in these outlying parts of the city.

Though the mechanisms of spatial mismatch are varied, the central issues are that when jobs are farther away, commuting becomes increasingly costly, less information is available to job seekers, and the efficiency of the job search can drop considerably (Ihlandfeldt, 1997). Yet the impact of location relative to appropriate employment must be considered along with other neighborhood effects. Neighborhood effects refer to other characteristics of residential location that can affect employment, such as discrimination on the part of employers against residents of certain neighborhoods, and limitations in learning of job opportunities through social networks (Granovetter 1995; Gobillon, Selod, and Zenou, 2007).

In spite of solid theoretical foundations, empirical work on spatial mismatch faces a central challenge – separating a "skills mismatch" component from spatial location. In most cities, due to the nature of land markets, low-skilled or otherwise less employable people are more likely to live in areas with less access to employment (Houston, 2005). Thus, assessment of spatial mismatch is complicated by a need to control for the endogeneity of employability and residential location, as well as neighborhood effects separately from job accessibility. A variety of empirical approaches have been used to assess the presence and importance of spatial mismatch, such as multi-level models (Fieldhouse 1999; Fieldhouse and Tranmer 2001; Dujardin, Selod, and Thomas, 2008). Another fruitful approach to the question is isolating the analysis to residents of public housing, as we do in this paper. In many public housing systems, new entrants into the public housing system do not have a choice as to the location of their new home. Moreover, as is the case in Hong Kong, they often have to move greater distances to access public housing and once allocated a housing unit, are less likely to move again (Lui and Suen, 2010).

Early empirical work estimating the causal connection between living in public rental housing and unemployment (Hughes and McCormick, 1981; Hughes and McCormick, 1987) has recently been challenged. Studies from the Australia, the United Kingdom, and France on the connection between public housing and employment have all found that when properly accounting for the endogeneity of housing tenure, the apparent effects of living in public rental housing are no longer significant (Flatau et al., 2003; Battu, Ma, and Phimister, 2008; Dujardin and Goffette-Nagot, 2009). In the Unites States, though no work on unemployment has been carried out in this framework, other previously accepted

effects of public housing, such as negative outcomes for children, have also been shown not to hold when properly modeled (Currie and Yelowitz, 2000).

3. Employment and Public Housing in Hong Kong

In order to better understand recent changes in housing and employment in Hong Kong, descriptive data are presented that motivate subsequent statistical models. Changes in the employment outcomes, employability indicators and spatial location of residents of different types of housing are evaluated over a 20 year period in order to assess the drivers of the increase in unemployment among residents of public housing.

First, Table 1 presents the numbers and percents of the Hong Kong population according to their housing tenure over two decades. The government's Long Term Housing Strategy (LTHS) launched in 1987, led to the rapid expansion of the public ownership housing tenure afterwards; one million people purchased public housing units between 1986 and 2006. Concurrently the relative populations of public and private rental housing declined fairly substantially. It is worth note that many of those that purchased these public housing units moved from public rental housing, as they received favorable terms, and this selection led to more-skilled people moving out of public rental housing (La Grange 1998).

<<Insert Table 1 here >>

Table 2 reports the employment status of the working age population (18 to 65 years old) from 1986 to 2006 according to different housing tenures. The first set of percentages describes the share of people that are economically active, either at work or seeking work. It excludes students, retirees, homemakers, people with disabilities, and others that do not participate in the labor force. The significant drop in labor force participation among public housing tenants since the early 1990s is notable. Only a small share of this is due to there being more people with disabilities living in public rental housing. In fact, the economically inactive population had a similar division of activities across different housing tenures in 2006; most were homemakers, students, or retirees.

<<Insert Table 2 here>>

Not only did labor force participation change much more among public rental tenants, the difference in unemployment rates among people living in different housing tenures increased substantially from 1986 to 2006. Residents of public rental housing had a less than one percent higher rate of unemployment as compared to residents of private rental or private ownership housing in 1986, but by 2006 it had increased to two and four percent higher. In an analysis of unemployment, it is important to note that we do not know the exact reason for being unemployed. In some cases, there is an element of decision in this outcome; a job is available but the unemployed person is expecting a better one thus chooses not to take the available job. In other cases, a person is unable to secure a job at all, due to some deficiency leading to a low level of employability.

