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Publication Date

1994-09-01

Spatial Mismatch or Automobile Mismatch? An Examination of Race, Residence and Commuting in US Metropolitan Areas

Brian D. Taylor and Paul M. Ong

[Paper first received, July 1993; in final form, September 1994]

Summary. This paper uses data from the metropolitan samples of the American Housing Survey in 1977–78 and 1985 to examine the commute patterns of whites, blacks and Hispanics in US metropolitan areas, with a particular focus on the commutes of workers living in predominantly minority residential areas. Overall, the commute patterns of white and minority workers appear to be converging rather than diverging over time, even among low-skilled workers. Contrary to the spatial mismatch hypothesis, black and Hispanic workers living in minority areas had both shorter commutes and commutes that increased more slowly between 1977–78 and 1985 compared to workers in other areas. Further, a longitudinal analysis shows that the average commute times of non-moving minority workers in predominantly minority areas decreased during the study period. We find no evidence in these commuting data to support the spatial mismatch hypothesis.

1. Overview

The validity and significance of the spatial mismatch hypothesis has been an enduring debate in the social sciences since John Kain first proposed it 25 years ago. Kain (1968), in his study of black workers in Chicago and Detroit during the 1950s, argued that the persistent residential segregation of minorities, particularly blacks, in central cities combined with the increasing suburbanisation of metropolitan employment to create a spatial mismatch for minority workers. The important consequence of this mismatch, according to the hypothesis, is declining levels of employment access for central-city minority

residents. This, in turn, results in higher unemployment levels for minorities and longer commutes (hence, lower real wages) for central-city minorities able to find work.

Of these expected outcomes of the spatial mismatch, longer and increasing commutes are the most explicit indicators of the hypothesis because they directly measure the spatial phenomenon in question. Higher levels of unemployment and lower incomes among central-city minorities are clearly the result of a complex set of factors, many of which (education and training, work experience and discrimination) are not necessarily spatial.

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On the other hand, the relationship between commute behaviour and the spatial mismatch is less ambiguous. With the continuing dispersion of employment to outlying suburbs, we would expect to see commute times and distances for central-city workers to be increasing faster than for workers in general; this should particularly be the case for ghetto minority workers, who are less able (due to income constraints and housing discrimination) to relocate closer to suburban jobs.

The residential population of American cities has been de-concentrating since at least the First World War, and metropolitan employment has been de-concentrating since at least the Second World War. On the other hand, the residential segregation of urban minorities, particularly blacks, has proven far more static. Thus, the major population and employment trends Kain identified in Chicago and Detroit in the 1950s continue today. In other words, if there is a spatial mismatch, it is likely to have grown significantly worse since Kain's original work.

This paper examines the commuting trends of black and Hispanic workers *vis-à-vis* whites between 1977–78 and 1985, a period of ongoing suburbanisation of employment; we find little evidence to support the spatial mismatch hypothesis:

- White commuters in our sample had longer average commute distances than black or Hispanic commuters.
- Where longer commute times for minority workers were observed, they were explained largely by a higher reliance on relatively slow public transit for the journey to work.
- The commute times and commute distances of minority commuters generally did not increase relative to white commuters during the study period.
- Controlling for education and income, the average commute distance of minority workers did not vary from those of white workers in either time period.
- Commuters living in predominantly minority areas had shorter average com-

mute times and distances than commuters living in other areas.

- The average commute time for black and Hispanic workers living in predominantly minority areas decreased slightly during the study period.
- Among workers keeping the same residence between 1977–78 and 1985, minority commute times decreased both absolutely and relative to white commuters.
- And, among workers keeping the same residence, long commutes did not increase the likelihood of leaving paid work between 1977–78 and 1985.

The remainder of this paper is divided into four sections. The first briefly reviews the spatial mismatch literature, with a particular emphasis on previous examinations of racial/ethnic variations in commuting behaviour. The second section details our methodology, data sources, data set construction and principal assumptions in our analysis. The third section summarises the findings of our analysis. And the final section briefly discusses the implications of our findings.

