Different Types of Spatial Mismatch:
A U.S.-China Comparison of Poverty Concentration and Low-Skill Job Distribution

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Abstract

This paper presents detailed case studies of the jobs-housing mismatch phenomenon in Beijing, China and the Twin Cities metropolitan region in the U.S. By examining poverty concentration and low-skill job distribution patterns in the two study regions, the case studies demonstrate that jobs-housing mismatches exist and negatively affect job accessibility of the working poor in both regions. However, marked differences exist between the two regions in terms of appearances as well as the potential consequences of the jobs-housing mismatch phenomenon. The differences suggest that the U.S. experience in combating the job-housing mismatch cannot be directly applied in China. How existing U.S. spatial mismatch mitigation strategies could be used in the context of Chinese cities merits additional research and discussion.

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1. Introduction

Urban economists and sociologists have long considered poor access to jobs to be an important factor explaining disadvantage in the labor market, especially since John Kain formulated the spatial mismatch hypothesis (Glaeser, Hanushek, & Quigley, 2004; Gobillon, Selod, & Zenou, 2007). Kain's hypothesis focused mainly on African Americans in the U.S context. The hypothesis states that racial discrimination in the housing market, exacerbated by the decentralization of jobs to suburbs and limited transportation options, contributes to poor employment outcomes among U.S. African American urban residents (Kain, 1968).

Over time, the spatial mismatch literature has begun to shift its focus on African Americans to other disadvantaged population groups such as Latinos, low-income single mothers, welfare recipients and immigrants. Evidence shows that these disadvantaged groups also experience poor job accessibility (Blumenberg, Ong, & Mondschein, 2002; McLafferty & Preston, 1996a; Preston, McLafferty, & Liu, 1998; F. Wang, 2003) and their poor job accessibility is relevant to their disadvantage in the labor market (Allard & Danziger, 2002; Korsu & Wenglenski; McLafferty & Preston, 1996b; Parks, 2004; Raphael, 1998).

Much of the previous empirical research in this field has been undertaken by U.S. researchers, and thus focuses on the specific context of U.S cities. One reason for this is that US cities have characteristics that are more conductive to jobs-housing mismatch and poor job accessibility. Compared with European cities or cities in developing countries like China, U.S. cities are generally more spread out, and have lower density of jobs and population (Korsu & Wenglenski, 2010). With stronger car dependency, U.S. cities typically have less developed public transit networks than European cities and cities in China. As such, an individual without car access almost necessarily faces poor job accessibility. U.S. cities are also notable for their relatively high levels of social and racial segregation, providing only limited residence location choices for low-income minorities.

Chinese cities, compared with their U.S. counterparts, are often presumed to be more resistant to job accessibility issues. The supposed hallmarks of Chinese cities, including higher densities with greater proximity between jobs and housing, efficient public transit networks, and lower levels of social segregation (Kenworthy & Hu, 2002; Knaap & Zhao, 2009), are believed to reduce the risk of uneven access to job opportunities between population groups with different socio-economic status.

However, these differences between U.S. and Chinese cities may have been exaggerated. Many Chinese cities have experienced urban sprawl affecting both jobs and housing over the past two decades (Deng & Huang, 2004; Jiang, Liu, Yuan, & Zhang, 2007; E. Wang, Song, & Xu; Wu & Yeh, 1999). Public transit systems in Chinese cities are efficient with frequent services and extensive network coverage, but increased road congestion has made long-distance trips difficult

to achieve by transit within a reasonable amount of time (Pendakur, 1993; Shen, 1997). In large cities such as Beijing and Shanghai, buses are running at an average speed of around 10 kilometers per hour, which is slower than the average speed of bicycles (Shen, 1997). These land use and transportation trends, coupled with two other important phenomena in Chinese cities—status-based discrimination and affordable housing shortage—may have already put disadvantaged groups at high risk for poor job accessibility.