The difference in unemployment rates between residents of public rental and private housing is even larger when the sample is restricted to males in married couple households. In the remaining analysis, two restricted samples are used. Only working-aged individuals (19 to 64 years old) without disabilities are considered. The first restriction is to males in single family married couple households. A second sample of married couple households with two children or more is used, in order to employ the gender composition of children as instruments (Dujardin and Goffette-Nagot, 2009).

Single-person and multiple-family households are excluded due to a selection bias connected to employment and household formation. Women are also excluded as their employment outcomes will be complicated by the use of variables related to the presence, age, and gender composition of children as instrumental variables. We also exclude those who have moved to Hong Kong within the last 7 years as they are not eligible for public housing. People living in institutions are also excluded (Hong Kong Housing Authority, 2011).

It is probable that much of the observed difference in employment outcomes between public rental housing tenants and the remainder of Hong Kong is due to differences in the characteristics of individuals in different housing tenures. Characteristics that lead people to live in public housing are likely to make them less employable; for example, lower education levels, not speaking the local language, or being foreign. Thus, changes in these characteristics over time, or changes in the needs of employers with respect to these characteristics likely explain the some of the increasing gap in unemployment rates between residents of public rental and private housing.

Table 3 reports relevant characteristics of working-aged males in married couple households in 1986, 1996, and 2006. Although there was already a significant difference in characteristics like education and place of birth between public rental tenants and the rest of the population, the difference has increased over the decades. The share of people with a specialized education doubled in the general population and remained stagnant among public rental tenants. The share of people born in mainland China dropped by almost half among the general population and by roughly 15 percent among public rental tenants.

<<Insert Table 3 here>>

In addition, these changes in the difference in education and other characteristics of public housing tenants and the rest of the population emerged as the economy of Hong Kong shifted from a one based on manufacturing exports to one dominated by producer and financial services (Tao and Wong, 2002). Public housing tenants were more likely to work in the manufacturing sector, with 43 percent employed in manufacturing in 1986 as compared to 32 percent of those in other housing tenures (Hong Kong Census and Statistics Department, 1986). Additionally, as economies undergo these shifts, skills become more important for labor market success (Machin and Van Reenan, 1998). In the case of Hong Kong, Hsieh and Woo (2005) found that there was a five percentage point

increase in the return to education between 1986 and 1996, its most rapid period of economic change.

A final contribution to the increasing unemployment among public housing residents is the distant location of new public rental housing estates, and a spatial mismatch between public rental housing residents and jobs, which has been documented in case studies (Lau, 2010). Thus, it is important to note that while the average distance between public housing tenants and the city center has remained consistently higher than among the general population, the distance to work is the same. This suggests that public housing tenants are not willing to commute farther to work.

Given that Hong Kong is a geographically small area considering its population (approximately 7 million people in 1,000 square kilometers in the year 2006), access to employment might not be expected to arise as a problem. In fact, the average distances to the city center and to individual's place of work reported in Table 3, which range from 13 to 20 kilometers, do not seem excessive. Nevertheless, the city's physical geography – a combination of mountains and islands, an extremely high population density, and a widespread reliance on public transit combine to make commute times long. Roughly 90 percent of trips in 2002 were made by public transit and the average commute time was 46 minutes (ARUP, 2003).

<<Insert Figure 1 here>>

Figure 1 is a map of Hong Kong that gives a picture of the city's complicated geography and identifies the three major regions of the city; Hong Kong Island, the Kowloon peninsula, and the New Territories. The central urban area includes the northern shore of Hong Kong Island and the Kowloon peninsula, spanning Victoria Harbour. The New Territories are separated from this central urban area by mountains, and are the location of the newer and more problem-riddled public housing estates.

Although data on commute times are not readily available from previous decades, changes in the spatial structure of the city, especially the decentralization of the city's population into the outlying areas of the New Territories that occurred during the 1980s and 1990s (Loo and Chow, 2011), which occurred without a concomitant suburbanization of jobs have had a negative impact on overall job accessibility (Hui and Lam 2005; Sui 1995). Before deeper analysis of the connection between public housing, employment, and access to the city, unemployment rates across the city are examined.

Figure 2 shows rates summarized for the 18 political districts of Hong Kong arranged by the road distance of the district center to the city center. It is important to note that districts do not contain an equal number of people, and for this reason, markers in the scatter plots are sized according to the district population. There is also variation in the number of public housing by district. There is a clear positive correlation between the distance to the city center and the unemployment rate among public housing tenants. This correlation is much stronger than for non-public housing tenants, and it would be even stronger but for an outlier, the Yau Tsim Mong district. Yau Tsim Mong has a high

unemployment among public housing tenants, but the absolute numbers are quite small (0.5 percent of the city's public housing residents live in Yau Tsim Mong), thus its overall importance is minimal.