2. Previous Research

While minority employment levels and earnings clearly lag behind the white majority, the contribution of a spatial mismatch to this lag is far from clear. The question has been examined by numerous researchers over the years, from a wide variety of approaches (see recent literature reviews by Holzer, 1991; Jencks and Mayer, 1991; and Moss and Tilly, 1991). While attempts to measure the effects of the spatial mismatch have varied widely, few have attempted to directly measure racial variations in commuting behaviour. Most studies have tried to infer the effects of residential segregation and employment suburbanisation on minority employment and earnings, with decidedly mixed results (Kain, 1968; Mooney, 1969; Offner and Saks, 1971; Harrison, 1974; Masters, 1975; Danzinger and Weinstein, 1976; Vrooman

and Greenfield, 1980; Straszheim; 1980; Price and Mills, 1985; Farley, 1987; Galster, 1987; Hughes, 1987; Ihlanfeldt, 1988; Blackley, 1990).

More recently, Gillard (1979), Ellwood (1986), Leonard (1987), Ihlanfeldt and Sjoquist (1989, 1990), Hughes and Madden (1991) and O'Regan and Quigley (1991) used commuting data as part of their examinations of the spatial mismatch hypothesis, usually by using commute data as an independent variable to explain income or employment outcomes. While there is general agreement among these authors that human capital and discrimination are important factors in explaining income and employment, there is considerable disagreement over the size and significance of a spatial mismatch.

As argued at the outset, however, a fundamental principle of the spatial mismatch hypothesis is a growing separation of minority neighbourhoods and new employment. Most of the research cited so far has focused on commuting time or distance as one of many independent variables used to explain the lower incomes or higher unemployment rates of minority workers. Very little research has tried to examine directly whether there is indeed a spatial mismatch, such as whether the journeys to work of central-city minorities are growing disproportionately to other workers; but, like most other research on the spatial mismatch hypothesis, the few studies that have directly examined minority commuting have come to disparate conclusions.

Unequivocal in their support of the spatial mismatch were Alexis and DiTomaso (1983), who analysed a survey data of 720 employees and job-seekers in Chicago and concluded that limited transport opportunities for the poor materially affected their job and income opportunities. Examining commuting data from a sample of 360 workers at three non-CBD firms in Chicago, they found that blacks had the longest commute times, followed by whites, then Latinos. Importantly, however, Alexis and DiTomaso (1983, p. 87) implicitly acknowledged that automobile access, not commute distance *per*

se, may be key: "when blacks have access to a car, transportation does not appear, on the face of it, to be anymore of a problem for them than for whites or Latinos".

Also supportive of the spatial mismatch were Goodman and Berkman (1977), who used Panel Study of Income Dynamics data to compare the commuting patterns of black and white metropolitan workers. Goodman and Berkman argued that much of the difference in commuting burdens between whites and blacks was explained by housing market and labour market discrimination of blacks. However, the authors acknowledged, but did not control for, the fact that black workers are also more likely to reside in relatively congested central-city areas than whites, which would likely explain some of the remaining difference in commute burden. And, while the Panel Study data are longitudinal, they did not test whether the observed differences in commuting burdens between blacks and whites were increasing or decreasing over time.

O'Hare (1983), used 1975 American Housing Survey data and 1977 National Personal Transportation Survey data to arrive at findings similar to those of Goodman and Berkman. O'Hare further found that the majority of black central-city/suburb commuters travel from the central city to the suburb, while the majority of white central-city/suburb commutes travel from the suburbs to the central city.

Finally, and in outspoken contrast to these three earlier studies, Gordon and Kumar (1989) used National Personal Transportation Survey data from 1977 and 1983 to compare directly commute times and distances of non-white and white workers. Gordon and Kumar focused primarily on commuters in private vehicles and found little difference between the commute patterns of non-whites and whites when controlling for income, time of day and suburb/central-city residence. They found much more variation in commute times by occupation group and sex, for example, than by race, though limited comparative data for black and white manufacturing workers in large metropolitan

areas did show that peak-hour commute distances, and especially commute times, increased more for non-whites between 1977 and 1983 than for whites.

While making important contributions to the spatial mismatch debate, none of these commuting studies have adequately controlled for residential location in their analyses. The spatial mismatch hypothesis does not apply to all minority workers throughout metropolitan areas, nor does it apply to all central-city minority workers; the spatial mismatch specifically refers to a growing separation of workers in minority neighbourhoods from new areas of employment in metropolitan areas. Yet the only geographical characteristic examined in the commuting studies to date has been the distinction between central-city and suburban residents. Our analysis seeks to address this shortcoming by examining the commute patterns of white, black and Hispanic workers based on the racial/ethnic composition of residential areas.