In China, race and ethnicity have an only moderate connection with socio-economic status, which are not major sources of discrimination. However, other types of discrimination are serious, especially the institutional-level discrimination against urban migrant workers. China's household registration system (*hukou*) classifies individuals according to their place of presumed regular residence (*suozaidi*). Migrants who live outside their officially-registered areas are often denied state-provided education, housing, social security, and economic opportunities (Chan & Zhang, 1999; Fan, 2002). In 2010, there were 221.4 million migrants in China, if that category is defined as migrants who moved between cities or counties and left their officially-registered areas for six months or more (National Bureau of Statistics, 2011). Migrants are permitted to work in cities on the basis of temporary residence permits, but have much less access to government subsidies and in several respects they occupy a social and economic status similar to illegal immigrants (Fan, 2001).

Housing prices in Chinese cities have been on a steep rise since 1998 when China introduced several major policy initiatives to end the distribution of housing by employers and set up new housing finance and market systems (Y. P. Wang, 2001). These policy initiatives include individual mortgage loan programs, economic incentive programs for private development companies and abolishment of welfare allocation of housing by working units (Jim & Chen, 2006; Y. P. Wang, 2001). A 2007 assessment found that sales prices of new residential apartments rose by 10.6% on a yearly basis (Hu, 2007). In addition, investment in real estate rose 31.4% on a yearly basis, with residential property investment accounting for more than 70 percent of the total real estate investment (Hu, 2007). These indicators suggest a potentially overheated industrial sector and an affordable housing crisis in Chinese cities. It has been estimated that 70% of urban residents in China cannot afford the commodity housing that is driving the country's economic growth (CB Richard Ellis, 2007). As China's upper classes (who see housing purchases as a profitable investment for their idle cash) and private real estate developers reinforce high housing prices in a frenzied cycle of buying and building, it would seem unlikely that the private sector would address the housing demand in lower-income markets (Stuchell, 2004). Yet, it was less than five years ago in 2006 that systematic policy efforts were implemented in China to increase affordable housing. In 2005, only 329,000 low-income households in China had access to government-subsidized affordable housing (Xinhua, 2011).

The discussion above shows that, despite differences between U.S. and Chinese Cities, social and spatial structures in these two types of cities have been converging over time. From a comparative point of view, it is important to know whether or not disadvantaged groups in U.S. and Chinese cities may face similar problems of jobs-housing mismatches and poor job accessibility. In this research, we use the Beijing metropolitan area, China and the Twin Cities metropolitan area, U.S. as case studies to demonstrate whether the jobs-housing mismatch

among disadvantaged groups exists in both regions, and whether the types of mismatch in these two regions are similar or distinctive. To do so, we examine and compare poverty concentration and low-skill job distribution patterns between the two study regions. The case study findings are expected to shed light on the transferability of the spatial mismatch hypothesis in a cross-country context. If spatial mismatch exists in Chinese cities, such a US-China comparison helps to assess the relevance and applicability of U.S. spatial mismatch migration strategies in the context of Chinese cities.

2. Data and Study Area

This paper incorporates employment and population data from both study regions. Table 1 illustrates data sources used in this research. Significant efforts have been made to obtain data in Beijing and Twin Cities in similar time frames and at similar geographic scales. Nonetheless, the moderate differences exist and affect the comparability of population and employment data between the two regions.

Table 1. Data sources used in this research

Data		Beijing	Twin Cities
Employment	Locations of low-skill jobs	2001 Basic Units Census, business-level point data.	2002 Longitudinal Employment and Household Dynamics (LEHD), census block level data available at http://lehd.did.census.gov.
Population	Locations of people under poverty	N/A	2000 Population Census, census tract level data.
	Locations of low-skill migrants	2000 Population Census, jiedao (subdistrict) [a]-level areal data.	N/A
	Locations of affordable housing	2010 published project information by the Construction Commission of Beijing Municipality, project-level point data available at http://www.bjfdc.gov.cn.	N/A

Note: [a] Jiedao (subdistrict, and "街道" in Chinese) has been the basic administrative unit in Chinese cities for decades and also the lowest geographic level reported in government statistical reports accessible by the public (Gu, Wang, & Liu, 2005).