<<Insert Figure 2 here>>

As discussed in the literature review, public housing residence also is likely to effect employment due to the limitations imposed on residential mobility. Previous academic work in Hong Kong has shown that residential mobility is much lower for those living in public housing, even when controlling for all observable differences between individuals and households (Lui and Suen, 2010). Not only were public housing tenants found to be 25 percent less likely to have moved within a recent time period than residents of other housing types, if they did move, they were more likely to have moved a greater distance across the city.

4. Data and Empirical Models

Data for both empirical models are taken from the one percent microdata sample of the Hong Kong by-census of 2006. As previously discussed, observations are limited to working-aged male household heads of married-couple households. People with disabilities are excluded, as are people who have lived in Hong Kong for less than 7 years. A more restricted sample of those households with two or more children is also used for the first model. Consistent with previous work on this and similar topics (Dujardin and Goffette-Nagot, 2009; Lui and Suen, 2010), control variables are included for individual and household characteristics that influence the probability of unemployment, including education and primary language of the spouse.

Table 4 presents descriptive data for the three different samples used in later models; working-age males in married couple households, working-age males in married couple households with two or more children, and working-age males in married couple households living in public rental housing.

<<Insert Table 4 here>>

Two modeling strategies are employed; the first to isolate the impact of living in public housing on the probability of unemployment, and the second, to assess the importance of access to the city on the probability of employment. Cross-sectional data is used with the current employment status as the dependent variable. Although some empirical work in this area uses the duration of unemployment spells or the number of unemployment spells as a dependent variable (Flatau et al., 2003; Battu, Ma, and Phimister, 2008), we use current employment status due to the structure of available data.

Unobservable determinants of living in public rental housing and being unemployed are generally assumed to be correlated. In order to account for this endogeneity, we jointly estimate the probability of the two outcomes, following the strategy of Dujardin and

Goffette-Nagot (2009), who assess the relationship using data from France. A simultaneous probit model, which is a standard method to deal with endogenous binary variables, is used. This corrects for the correlation between unobservable variables in both equations, which would otherwise bias coefficient results for the endogenous variable (Maddala, 1983; Greene, 1998).

The simulataneous probit model is based on a latent variables, represented by y_i^*, that determine the observed variables, being unemployed or being a public tenant, represented by y_1 and y_2, respectively. Latent variables related to the observed variables as follows:

$$y_i = \begin{cases} 1 & y_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

The two equations describing the latent variables for unemployment and being a public renter are as follows:

$$y_1^* = \alpha y_2 + \beta_1 X + u_1$$
$$y_2^* = \beta_2 X + \gamma Z + u_2 \tag{2}$$

All exogenous variables are included on the right hand side of both equations, represented by the vector X, whereas the vector Z represents the instrumental variables used to identify the endogenous variable, y_2, public rental tenancy. On account of the fact that unobserved characteristics influence both the move into public rental housing and unemployment, residuals of the two probit models, u_1 and u_2 in the above equations are assumed to be correlated. Their correlation coefficient is ρ_{12} is then included in the likelihood function below, as is the term q_{ij}, which is equal to $2y_{ij} - 1$, so that it is 1 when y_{ij} is 1 and -1 when y_{ij} is 0. $\Phi_2(.)$ is the bivariate normal cumulative distribution function.

$$P(y_{i1}, y_{i2}) = \Phi_2 [q_{i1}(\beta_1 X_i + \alpha y_{i2}), q_{i2}(\beta_2 X_i + \gamma Z_i), q_{i1} q_{i2} \rho_{12}] \tag{3}$$

The sample log-likelihood function written below can then be estimated using a maximum likelihood method.

$$\ln L = \sum_i^N \ln P(y_{i1}, y_{i2}) \tag{4}$$

In order to identify the effects of public housing in the system of equations, instrumental variables must be included in the public housing equation. Finding the 'right' instrument is always a challenge, but in this case, as with previous similar work, the gender composition, number, and age children are deemed to be appropriate (Currie and Yelowitz, 2000; Dujardin and Goffette-Nagot, 2009). For the first sample of working-aged males in married couple households, the presence of any children is used as an instrument. Having more children is considered to strongly impact the probability of living in public rental housing, which it does, and to be exogenous to the father's employment outcomes (Dujardin and Goffette-Nagot, 2009). In a separate linear model

estimated using GMM, at over 100, the F statistic of this variable is found to exceed the standard criteria for weak instruments by many times (Stock and Yogo, 2005).

