

Expansion of the Research Scope of Spatial Mismatch

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A growing number of studies have realized that spatial mismatch itself was from the beginning not only about how space interacts with the labor market, but about how space is related to race, transport, skills, social relations, occupational segmentation, and other elements that influence labor market outcomes, and that spatial mismatch needs to be understood and constructed in a broader context. With further suburbanization, changes in demographic characteristics, housing market reforms, and economic restructuring, and urban sprawl, scholars have begun to reassess the diametrically opposed findings on spatial mismatch by placing them in the new socio-economic context and working to expand the possibilities of spatial mismatch in terms of the group concerned, influencing factors, indicator methods, spatial relationships, and consequential effects.

spatial mismatch

theoretical evolution

connotation expansion

1. Expansion of the Group Concerned

Black inner-city Americans face employment vulnerability from the separation of residence and employment, as do other minorities in inner cities. Employment suburbanization can also negatively affect the employment rates of inner-city Hispanic and Latino workers ^{[1][2][3]}, and even inner-city Whites experience employment vulnerability due to the separation of residential-employment space ^[4]. Youth are more vulnerable to job market fluctuations due to their lack of employability skills and transportation options ^[5], and the employment participation rate of ethnic minority youth in particular declines significantly due to reduced employment accessibility ^{[6][7]}. Female workers also present frequent employment disadvantages due to occupational segmentation and family responsibilities in the process of suburbanization of employment ^[8]. Other disadvantaged groups, such as immigrants ^[9], low-skilled ^[10], low-income groups ^{[11][12]}, entry-level workers ^[13], individuals recently released from prison ^[14], and welfare-recipients ^[15], have entered the study of spatial mismatch in America.

Since then, scholars in other countries have found that not only disadvantaged groups, but also ordinary workers may face employment disadvantages arising from spatial mismatch. Groups such as city dwellers, community dwellers, and general commuters have also become the subject to be included in the study of spatial mismatch ^[16]. However, subsequent studies have argued that there may be considerable differences in the spatial separation of residence-employment and the resulting negative labor market impacts for different groups, i.e., the spatial separation of residence and employment may not necessarily face spatial mismatch, as some groups may rely on transport as well as personal capabilities to compensate for the threats posed by spatial separation. Therefore, disadvantaged groups remain the focus of spatial mismatch research, but only that the types of disadvantaged

groups vary over time and depending on their locations. In China, disadvantaged groups living in low-income settlements such as subsidized housing, urban villages, and old neighborhoods are the main targets of spatial mismatch studies [\[17\]](#)[\[18\]](#)[\[19\]](#).

2. Complication of Influencing Factors

Since the late 1990s, spatial mismatch research has shifted from simply examining spatial mismatch to disentangling the influences that trigger it. Early scholars had mainly attributed spatial mismatch in US metropolitan areas to the suburbanization of employment and the residential-employment separation under housing market segregation [\[20\]](#)[\[21\]](#). Later, a growing number of studies have argued that it is important to focus not only on the spatial separation of residence and employment, but also on the processes of connection or barriers between employment opportunities and workers [\[22\]](#)[\[23\]](#), i.e., what prevents ethnic minorities such as inner-city Blacks from supplying labor to suburban areas where labor demand is growing. Residential immobility, commuting barriers, and job searching barriers form three major barriers to spatial mismatch: (1) In the context of suburbanization and urban spatial reconstruction, the lack of residential mobility makes it spatially difficult for ethnic minorities, such as Blacks, to move closer to jobs and increases their employment possibilities [\[24\]](#); (2) The lack of cars and the inaccessibility of public transport in situations where residence is far from employment result in barriers to commuting [\[1\]](#); (3) Weaker access to employment information and inefficient job searching behavior may exacerbate the employment vulnerability of the groups concerned in the absence of the separation of their residence and employment [\[25\]](#). The current widespread urban sprawl, urban renewal in many developing country cities, such as the reconstruction of city centers, shantytown renovation, new town development, and the construction of affordable housing in suburbs, have shifted a large number of vulnerable groups to the urban periphery, inevitably leading to the spatial separation of vulnerable groups from the job-rich central areas. Meanwhile, the combination of barriers to migration caused by high property prices in central areas, barriers to commuting caused by poor transport facilities in the suburbs, and barriers to job search caused by a lack of access to employment information leads to spatial mismatch [\[17\]](#)[\[26\]](#)[\[27\]](#).