Table 2 illustrates the general area characteristics of the two study regions. In terms of area size, the Beijing region is 20% larger than the Twin Cities. Yet, population density in Beijing (1244 persons per square kilometer) is almost four times as high as that of the Twin Cities (343 persons per square kilometer).

Table 2. General comparison between Beijing and Twin Cities

|	Beijing	Twin Cities
Area size (km^2)	9,275	7,704
Population (1,000)	11,537	2,642
Population density (persons/km^2)	1,244	343
# of jiedao subdistricts	240	N/A
# of census tracts	N/A	689

3. Analysis and Findings

In the following text, we analyze and compare issues of jobs-housing mismatch among disadvantage groups between the two study regions by examining poverty concentration and low-skill job distribution in each region.

3.1 Poverty Concentration

Figure 1 illustrates the percentage of population living below the poverty line by census tract in the Twin Cities based upon the 2000 U.S. Census. The 2000 Census uses income from the previous calendar year, 1999, to determine poverty status. In 1999, the poverty line was $13,410 for a family of three with one member under the age of 18. Poverty thresholds for other types of households are available online from the U.S. Census Bureau and can be downloaded at http://www.census.gov/hhes/www/poverty/threshld/thresh99.html. To determine the total number of people living in poverty, U.S. Census sums the number of people in poor families and the number of unrelated individuals with incomes below the poverty level.

As shown in Figure 1, poverty tend to concentrate in the two central cities—Minneapolis and St. Paul. The majority of the census tracts outside of Minneapolis and Saint Paul have the lowest concentrations of poverty with fewer than five percent of the population living in poverty. Almost all of the block groups with the highest concentrations of poverty (>20%) are found within central cities.

Figure 1. Poverty concentration in the Twin Cities metropolitan area, U.S.
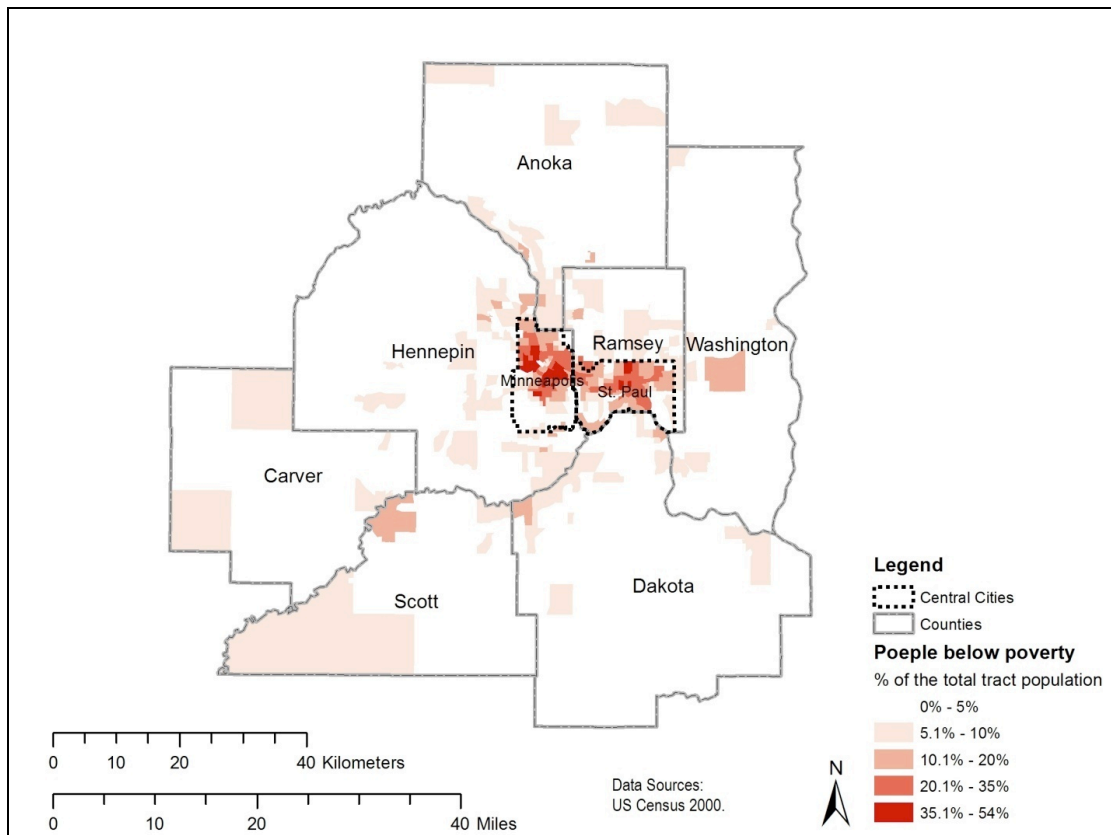
In China, although there have been nationally defined poverty lines, the poverty lines typically apply to rural population and the Chinese Census does not publish poverty data. For example, the 2010 poverty line in China was 1500 RMB per year for all household types, which was an unreasonably low poverty threshold for people who temporarily or permanently live in urban areas (the Chinese RMB and US Dollar exchange rate in 2010 was about 6.7). To address this data limitation, we use migrant worker and affordable housing data to illustrate locations of poverty in the Beijing region. According to China's affordable housing policy, only households with local hukou (registered permanent residence) have access to government supplied affordable housing. Consequently, the locations of affordable housing projects are proxy locations of low-income, local-hukou families in Beijing.