Although the first instrument is relevant, there might be some question about whether it is orthogonal to error terms in the equations of public housing tenancy and unemployment. Thus, a model is run on the sample of married couple households with two or more children. By doing this, the gender composition of children can be used as an instrument, as having children of different genders is exogenous, and has been shown to have a strong influence on having more children and housing consumption (Currie and Yelowitz, 2000; Dujardin and Goffette-Nagot, 2009). In the restricted sample of data from Hong Kong, households where the oldest two children are of different genders were an estimated 9 percent less likely to have three children in a probit model including the same controls as below, and their house had an estimated 0.1 more rooms in a regression model of the number of rooms that included the same controls as below.

However, the dummy for having two children of different genders is a weak instrument according to standard criteria; its F statistic in a separate GMM model was 6.5, less than the commonly accepted 10. Thus, the additional instrument of a dummy variable indicating whether the oldest child is over 18 was added. This variable is strongly negatively associated with living in public housing, as moving to a larger flat is difficult even as children become adults (Lui and Suen, 2010). For the purposes of determining flat size, the Hong Kong Housing Authority considers younger and older children as equivalent, and once a child turns 18 they are eligible to apply for their own flat (Hong Kong Housing Authority, 2011). Together, an F test of weak instruments on these two variables yields an acceptable 13.7, and the test for overidentification is not significant.

Table 5 presents the results of two simultaneous models of unemployment and public housing tenancy using the two different samples described above. The most striking results of the models are the lack of significance of many of the variables on the probability of being unemployed. This is in sharp contrast to work in other countries where characteristics like being younger, being foreign born or having a foreign primary language are associated with higher probabilities of unemployment (Arulampalam and Stewart 1995; Battu, Ma, and Phimister, 2008; Dujardin and Goffette-Nagot, 2009). Nor is it the case that in a simple probit model of unemployment these characteristics are statistically significant. This likely reflects the nature of the labor market in Hong Kong, where low levels of unemployment are argued to stem from the limited and flexible regulations (Fields, 1994).

<<Insert Table 5 here>>

On the other hand, education does have the expected impacts on unemployment and public housing tenancy, with a secondary school level of education or higher being associated with a chance of unemployment that is several percentage points lower, and a much lower chance of living in public rental housing – over 20 percent in some cases!

In both models, public rental tenancy is a strong positive determinant of being unemployed; marginal effects are 12 and 19 percent respectively. These strong effects are larger those found in naïve probit models of unemployment. We do not report their full results here, but the marginal effects of living in public housing were around six and seven percent for the two samples. Other variable coefficients were similar in size and significance.

The reason effects of public housing are larger when modeled properly is that in Hong Kong, unobserved determinants of public housing occupancy are negatively correlated to unobserved characteristics that determine unemployment, although these correlations are not statistically significant in the above models. This striking result is the opposite of findings in France. It has two implications based stemming from the two categories of unobservable reasons for someone being unemployed; a decision not to take an available job and an inability to get a job due to a low level of employability. First, it implies that individuals who are less likely live in public rental housing are more selective in terms of the job they accept, but upon becoming public tenants, they are more likely to be unemployed for that reason. Additionally, it suggests that individuals with less ability to get a job offer for unobservable reasons, those with low employability, are less likely to live in public housing. This is not surprising, given that gaining entry into the public housing system selects, at least among working-age individuals without disabilities, those with more affinity towards following bureaucratic procedures. The implementation of a marking scheme to control anti-social behavior by the Hong Kong Housing Authority in 2003, also means that those people that cannot follow rules will be evicted (Yau, 2008).

The second estimation effort is more straightforward. We take advantage of the strong limitations in choice of public housing tenants in terms of residential location and mobility (Lui and Suen, 2010), and make the assumption that unlike for residents of private housing, housing and land markets do not determine residential location. In this way, moving decisions and residential location distance to city center can be taken as exogenous in a model of unemployment. The difference between the determinants of residential location in public and private housing is supported by other work on housing and residential location in Hong Kong that finds divergent relationships between income and access to the city for residents of public and private housing. Income is strongly negatively correlated to the distance to the city center among residents of private housing, but not for public housing residents (Monkkonen and Zhang, 2011).