Also ignored in previous work is whether individual workers who remain in predominantly minority areas are experiencing longer commutes over time. This has been ignored because the aggregate data used in most previous work do not permit the residential and commuting patterns of individual workers to be traced over time. To address this question, a longitudinal data sub-set is used to examine the commutes of workers, in and out of minority areas, over time.

3. Methodology

The data used in this analysis come from the metropolitan samples of the American Housing Survey in 1977, 1978 and 1985. In 1985, 53 000 housing units in 10 metropolitan areas were surveyed. Eight of these ten cities were also surveyed in 1977, the other two in 1978.¹ Our dataset, then, was comprised of these 10 metropolitan areas surveyed in both 1977–78 and 1985² and contained data on black commuters (5231 in 1977–78 and 5390 in 1985), Hispanic commuters (1833 in

1977–78 and 2388 in 1985), white commuters (26 295 in 1977–78 and 24 892 in 1985) and commuters of other races and ethnicities (1000 in 1977–78 and 1481 in 1985).

While metropolitan employment has dispersed faster than minority populations over time, this is not *prima facie* evidence of a spatial mismatch.³ The key issue is not whether new employment is locating outside central cities, but whether employment access in predominantly minority areas is decreasing because low- and moderately-skilled jobs are tending to locate away from these minority areas.⁴ To examine this issue, we focus on the commuting trends of workers in predominantly minority areas, for it is minority ghettos that should be most profoundly affected by a growing spatial mismatch. If workers in predominantly minority areas are experiencing longer commutes or commute lengths that are growing faster than for those of commuters in other areas, then we would accept this as evidence in support of the spatial mismatch hypothesis. On the other hand, if trends in commuting between workers inside and outside predominantly minority areas do not vary significantly, then we would conclude that the spatial mismatch hypothesis was not supported by these commuting data. It is important to note here that, even if a significant outcome of the spatial mismatch is higher unemployment, we would still expect the residents of primarily minority areas who remain in the labour market to experience longer commutes over time.⁵

To examine these questions, we divided the 10 metropolitan areas studied into travel analysis zones which were defined, on the basis of residential population, as either 'white', 'mixed', or 'minority'.⁶ We then compared the commute patterns of white, black and Hispanic workers within each of the three residential area types in both time periods. The number of zones varies with the size of the metropolitan area; Fort Worth is divided into 6 zones and Los Angeles County into 44. The 10 cities in the sample are divided into a total of 228 zones with an

average 1980 population of 143 000 per zone; these zones are larger than a local neighbourhood, but substantially smaller and finer than the central-city/suburb distinction used in most previous analyses.

Despite its advantages for geographically specific analyses, an important variable not included in the American Housing Survey data is occupation. So in order to examine the commuting patterns of workers in low-paid, low-skilled occupations, we identified such workers by proxy. If a worker had no post-high school education *and* an annual income of less than \$8000 in 1977-78 or \$13 200 in 1985, that worker was classified as 'low-skilled'. Using this method, about one-fifth of the workers in both 1977-78 (20.4 per cent) and 1985 (19.9 per cent) were classified as low-skilled.

Finally, while time-series data allow us to examine aggregate trends in commuting behaviour, they tell us nothing about the commuting experience of individual workers. The primary purpose of the American Housing Survey (AHS) is to measure and to track the conditions of the housing stock through time. To do this, the AHS surveys the residents of particular housing units approximately every 4 years; by returning to the same housing units every 4 years, the AHS is a longitudinal survey of housing units. As a result, long-term residents in AHS-tracked housing units may be surveyed repeatedly on 4-year intervals, while, in AHS-tracked units with relatively high residential turnover, the survey will report on different residents at each 4-year interval. While the AHS does not assign unique identifiers to the individuals surveyed, the demographic data gathered on each resident permits a longitudinal sample of individuals to be estimated.⁷ We estimated a longitudinal sample of 11 465, about 25 per cent of the entire sample.