Besides low-income families with local hukou, urban migrants are another vulnerable population group who could be adversely affected by jobs-housing mismatch. In this research, we focus on low-skill migrants because high-skill migrants tend to have high levels of economic mobility and with recent innovations such as "blue-stamp" hukou, high-skill migrants could be awarded urban hukou (Fan, 2001). Differentiating low- and high-skill migrants is not an easy task given that education or other skill-related data are often non-existent in China. In this research, we use sector-based migrant data available from the 2000 Population Census to identify low-skill migrants. It is worth noting that, although industry sector correlates with wage and skill levels, it is not a perfect proxy measure of wage or skill. The results of this analysis must be interpreted with caution.

Table 3 illustrates the sector-based skill classification approach used in this research. The approach is developed based upon the 2-digit North American Industry Classification System (NACIS) codes to ensure consistent skill categorization of sectors between the US and China sector-based data. The sectors included in the 2000 Chinese Population Census were classified based upon the Year 1994 Industry Classification Scheme (ICS1994: GB/T 4754—1994). As shown in Table 3, each ICS1994 code was assigned to the corresponding NAICS code. All the NAICS sectors were then categorized into three broader skill categories, including blue-collar, pink-collar, and white-collar:

- Blue-collar workers are a working class who typically perform manual labor. Their jobs typically involve manufacturing, mining, building and construction, mechanical work, maintenance, repair and operations maintenance or technical installations.

- Pink-collar workers are employed in a job that is stereotypically considered to be women's work. Pink collar occupations tend to be personal-service oriented, involving customer interaction, entertainment, retail and outside sales, and the like.

- White-collar, by contrast, is a professional or educated working class who performs non-manual labor in largely office positions. White collar workers typically earn a significantly higher wage than pink- or blue-collar workers.