Table 6 presents the marginal effects from two standard Probit models of unemployment. The same controls as used previously and various job accessibility measures are employed. Standard errors are clustered for the 22 districts in which public housing tenants live and for which district level data are available. Thought the model is highly significant, its predictive power is quite low, with a Pseudo R^2 of only two percent.

<<Insert Table 6 here>>

In spite of a low explanatory power, the results in Table 6 regarding residential location are clear. Access to the city has a strong and significant impact on employment success,

as does having moved to a different district recently. Public housing tenants are three percent more likely to be unemployed if they recently moved to a different district, and are three percent more likely to be unemployed for every 10 percent further they live from the city center. The concentration of public housing, measured by the share of households in a district that are public rental tenants, is not a statistically significant determinant of unemployment.

Additionally, unlike the models of unemployment for the entire sample of working-aged males in married couple households, the coefficients on age and being born in mainland China attain statistical significance when restricted to public housing tenants only. One difference from other countries where similar analyses have been performed, however, is that being older is associated with a higher chance of being unemployed. This is likely related to the changing demands in Hong Kong's service-based economy (Hsieh and Woo, 2005).

5. Conclusions and Policy Implications

This paper examines the relationship between public housing residence, unemployment and residential location in detail for the year 2006, but emphasizes that these relationships have changed in recent years with the economic and spatial restructuring of Hong Kong. When Hong Kong's economy was based on manufacturing, it could be and was argued that public housing was a policy used to promote the industrial development of the territory by subsidizing the wages of workers (Castells, Goh, and Kwok, 1990). In contemporary Hong Kong, however, public housing plays a social welfare function. It houses a disproportionate and growing number of elderly, disabled, foreign-born and unemployed people.

The changing role of the public rental housing system is a policy decision, not an empirical question. However, the results from the analysis in this paper show that the current system contributes to the higher rate of unemployment observed among public housing tenants. Overall unemployment rates in Hong Kong and the difference in unemployment between public tenants and other types of tenure are lower than in many other countries. In France, for example, unemployment among public tenants is 15.7 percent, almost three times the unemployment rate of people in other tenures (Dujardin and Goffette-Nagot, 2009). Nevertheless, this difference is shown to stem from other characteristics of public tenants and the endogeneity of living in public housing and being unemployed. In Hong Kong, public housing tenancy leads to a larger probability of being unemployed even when properly modeled, suggesting that some reform of Hong Kong's public housing system is needed.

The present analysis has two clear policy implications for the reform of the public rental housing system, beyond a simple criticism of the unfairness of public housing benefits (Yeh, 1990). Nevertheless, it should be noted that in 2006 almost 50,000 of the roughly 700,000 households in public rental housing had an income above than the city's median income of about 30,000 HKD/Month, and there were just over 100,000 households on the

waiting list that year (Hong Kong Census and Statistics Department, 2006; Hong Kong Government 2006).

First, the impact of location on unemployment demonstrates the need for more flexibility within the public housing system with regards to moving. Currently, the policy of the Hong Kong Housing Authority with regards to transfers of public rental flats is limited to medical reasons, loss of income and need for a cheaper flat, changes in family circumstances, accidents, or rehabilitation of the flat (Hong Kong Housing Authority, 2011). Thus, reform of the public rental housing system should at minimum include the expansion of options of transfer or flat swapping for employment reasons. Additionally, the Hong Kong Government should consider the possibility of expanding housing assistance to include a demand-side rental assistance scheme, perhaps gradually and starting with support for those living in outlying estates who cannot find appropriate employment. Although a shift to a demand-side housing subsidy scheme is a major undertaking, it has been shown previously that public rental housing system is an inefficient way to ameliorate the city's high level of income inequality (Lui, 2007).

Secondly, in identifying the importance of access to the city center for unemployment, the paper's findings suggest a need to reevaluate the spatial development policy of the Hong Kong government. More should be done than ameliorative policies like the Transport Support Scheme, which assisted low-income residents of outlying districts in the city with their transportation expenditures, enacted by the Labour Department of the Hong Kong Government in 2007. Given that the government controls land use closely, efforts should be made to push the decentralization of economic activities (Yeh, 1997). Although the planning department acknowledged this as a goal as early as the late 1990s, in a review of the Metroplan framework introduced in 1990 (Hong Kong Planning Department, 1999) more efforts should be made to realizing the goal should be undertaken.