Therefore, the research which were originally presented to falsify the objective existence of spatial mismatch shown in **Table 1** have turned out to help the expansion of spatial mismatch theory at last (**Figure 1**). Employment suburbanization and residential segregation bring about the physical manifestation of residence-employment spatial separation on one hand. On the other hand, a series of factors, such as race, transportation, employment skills, employment information, etc., may create residential immobility, commuting barriers, and job searching barriers to aggravate the dysconnectivity between residence and employment. In a word, spatial mismatch is a phenomenon that reflects the loss of employment welfare due to the spatial distance of residence from employment and the lack of connectivity between residence and employment. Spatial mismatch is caused by a combination of factors such as restricted residential migration, imbalanced public transport policies, lack of individual mobility, selective discrimination in the job market, and poor access to employment information, all of which are superimposed on the changing spatial structure of the city. Overall, research on the factors influencing spatial mismatch has evolved in two respects: firstly, from focusing on the factors influencing the distance of the

relevant subject from employment (residential segregation) to the lack of connection between residence and employment (residential immobility, commuting barriers, job searching barriers); and secondly, by interconnecting and embedding these factors with space and understanding spatial mismatch from a broader perspective of spatial inequality, emphasizing the essential link between space and factors such as race, poverty, transport, and individual characteristics rather than separating them out and considering only spatial distance, so as to resolve the debate between spatial mismatch and racial mismatch, transportation mismatch, skills mismatch, information mismatch, etc.