A central tenet of the hypothesis is that minority ghetto residents are uniquely constrained in their residential location choice and, therefore, are particularly vulnerable to the dispersion of metropolitan employment. Thus, this work differs from nearly all pre-

vious work on the spatial mismatch hypothesis by including longitudinal data in its analysis. By tracing the commuting behaviour of individual workers living in predominantly minority areas over time, we can directly test whether ghetto workers who do not (or cannot) move are experiencing longer commutes over time.

4. Findings

The data presented in this section reveal systematic variations in commute patterns by race and ethnicity, but no evidence of a growing jobs/housing mismatch for minority workers relative to white workers. In general, the average commute times and distances of minority workers have not increased relative to whites. In fact, the commute patterns of white, black and Hispanic workers appear to be *converging* rather than *diverging* with time.

While the average commute distance for minority commuters did increase between 1977-78 and 1985, commute distances for whites increased as well (Table 1). The biggest jump in average commute distance was among Hispanics (16.8 per cent, 1.5 miles); the average commute distance for whites grew 10.8 per cent (1.1 miles); while the smallest commute distance increase was among blacks (7.1 per cent, 0.7 mile). And, significantly, white workers commuted nearly a mile further, on average, than both black and Hispanic commuters in both 1977-78 and 1985.

Turning to commute time, we see a very different pattern. Despite increasing average commute distances over time, the average commute time for all workers remained largely unchanged between 1977-78 and 1985. Despite having shorter average commute distances, black workers had average commute times about 3 minutes longer than white workers in both 1977-78 and 1985.

This apparent paradox of shorter average commute distances and longer average commute times for black workers is the result, obviously, of differences in commute

Table 1. Average commute distance, time and speed: analysis of variance by race/ethnicity for 1977-78 and 1985

	1977-78		1985		Change 1977-78 to 1985	
	Miles/minutes	Difference from White	Miles/minutes	Difference from White	Miles/minutes	Percentage
<i>Distance</i>						
White	10.3		11.4		1.1	10.8
Black	9.3**	-1.0	9.9**	-1.5	0.7	7.1
Hispanic	9.1**	-1.2	10.6	-0.8	1.5	16.8
<i>Time</i>						
White	22.3		22.6			1.3
Black	25.6**	3.3	25.4**	2.9	-0.1	-0.5
Hispanic	21.3**	-1.0	22.1	-0.5	0.8	3.7

**P < 0.05 (statistically different from whites at the 0.05 level).

speed among racial/ethnic groups. While the average commute speed for all three populations increased between 1977-78 and 1985, black commuters averaged nearly 6 miles per hour less than white workers in 1977-78 and nearly 7 miles per hour less in 1985.

These measured changes in average commute time and average commute distance between 1977-78 and 1985 are consistent with other recent findings of increasing commute distance and slightly declining commute times during the 1980s (Gordon *et al.*, 1991; Hu, 1993). The observed pattern of rising commute lengths and stable or falling commute times may be explained by the continuing dispersion of US metropolitan areas. As a rule, automobile commutes are significantly faster than those on public transit, and suburban commutes are generally faster than commutes in central cities. Thus, in spite of highly publicised increases in peak-hour traffic congestion in most US cities during the 1980s, the continued dispersion of metropolitan areas and increasing use of the private vehicles for commuting probably explain the general trend of stable average commute times in the face of increasing average commute distances.

The importance of commute mode in explaining differences in the commute times of white, black and Hispanic workers can hardly be overstated. Workers driving alone have a clear time advantage over commuters on other modes, particularly those on public transit. The average ride-sharing commute in this sample was 11.4 per cent (2.4 minutes) longer than the average drive-alone commute, while commute times on public transit were 74.8 per cent longer (15.8 minutes) than the average drive-alone commute.

These differences in commute times are important because black workers in this sample were nearly three times as likely as white workers to use relatively slow public transit to get to work. Much of the observed differences in average commute time can be explained by variations in commute mode by race/ethnicity. In both 1977-78 and 1985, about 20 per cent of all black workers commuted to work on public transit, compared to

a 10 per cent transit mode share for Hispanics, and just 7 per cent for whites.

For blacks driving alone to work, average commute times were not significantly different from white commuters in 1985 (Table 2). In most cases, the average commute time and distance for white commuters in private vehicles (driving alone and ride-sharing) increased slightly relative to blacks and Hispanics between 1977-78 and 1985.