The analysis has an additional importance with regards to China's emerging public rental housing system. In the 12th five-year-plan, released in March 2011, the Chinese government announced a target of 36 million affordable housing units to be built over the next five years. Many of these units will not be rental housing, and much of the rental housing will not be allocated based on need (Deng, Shen, and Wang, 2011), cities in mainland China can nonetheless learn from the experience of Hong Kong as they design their own programs. The location of public rental housing is shown to be of great importance and this will be truer in the large metropolitan areas of China. Although and perhaps because the public housing system in Hong Kong has a relatively mixed-income population, concentration is not found to be an important determinant of employment success, thus greater consideration should be given to job accessibility.

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Tables

Table 1. Population by housing type, 1991-2006

Housing Type	1986		1996		2006	
	Million People	**Percent**	**Million People**	**Percent**	**Million People**	**Percent**
Private						
Rental	0.84	15.1	0.76	12.5	0.70	10.2
Owned	1.73	31.0	2.04	33.3	2.40	34.9
Public						
Rental	2.38	42.7	2.39	38.9	2.12	30.9
Owned	0.23	4.1	0.72	11.8	1.23	17.9
Other [a]	0.41	7.3	0.21	3.5	0.42	6.1
Total	5.59	100.0	6.13	100.0	6.87	100.0

Sources: Hong Kong Census and Statistics Department, 1986 and 2006.
Notes: [a] Other includes collective households, marine housing, institutions, squatters and illegal dwellings, and rent-free or employer provided housing.

Table 2. Employment outcomes of working-age population [a], 1986-2006

Housing type	Percent economically active				
	1986	1991	1996	2001	2006
Private					
Rental	78.0	81.5	78.5	74.9	74.9
Owned	72.8	76.7	74.7	75.2	74.1
Public					
Rental	75.6	74.1	69.3	66.6	65.9
Owned	72.8	76.5	74.7	73.7	73.3
Housing type	Percent unemployed [a]				
	1986	1991	1996	2001	2006
Private					
Rental	2.5	3.2	2.9	5.0	4.9
Owned	2.4	2.1	2.2	3.5	2.9
Public					
Rental	3.5	4.5	4.8	7.7	8.9
Owned	2.4	2.1	2.3	4.2	4.5

Sources: Hong Kong Census and Statistics Department, 1986-2006.
Notes: [a] Unemployment is defined in the census under economic activity status as "job seekers available for work".

Table 3. Selected characteristics of working-age males in married couple households, 1986 - 2006

Characteristic	1986		1996		2006	
	Non-PRH	PRH	Non-PRH	PRH	Non-PRH	PRH
Economically active	94.1	90.2	93.4	88.7	88.7	80.2
Unemployed (%) [a]	1.8	2.3	1.8	3.8	2.9	10.2
Secondary plus (%)	41.9	15.2	56.0	18.1	60.8	20.7
Field specialism (%)	15.9	2.8	23.3	3.5	29.2	3.3
Born in China (%)	56.0	65.7	37.8	56.2	28.1	53.9
Age (years)	42.3	45.6	43.0	47.3	46.3	49.7
HH size (persons)	3.8	4.7	3.6	4.1	3.5	3.8
Kilometers to central [b]	13.8	17.3	16.8	20.3	18.2	20.0
Kilometers to work [a][b]	NA	NA	11.2	12.1	13.2	13.4
N	4,991	3,507	5,979	3,120	7,612	2,641

Sources: Hong Kong Census and Statistics Department, 1986, 1996, and 2006.
Notes: NA indicates not available. [a] These numbers are from the sample of the economically active population only. [b] These distances were estimated based on road distances between the 24 districts for which microdata are available.

Table 4. Data on working-age men in married couple households, 2006

Variable	All	2 or more children	Public rental housing only
Unemployed	5.41	6.22	11.58
Public rental tenant	23.75	31.07	100.00
Age (years)	45.96	47.79	48.18
Recent move, same district	12.74	11.63	9.89
Recent move, different district	20.62	15.77	25.31
Distance to Central (km)	18.16	18.65	19.79
District public housing (%)	31.14	32.44	42.59
Any children	49.45	100.00	54.76
Different gender	NA	49.23	NA
Oldest child over 17	NA	44.09	NA
Birthplace			
Hong Kong	64.20	56.37	44.91
Mainland China	31.60	39.34	51.44
Other	4.20	4.29	3.65
Language			
Cantonese	94.16	94.52	91.5
Other Chinese	3.74	3.74	7.35
Other	2.10	1.74	1.15
Education			
Primary or less	18.97	25.33	37.11
Some secondary	51.76	52.97	56.44
Secondary	12.39	10.30	5.24
Secondary plus	11.07	7.60	1.59
First degree plus	5.82	3.81	0.19
Spouse birthplace			
Hong Kong	60.30	53.74	37.37
Mainland China	33.61	40.21	55.91
Other	6.09	6.05	6.72
Spouse education			
Primary or less	21.08	28.80	39.76
Some secondary	53.92	54.39	53.75
Secondary	12.07	9.45	6.48
Secondary plus	9.97	5.43	0.91
First degree plus	2.98	1.93	0.10
N	**8,768**	**4,146**	**2,077**