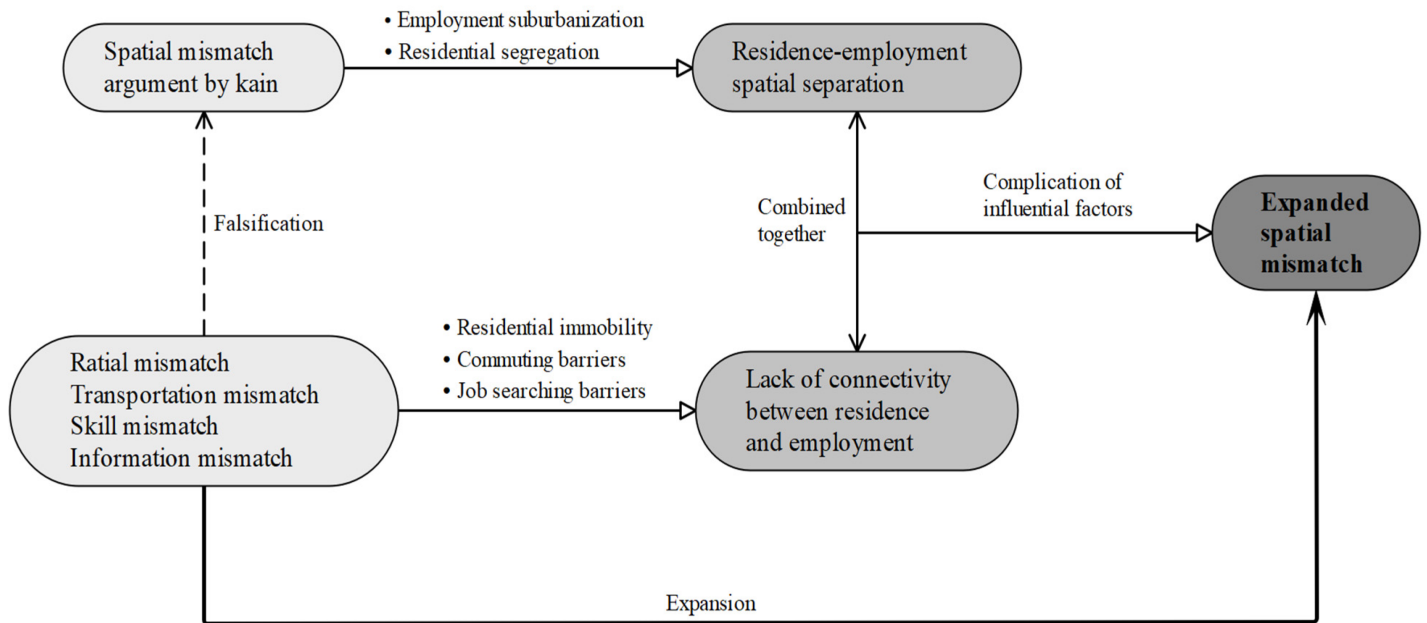


Figure 1. The complication of influential factors of spatial mismatch.

Table 1. Representative literatures of the various mismatch types.

Mismatch Type	Representative Literatures	Main Conclusions
Racial Mismatch	Ellwood (1983) [28]	Barriers to employment for Blacks do not stem from spatial factors, but rather from racial issues arising from skin color
Transportation Mismatch	Ong & Miller (2005) [29]	Heavy reliance on the slow public transport is the real reason for the long commute times for residents of inner cities
Skill Mismatch	Stoll (2005) [30]	The mismatch between lower-skilled inner-city minorities and traditional lower-skilled jobs in the suburbs could explain a large proportion of the Black-White employment gap
Information Mismatch	Parks (2004) [31]	Good social relations in the family can improve employment outcomes for migrants, especially for women
Policy Mismatch	Chapple (2006) [32]	Many policy measures to improve the links between minorities and suburban job opportunities have not significantly improved their

Mismatch Type	Representative Literatures	Main Conclusions
		employment outcomes

To confuse spatial mismatch with residential segregation, residential-employment separation, and lack of accessibility is in fact to confuse the measurement of spatial mismatch with the manifestation of spatial separation. No matter segregated in inner city but employment decentralized or relocated in suburbs but employment concentrated in city centers, both manifest the residence-employment spatial separation. However, spatial separation is only a pre-stage of spatial mismatch, which occurs when spatial separation results in employment loss for the group concerned. Appropriate indicators and methods to accurately measure spatial separation are the prerequisite for testing spatial mismatch. Job accessibility is an indicator commonly used to characterize the spatial relationship between residence and employment. It is literally easy to understand, but its accurate measurement is very difficult. Over the years, research has developed a number of indicators to measure spatial relationships. These indicators can be divided into two main categories: those that indirectly reflect job accessibility and those that directly reflect job accessibility (**Table 2**).

Table 2. Category of spatial relationship measurement indicators.

Categories	Specific Indicators
Indirectly reflecting job accessibility	Residential Segregation
	Residential suburbanization
	Employment suburbanization
Directly reflecting job accessibility	Commuting-based job accessibility: commuting time, commuting distance, commuting costs, etc.
	Employment-based job accessibility: ratio of job to residence

3.1. Indirect Indicator of Job Accessibility

(1) Residential segregation

Using residential segregation to reflect the separation of Blacks from employment was the indicator originally used in the spatial mismatch test. This is related to the initial emphasis on racial discrimination in suburban housing markets and the resulting residential segregation leading to impaired employment status for Blacks [20][21]. The logic behind this was that residential segregation would prevent the group concerned from being closer to employment growth opportunities and therefore affect their employment status. However, the degree of residential segregation can indirectly measure the separation from employment and can be seen as a crude institute for job accessibility, as residential segregation does not show the relationship between residential area and job distribution and can lead to biased results.