Table 3. Sector-based skill classification

US-NAICS	CN-ICS1994	Sector description	Low-skill		High-skill
			Blue-collar	Pink-collar	White-collar
11	01-05	Agriculture, Forestry, Fishing and Hunting	✔		
21	06-11	Mining, Quarrying, and Oil and Gas Extraction	✔		
22	44-46	Utilities	✔		
23	47-49	Construction	✔		
31-33	13-43	Manufacturing	✔		
42	61-63	Wholesale Trade		✔	
44-45	64	Retail Trade		✔	
48-49	52-59	Transportation and Warehousing	✔		
51	60, 83	Information			✔
52	65, 68, 70	Finance and Insurance			✔
53	72-74, 79	Real Estate and Rental and Leasing			✔
54	92, 93, 50, 51	Professional, Scientific, and Technical Services			✔
55	99	Management of Companies and Enterprises			✔
56	80, 82, 75	Administrative and Support and Waste Management and Remediation Services			✔
61	89	Educational Services			✔
62	85, 87	Health Care and Social Assistance			✔
71	81, 86, 90, 91	Arts, Entertainment, and Recreation		✔	
72	67, 78	Accommodation and Food Services		✔	
81	76, 84	Other Services (except Public Administration)		✔	
92	94-97, 99	Public Administration			✔

Based upon the sector-based skill classification scheme in Table 3, Figure 2 illustrates the percentage of low-skill migrant workers (i.e., blue- and pink-collar migrants) by subdistricts in Beijing, China. Figure 2 also illustrates the total gross floor area of government-supplied affordable housing units at the subdistrict level. Together, Figure 2 provides a proxy illustration of poverty concentration patterns in Beijing, China (including poverty in both local and migrant populations).

Figure 2. Concentrations of low-skill migrant workers and affordable housing projects in Beijing, China
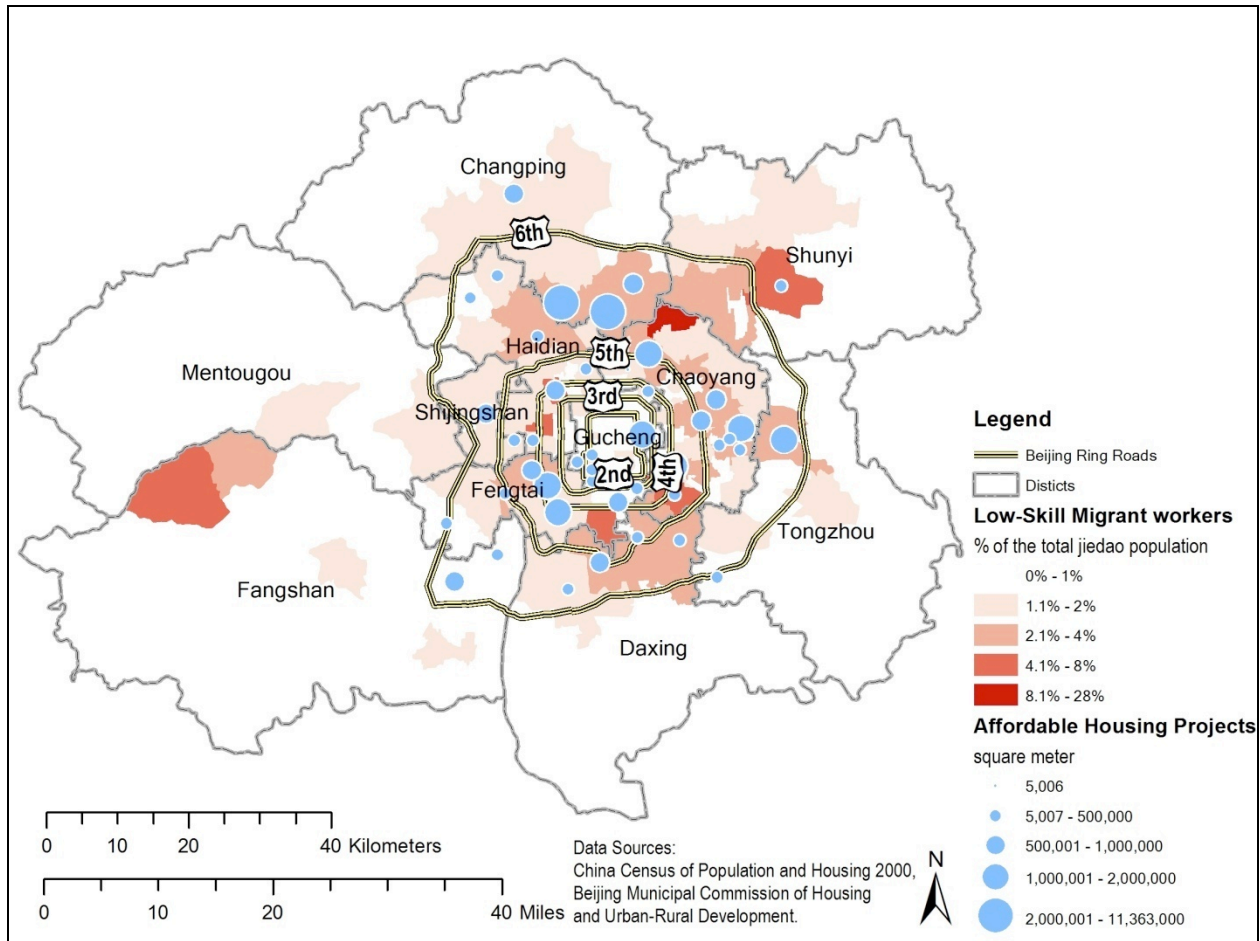
As shown in Figure 2, few affordable housing units are located within the central city area in Beijing (commonly defined as areas within the 3rd ring road), and so are the low-skill migrant workers. The majority of the affordable housing units and low-skill migrant workers are located between the 4th and 6th ring roads. The patterns suggest an interesting contrast between the form of poverty concentration observed in Beijing and that of the Twin Cities: Poverty concentrates in central city areas in the Twin Cities yet occurs in a belt form at urban fringe areas in Beijing.