Table 5. Marginal effects from simultaneous probit models

Variable	Full sample		2 or more children	
	Unemployed	Public tenant	Unemployed	Public tenant
Age	0.027	-0.068	0.034	-0.413
	[0.029]	[0.005]	[0.058]	[0.107] **
Age^2	-0.000	0.001	-0.000	0.004
	[0.000]	[0.000]	[0.001]	[0.001] **
Birthplace (base is HK)				
Mainland China	0.006	0.072	-0.006	0.101
	[0.006]	[0.011]**	[0.010]	[0.018] **
Other	-0.002	0.024	0.001	-0.003
	[0.014]	[0.026]	[0.021]	[0.043]
Language (base is Cantonese)				
Other Chinese	-0.001	0.057	0.008	0.058
	[0.011]	[0.023]**	[0.019]	[0.040]
Other	0.028	-0.044	0.050	0.053
	[0.029]	[0.032]	[0.054]	[0.086]
Education (base is Primary/less)				
Some secondary	-0.011	-0.092	-0.013	-0.124
	[0.007]	[0.011]**	[0.010]	[0.018]**
Secondary	-0.021	-0.155	-0.019	-0.213
	[0.008]**	[0.009]**	[0.014]	[0.018]**
Secondary plus	-0.028	-0.180	-0.040	-0.259
	[0.008]**	[0.009]**	[0.013]**	[0.017]**
First degree plus	-0.022	-0.189	-0.023	-0.284
	[0.009]*	[0.007]**	[0.022]	[0.012]**
Spouse birthplace (base is HK)				
Mainland China	0.001	0.130	0.001	0.149
	[0.007]	[0.011]**	[0.011]	[0.018]**
Other	0.003	0.112	-0.014	0.169
	[0.011]	[0.024]**	[0.016]	[0.040]**
Spouse education (base is Primary/less)				
Some secondary	0.013	-0.074	0.023	-0.092
	[0.007]*	[0.011]**	[0.010]**	[0.018]**
Secondary	0.018	-0.096	0.003	-0.116
	[0.012]	[0.012]**	[0.019]	[0.026]**
Secondary plus	0.017	-0.171	0.070	-0.237
	[0.016]	[0.010]**	[0.044]	[0.024]**
First degree plus	0.017	-0.160	omitted	omitted
	[0.025]	[0.016]**	omitted	omitted
Public rental housing	0.123		0.191	
	[0.062]*		[0.096]**	
Any children		0.093		

	[0.009]**	
Different gender		-0.039
		[0.014]**
Oldest child over 18		-0.077
		[0.018]**
F –statistic on first stage [p-value]	107.56 [0.000]	13.72 [0.000]
Hansen's J [p-value]		0.02 [0.977]
Correlation of residuals [p-value]	-0.22 [0.180]	-0.36 [0.344]
LR test of ($\rho_{1,2}=0$)	1.55	1.70
Log-likelihood	-5,643	-3,061
Pseudo R^2		
N	8,768	4,146

Notes: Standard errors are in brackets * and ** indicate significance at the 0.05 and 0.01 levels respectively.