(2) Residential suburbanization

Residential suburbanization is also an indirect way of reflecting the job accessibility [33][34]. The logic behind it is that inner-city Blacks are less accessible to job opportunities than suburban Blacks, and the lack of job opportunities can lead to higher unemployment, longer commuting distances, and lower wages. Earlier studies have examined spatial mismatch by comparing differences in employment participation, commuting, and wages between inner-city Blacks and suburban Blacks, but the findings vary considerably. This may be related to the simple city-suburban ring dichotomy: employment opportunities are unequal within the simple delineation of city-suburban areas, and the boundaries of city-suburban areas are constantly changing and blurring over time.

(3) Employment suburbanization

The degree of employment suburbanization is usually measured as a ratio of the number of jobs outside the inner city to the total number of jobs. The spatial mismatch can be tested by comparing the differences in the number of jobs in inner city and suburban areas and linking them to differences in the income status of Black in inner cities and suburbs [35]. However, some studies have suggested that discussing all job numbers in general would lead to bias, and that the proportion of certain jobs suitable for certain groups should be used, such as the proportion of manufacturing, retail, and service jobs suitable for Blacks [2]. It is important to notice that using this indicator is still subject to the simple city-suburban ring dichotomy and that wage earnings will vary according to the profitability, labor market supply and demand conditions of different zones, which need to be carefully excluded from the study.

3.2. Direct Indicator of Job Accessibility

While the first three indicators have their own use logic, they can only indirectly reflect job accessibility to characterize the spatial relationship between residence and employment. Some studies have suggested the need to directly measure job accessibility, i.e., to directly reflect the proximity of the employed population to job opportunities.

(1) Commuting-based job accessibility, such as commuting time

If the accessibility of jobs is low for a particular group, a longer commute is required for employment. While Ellwood argues that commute time is the best direct indicator of job accessibility, two contrasting conclusions have been reached by testing the relationship between commuting time and Black youth employment, with some studies that concluded no significant effect [28] and others that concluded that there was a significant effect [6][36]. The differences in empirical results may be related to sample selection bias, endogeneity of residential choices, and differences in commuting distances, commuting tools, and commuting nodes. Studies have also suggested that accessibility is a concept that involves physical, psychological, economic and social features, which makes the measurement of it invalid using traditionally place-based accessibility related to the costs needed to reach a destination [37]. Thus, explicit indicators, such as surface for vehicular traffic only, pedestrian accesses, percentage of accesses without architectural barriers, etc., are used to measure the commute-based accessibility directly [38][39].

(2) Employment-based job accessibility, such as employment to residence ratio

Direct measures of job accessibility can also be made by directly reflecting the matching of potential employers of different geographical units with potential jobs in the vicinity, i.e., employment to residence ratio [40]. However, a range of methodological challenges may also affect the accurate measurement of job accessibility, including measurement bias issues using all jobs rather than vacant jobs, labor market segmentation issues using all jobs without distinguishing jobs suitable for low-skilled workers, including the failure to consider job market competition from residents of neighboring communities seeking jobs in their own community and from residents of their own community working in other communities, as well as the failure to consider issues such as distance decay effects due to the spatial mobility of employed people [41]. In this regard, some studies have created functions that express job vacancies, labor market segmentation, employment competition, and the degree of spatial obstruction between two locations in order to measure spatial accessibility of jobs more accurately [42][43][44][45]. The scale is also a key issue to be considered in the accessibility measurement, since the level of accessibility of cities or metropolitan differs greatly with that of regional, local, and individual [46]. Accessibility of 15-min neighborhood level is often used responding to the current urban restructuring that much more employment activities are supposed to be done in the 15-min neighborhood instead of in city scale. There is a higher accessibility if it guarantees an adequate supply of jobs and basic services within the 15-min neighborhood [47].