Among public transit commuters, the average commute times of white and minority workers were very similar in 1977-78. By 1985, however, average transit commute times among white workers decreased slightly (1.9 per cent, 0.7 minute); for black workers transit times were unchanged, but for Hispanics transit travel times increased an average of 12.6 per cent (4.5 minutes); these longer average transit commute times for blacks (2.5 minutes) and Hispanics (4.0 minutes) relative to whites were statistically significant at the 0.05 level. The longer average transit commute times among minority workers were largely the result of slower transit travel speeds relative to whites and not to longer average commute distances. There are several possible reasons for the higher transit commuting speeds among white workers relative to minority workers. One is choice: white transit commuters are, on average, higher-income than minority transit commuters, and are more likely to have an automobile available. In other words, white transit commuters are more likely to use transit because it offers a reasonable alternative to a private vehicle, while (lower-income) minority commuters are more likely to commute by transit because they simply have no other choice. White transit users are also more likely to live, work and commute in the less congested suburbs or on line-haul transit to central business districts; these transit trips that tend to be relatively longer distance at higher speeds (Cervero and Wachs, 1982).

Using linear regression to control for commute mode, residential area type, income, education, age and sex, average commute times for black workers were just over 2

Table 2. Commute distance and time trends by mode by race/ethnicity for 1977-78 and 1985

	Commute distance			Commute time			Percentage change
	1977-8	1985	Percentage change	1977-8	1985	Percentage change	
<i>Drive-alone commuters</i>							
White	10.6	12.2	15.2	21.0	22.0	4.6	
Black	10.0**	11.1	10.6	22.4**	22.5	0.5	
Hispanic	9.6**	11.2	17.3	19.8**	20.5**	3.3	
<i>Ride-sharing commuters</i>							
White	12.4	14.5	16.3	23.5	27.0	14.6	
Black	10.9**	11.9**	9.3	24.3	24.8**	2.0	
Hispanic	10.6**	13.0	23.3	21.4**	23.3**	8.6	
<i>Public transit commuters</i>							
White	9.0	9.1	0.9	36.5	35.8	-1.9	
Black	7.0**	8.0**	14.4	38.2	38.3**	0.4	
Hispanic	6.8**	9.3	35.7	35.3	39.8**	12.6	

**P < 0.05 (statistically different from whites at the 0.05 level).

Table 3. Linear regressions of average commute distance and time for 1977-78 and 1985

	Commute distance (miles)		Commute time (minutes)	
	1977-78	1985	1977-78	1985
<i>Model</i>				
<i>N</i> =	19 990	23 149	20 159	23 564
<i>R</i> ²	0.0596	0.0448	0.1241	0.0895
Prob > <i>F</i>	0.0001	0.0001	0.0001	0.0001
<i>Independent variables</i>				
Intercept	2.64***	3.39***	9.52***	6.71***
Age (years)	0.24***	0.27***	0.29***	0.44***
Age ² (years)	-0.01***	-0.01***	-0.01***	-0.01***
Annual income (\$1000s)	0.14***	0.06***	0.19***	0.07***
Black (1 = yes)	0.29	0.39	2.42***	2.20***
Education (years)	0.01	0.02	0.03	0.10***
Hispanic (1 = yes)	-0.36	0.14	-0.27	0.27
Minority area (1 = yes)	-1.73***	-2.16***	-0.99***	-1.92***
Mixed area (1 = year)	-0.65***	-0.61***	0.07	0.22
Public transit (1 = yes)	-0.36	-1.40***	17.18***	16.34***
Ride-share (1 = yes)	1.60***	3.15***	3.21***	5.68***
Sex (1 = male)	2.06***	1.91***	2.22***	1.14***

P* < 0.1; *P* < 0.05; ****P* < 0.01.

minutes longer than for white commuters in both 1977-78 and 1985 (Table 3). The average commute times of Hispanics, on the other hand, did not vary significantly from whites in either time period. In both 1977-78 and 1985, the use of public transit added over 15 minutes to the average commute and had by far the largest influence on commute time of any of the independent variables in the models.