3.2 Low-Skill Job Distribution

Figures 3 and 4 respectively display the distribution of low-skill jobs by distance to city centers in Beijing and the Twin cities. As compared to the map illustration, this figure illustration helps to better quantify the differences between the two study regions in terms of the extent of their job sprawl. This format of this illustration also has the advantage of presenting distribution information of multiple job categories in one figure and thereby providing an easy comparison between job types within each study region.

Figure 3 shows the cumulative distribution of blue-, pink-, and white-collar jobs in relation to the two city centers in Beijing—the old center defined as the geometric center of the old city which is bounded by the Second Ring Road, and the new center on the eastern side of the old city, between the Second and Third Ring Roads (Zhou, 1998). The new center was designated as the official Central Business District (CBD) of Beijing in the 1992 Beijing Master Plan. It is close to the foreign-embassy district, has easy access to the international airport, and contains some of Beijing's most luxurious hotels and apartment buildings as well as most upscale shopping centers.

As shown in Figure 3, pink- and white-collar jobs have similar spatial distribution patterns. Both job categories concentrate within and near city centers. Over 70% of the pink- and white-collar jobs are located less than 10 kms from the old city center, as compared to about 40% of the blue-collar jobs. Almost all the pink- and white-collar jobs (>90%) are located less than 20 kms from either the old or the new city center. Blue-collar jobs have a more dispersed distribution than pink- and white-collar jobs. About 70% of blue-collar jobs are located less than 20 kms from either the old or the new city center. In other words, a significant portion of blue-collar jobs (30%) are located more than 20 kms away from the city center.