4. Extension of Consequential Effects

It is always emphasized that spatial mismatch is formed when spatial separation of employment from residence and the resulting adverse labor market outcomes occurs in both stages. Spatial mismatch was first proposed through research which found that inner-city Blacks had higher unemployment rates due to geospatial mismatch from employment resources. As the research progressed, indicators of labor market outcome status such as employment participation, commuting, and income, as the main manifestations of the consequences of spatial separation, gradually became important indicators of the consequences of spatial separation in the test of spatial mismatch. Employment participation is the most commonly used indicator to characterize labor market outcomes, and where job accessibility is high, employment rates are relatively high [48][49]. Commuting distance, time, and cost were also another indicator of early empirical evidence of spatial mismatch. It was later suggested that distance, time, and cost alone do not fully represent the burden imposed on commuting, and that a combination of commuting costs may be a better option, taking into account the degree of inaccessibility and other unforeseen problems in commuting [50]. The wage income indicator was developed as a result of research that found that Black Americans in inner cities may shift from higher-wage jobs to lower-wage jobs in response to the spatial mismatch caused by suburbanization of employment, and that these Blacks may have no change in employment participation and a shorter commute, but significantly lower wages and earnings [51]. When conducting spatial mismatch tests, there are multiple combinations of how indicators are selected to reflect spatial separation as well as reflect labor market outcomes (**Figure 2**). This combination of different indicators, combined with the methodological challenges faced in the use of the indicators, has led to differences in the empirical results and the debate on the objective

existence of spatial mismatch [52]. However, integration with labor market outcomes has been emphasized by spatial mismatch since its inception, and this is exactly where it distinguishes from macro-spatial pattern studies.