The longer average commute times of black workers, while not explained by other independent variables in the models, were not attributable to longer average commute distances relative to whites. Controlling for commute mode, residential area type, income, education, age and sex, race/ethnicity (either black or Hispanic) was not significantly related to commute distance in 1977-78 or in 1985.⁸

Thus, while black commuters experienced slightly longer average commute times than white or Hispanic workers in both 1977-78 and 1985, these differences were attributable to slower average commute speeds among blacks and not to longer relative commute

distances. With few exceptions, and despite the significant social, spatial and economic differences between white, black and Hispanic workers in metropolitan areas, their commute patterns are remarkably similar. Where differences exist, they appear to be explained largely by variations in commute mode. Further, and contrary to a basic premise of the spatial mismatch hypothesis, the commute patterns of white and minority workers appear to be *converging* rather than *diverging* over time. The average commute distance for both black and Hispanic workers did, in fact, increase during the study period, but the average commute distance for white workers increased as well. And while the average commute times of blacks were longer than whites or Hispanics in both time periods, this difference decreased slightly between 1977-78 and 1985.

Commute Patterns among Low-skilled Workers

An important premise of the spatial mismatch hypothesis is that disparities in job

Table 4. Linear regressions of average commute distance and time for 1977–78 and 1985 among low-skilled workers

	Commute distance (miles)		Commute time (minutes)	
	1977–78	1985	1977–78	1985
<i>Model</i>				
<i>N</i> =	3048	3242	3097	3299
<i>R</i> ²	0.0262	0.0324	0.1718	0.1709
Prob > <i>F</i>	0.0001	0.0001	0.0001	0.0001
<i>Independent variables</i>				
Intercept	2.16	3.47**	12.20***	9.33***
Age (years)	0.15***	0.17***	0.16	0.28**
Age ² (years)	-0.01***	-0.01***	-0.01*	-0.01**
Annual income (\$1000s)	0.15**	0.11**	0.20*	0.16**
Black (1 = yes)	0.63	-0.23	3.95***	2.32***
Education (years)	0.13**	0.01	0.03	-0.06
Hispanic (1 = yes)	-0.16	-0.46	0.46	-0.02
Minority area (1 = yes)	-0.40	-0.53	0.40	-0.04
Mixed area (1 = yes)	-0.63*	-0.64*	-0.08	-0.11
Public transit (1 = yes)	-0.25	0.13	16.88***	18.76***
Ride-share (1 = yes)	1.33***	3.63***	2.59***	4.35***
Sex (1 = male)	1.27***	1.30***	1.97***	0.82

P* < 0.1; *P* < 0.05; ****P* < 0.01.

access and commuting between white and minority workers are greatest among workers in low-skilled jobs. To test this part of the hypothesis, we compared the commute patterns of low-skilled whites *vis-à-vis* low-skilled minority workers. After controlling for worker skill level, however, the racial/ethnic patterns in commuting generally mirrored those found in the entire sample.

Table 4 repeats the linear regression models of commute distance and time in both time periods for low-skilled workers only. As with the models in Table 3, race/ethnicity (black or Hispanic) is not significantly correlated with commute distance. And, similar to the models for the entire sample, the variable black does contribute to longer commute times, though this contribution declined by over 50 per cent between 1977–78 and 1985. One significant departure from the models of the entire sample is that residing in minority areas has no influence on the commute distance or time of low-skilled commuters. In a third set of commute time and distance models for high-skilled commuters, which

are not shown here, minority area residence had a strong negative influence on both commute time and distance. These divergent findings may indicate the relative differences in the residential mobility of high- and low-skilled workers; high-skilled workers are more likely to move to or remain in predominantly minority neighbourhoods when such residence offers significant commute time savings.

As with the commute time and distance models for the entire sample, however, we do not see a pattern of longer or increasing commutes among minority workers nor do we see such patterns among workers living in predominantly minority areas.

Spatial Variations in Commute Patterns

The analysis thus far has been largely aspatial; the commute times and distances of white and minority workers may be similar, but the origins and destinations of their commutes are not. A central tenet of the spatial mismatch hypothesis is that workers in predominantly minority areas are particularly

disadvantaged by the dispersion of metropolitan employment, and workers in these areas should be experiencing longer commutes *vis-à-vis* other workers over time. Disaggregating commute patterns by residential area racial/ethnic composition, however, reveals no evidence of increasing commute lengths for black or Hispanic workers living in predominantly minority areas relative to workers in other areas.