Figure 3. Employment proportion by distance from CBDs, Beijing, China
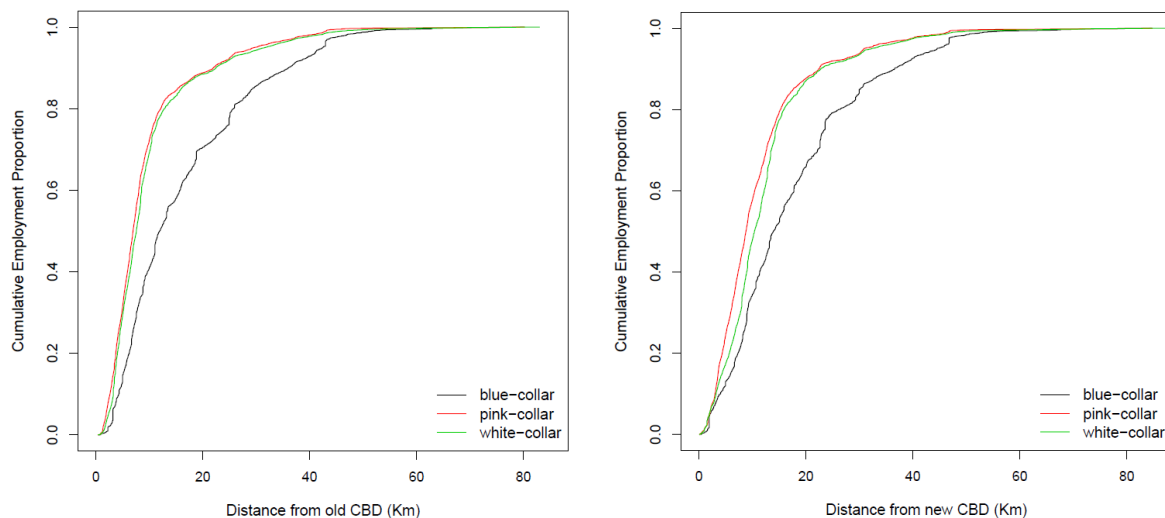

Figure 4 shows the cumulative distribution of blue-, pink-, and white-collar jobs in relation to the two city centers in the Twin Cities region—the Minneapolis CBD and the Saint Paul CBD. The Twin cities region is nicknamed for its two largest cities: Minneapolis, with the highest population, and Saint Paul, the state capital. It is a classic example of dual-center region in geography.

As shown in Figure 4, the slope of the cumulative distribution curves is much lower compared to that of Figure 3. Unlike in Figure 3 where blue-collar jobs show distinct distribution patterns from pink- and white-collar jobs, all three job categories show similar distribution patterns in Figure 4. About 60–70% of the jobs in each category are located less than 20 kms from the two CBDs in the Twin Cities, and only about 20–30% of the jobs in each category are located less

than 10 kms from the two CBDs. In Beijing, even the most dispersed job category, i.e., the blue-collar jobs, have 40% of its jobs located less than 10kms from the city center.

Figure 4. Employment proportion by distance from CBDs, Twin Cities, USA
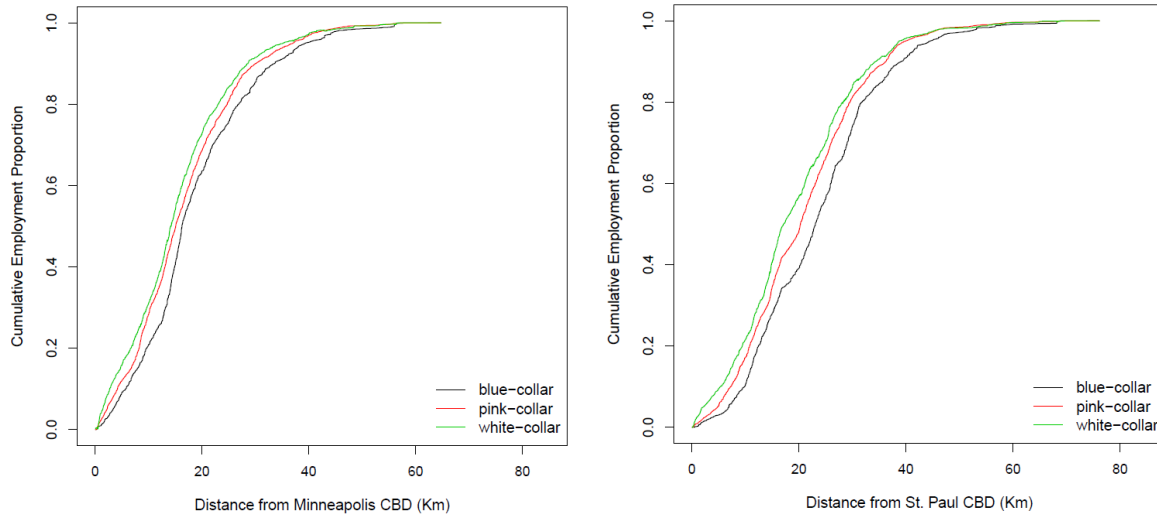
Our analysis suggests that although low-skill blue-collar jobs in Beijing show some level of job sprawl, low-skill pink-collar jobs in Beijing remain heavily concentrated within and near city centers. Nonetheless, both low-skill blue-collar and pink-collar jobs are significantly more concentrated in Beijing than the Twin Cities.