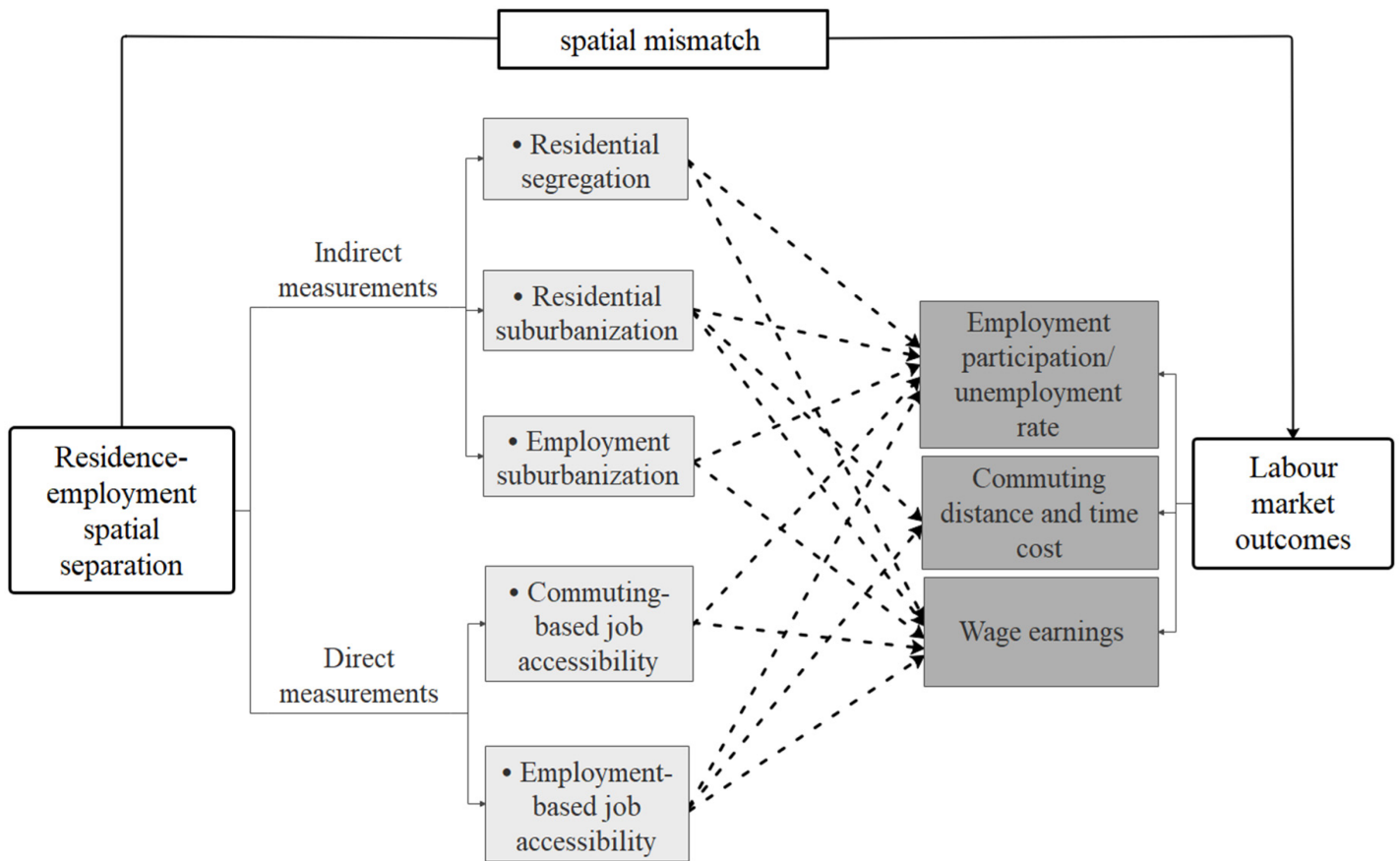


Figure 2. The measure of Job Accessibility and Spatial Mismatch.

In addition to impaired employment well-being resulting from the separation of residential and employment resources, residential misalignment with other spatial resources may also lead to a range of spatial welfare losses; the latter has become a powerful direction for the expansion of spatial mismatch research. The groundbreaking research in this area continues to be produced by Kain, who in 2004 raised concerns about the mismatch between disadvantaged groups and public service resources such as education and the resulting disadvantages. By using the example of public schools in Texas, he found that much of the Black-White achievement gap could be attributed to the continued residential segregation of Blacks in the inner city and the spatial inaccessibility of highly productive schools [53]. Public service resources include shopping and commercial services, health care, educational and cultural services, sports and green spaces, etc. The accessibility of public service resources is unequal across communities and is clearly linked to residential location [54]. With the suburbanization in the United States, there is a clear tendency to allocate public service resources to higher-income suburban communities. In China, the accessibility of public green space to different social classes varies and the excessive daily commute to kindergartens leads to a residence-kindergarten spatial mismatch [55]. In the UK, the accessibility of primary healthcare provision needs to be improved [56]. These studies have expanded spatial mismatch from the spatial relationship between employment and residence to public service provision. However, there is a need to further

deepen the theory of spatial mismatch to guide how to bridge the gap from accessibility to public service resources to loss of public service benefits.

In other words, when spatial mismatch was first proposed, it was mainly focused on the spatial separation of residence and employment and the loss of employment welfare from the perspective of labor economics. Subsequently, most studies in the US, the UK, and other western countries also followed this line of thought, emphasizing the labor market consequences as a level that must be attended to in the study of spatial mismatch. However, with the intervention of disciplinary fields such as sociology and planning, spatial mismatch is not only used to express the separation of the spatial relationship between residence and employment, but the spatial relationship between residence and public service resources has also entered the realm of spatial mismatch research. Spatial mismatch can be used to express the spatial relationship between multiple subjects, can be applied to areas other than the labor market, such as the study of the spatial relationship between residential areas and public service resources and the resulting loss of spatial welfare. This can dovetail with current hot issues such as spatial equality and social justice, thus continuously enrich and deepen the connotation of spatial mismatch and maintaining the vividness and lasting power of the theoretical value of spatial mismatch.

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