Table 6. Marginal effects from probit models with clustered standard errors

Variable	Unemployed	Unemployed
Age	0.018	0.019
	[0.009]*	[0.009]*
Age^2	-0.000	-0.000
	[0.000]	[0.000]
Birthplace (base is HK)		
Mainland China	0.026	0.029
	[0.012]*	[0.013]*
Other	-0.017	-0.016
	[0.031]	[0.031]
Language (base is Cantonese)		
Other Chinese	-0.005	-0.005
	[0.019]	[0.018]
Other	0.131	0.130
	[0.136]	[0.134]
Education (base is Primary/less)		
Some secondary	0.026	-0.028
	[0.015]	[0.015]
Secondary	0.064	-0.065
	[0.021]	[0.019]
Secondary plus	-0.037	-0.038
	[0.040]**	[0.040]**
Spouse birthplace (base is Hong Kong)		
Mainland China	0.011	0.009
	[0.011]	[0.011]
Other	-0.040	-0.041
	[0.018]**	[0.019]**
Spouse education (base is Primary/less)		
Some secondary	0.017	0.016
	[0.019]	[0.018]
Secondary	0.016	0.012
	[0.035]	[0.034]
Secondary plus	0.061	0.053
	[0.097]	[0.095]
Recent mover, same district	-0.004	-0.008
	[0.016]	[0.016]
Recent mover, different district	0.033	0.034
	[0.016]**	[0.016]**
District level variables		

Distance to Central	0.031	
	[0.012]**	
Public housing concentration (%)		0.040
		[0.039]
Wald chi^2	299.94	730.55
Log-likelihood	-727.85	-729.83
Pseudo R^2	0.02	0.02
N	2,077	2,077

Notes: Standard errors, clustered at the district level (n=220, are in brackets. * and ** indicate significance at the 0.05 and 0.01 levels respectively.

Figures

Figure 1. Map of Hong Kong Land and Urbanized Area in 2007
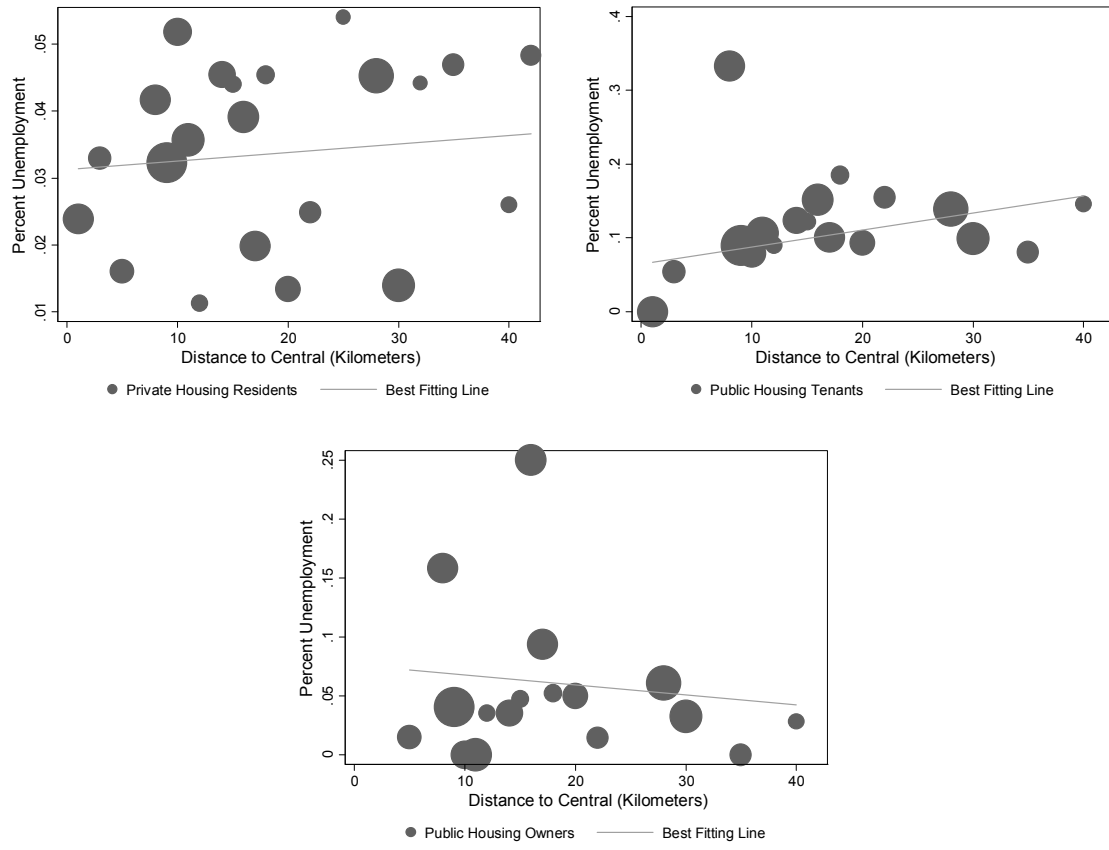Source: Planning Department 2007

Figure 2. District Unemployment Rates by Road Distance to Central, 2006