4. Discussion and Conclusions

Our spatial analyses find distinctive patterns of poverty concentration and low-skill job distribution between the two study regions. In the Twin Cities, poverty concentrates in central city areas yet low-skill job opportunities are largely located in suburban areas (over 60% of the low-skill jobs are located between 10 kms and 30 kms from the city centers). In Beijing, the absolute majority of low-skill migrant workers and affordable housing units is located between the Third and Six Ring Roads, roughly between 10 kms and 30 kms from the city centers. Yet, this fringe area only contains about 20% of the low-skill pink-collar jobs and 40% of the low-skill blue collar jobs. These study findings confirm that the socio-economically disadvantaged groups in the two study regions both suffer from high levels of jobs-housing mismatch. Yet the appearances/forms of the jobs-housing mismatch phenomenon in these two study regions are distinctive.

The marked differences in the mismatch phenomenon have important implications for the potential consequences of jobs-housing mismatch. First, public transit systems have the nature of concentrating services in central cities. Given the high level of transit dependency among disadvantaged groups, the extent to which the jobs-housing mismatch affects transit-based job accessibility depends on the type of mismatch that exists in the region. In the Twin Cities, as poor households concentrate in central cities, concentrated transit services in central cities play a

significantly positive role in improving job accessibility and mitigating the jobs-housing mismatch for the working poor. In Beijing, as low-skill migrants and the local poor largely live in urban fringe areas, transit is likely to play a minor role in improving their job accessibility and mitigating jobs-housing mismatch. As such, recent transit innovations used in U.S. cities, such as the Job Access and Reverse Commute program established in 1998 which focus on providing transit services for urban poor who commute from central cities to suburban areas, may be inappropriate for Chinese cities.

Second, although the main purpose of this paper is to investigate the spatial mismatch issues, our case studies shed light on the shortcomings and negative aspects of Beijing's current affordable housing program. About 90% of affordable housing units in Beijing are located outside the Third Ring Road at urban fringe areas, making the residents distant from their suitable job opportunities (i.e., low-skill jobs) as well as good transit services. Looking forward, Chinese cities should carefully consider the location of the new affordable housing projects to ensure that these projects not only provide affordable housing but also improve low-income people's transportation mobility and access to job opportunities. In addition, efforts are needed to reform the affordable housing program so that it benefits the local poor as well as the large migrant population. It is worth noting that relying only upon affordable housing production is unlikely to be sufficient for mitigating spatial mismatch. In Chinese cities, as land in and near urban centers has often been heavily bid upon or has been developed to its full capacity, physical and market conditions may not allow affordable housing projects to be built in proximity to urban centers. Chinese city governments may consider more innovative and integrated programs to address the spatial mismatch issue: for example, initiating job creation programs that focus on economic and community development in existing poverty-concentrated urban fringe areas as well as affordable housing production near rapid transit corridors that offer reliable and frequent transit services to central cities.

To conclude, the differences suggest that the U.S. experience in combating the jobs-housing mismatch cannot be directly applied in China. How existing U.S. spatial mismatch mitigation strategies could be used in the context of Chinese cities merits additional research and discussion.

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