Controlling for residential area type, we see little variation in average commute distance among white, black and Hispanic commuters (Table 5). In other words, all workers—white, black and Hispanic—living in predominantly white areas had about the same average commute distance. This pattern held for workers living in mixed and predominantly minority areas as well; in no case was the difference in average commute distance between white, black and Hispanic workers statistically significant at the 0.05 level in 1985.

Further, the average commute distance of workers in primarily minority areas tended to be shorter relative to workers in mixed and predominantly white areas. In both white and mixed areas, the average commute distance of white, black and Hispanic workers was about the same in 1985—11 miles; in minority areas average commute was about 9 miles. Importantly, and contrary to the spatial mismatch hypothesis, the average commute distance for all workers increased faster in white and mixed areas between 1977–78 and 1985 than in minority areas.

Turning to commute time, we see little variance between white and Hispanic commuters, regardless of residential area type. And, in predominantly white areas, the average commute times of white, black and Hispanic workers did not vary significantly in 1977–78 or 1985. In mixed and minority areas, however, black workers had longer average commute times (by 2–6 minutes) than for Hispanics or whites living in the same areas in both 1977–78 and 1985.

Even after controlling for commute mode, black workers driving alone and using public transit had longer average commute times

than whites living in the same area. This pattern was strongest in minority areas (Table 6). These longer average commute times for black workers, however, were not due to longer or increasing commute distances relative to other workers. In general, black workers had shorter average commute distances than whites in both 1977–78 and 1985 (Table 1); controlling for an array of social, economic and geographical explanatory factors in Table 5, there was no statistically significant relationship between race/ethnicity and average commute distance in 1977–78 or in 1985.

Again, this apparent paradox of similar commute distances and slightly longer commute times for black workers in mixed and minority areas is explained by differences in average commute speed between black and white commuters. We would expect that controlling for residential area type and commute mode would have accounted for most of the differences in average commute speed between white and black workers, but some unexplained racial variance remained. These unexplained differences in average commute speed are likely the result of black workers commuting in more congested conditions than similarly situated whites (Goodman and Berkman, 1977), but limitations in our data prevented us from directly testing this hypothesis.

In any case, it would be difficult to argue that these differences in average commute speed are the result of a spatial mismatch because the most explicit measure of space—commute distance—was no longer for blacks than for whites. For example, black workers living in predominantly minority areas who drive alone to work have the same average commute distance (10.2 miles) as white workers living in minority areas who drive alone to work, but the commute times of these black workers are longer by an average of 2.2 minutes. This, in our view, is stronger evidence of a transport mismatch than a spatial mismatch.

The predicted outcomes of a spatial mismatch—longer and increasing commutes for black and Hispanic workers living in pre-

Table 5. Commute distance and time trends by area type by race/ethnicity for 1977-78 and 1985

	Commute distance			Commute time		
	1977-78	1985	Percentage change	1977-8	1985	Percentage change
<i>Commuters from predominantly white areas</i>						
White	10.9	11.9	9.2	22.4	22.4	-0.3
Black	8.9**	11.2	25.8	21.7	22.1	1.9
Hispanic	8.4**	11.1	32.1	20.5	21.6	5.5
<i>Commuters from mixed areas</i>						
White	10.1	11.2	11.2	22.5	22.9	2.1
Black	10.0	11.0	8.5	24.6**	25.7**	4.7
Hispanic	9.5	11.0	16.7	21.3**	22.6	6.0
<i>Commuters from predominantly minority areas</i>						
White	8.1	8.8	7.8	20.1	20.5	2.2
Black	8.9**	9.1	2.7	26.4**	25.6**	-3.1
Hispanic	8.6	9.5	11.2	21.5	21.3	-1.0

**P < 0.05 (statistically different from whites at the 0.05 level).

Table 6. Commute time trends from mixed and predominantly minority areas by commute mode and race/ethnicity for 1977-78 and 1985

	1977-78		1985		Change 1977-78 to 1985	
	Minutes	Difference from White	Minutes	Difference from White	Minutes	Percentage
<i>Drive-alone from minority areas</i>						
White	19.2		19.4		0.2	1.2
Black	22.4**	3.2	21.7**	2.2	-0.8	-3.4
Hispanic	20.0	0.8	19.2	-0.3	-0.8	-4.2
<i>Ride-sharing from minority areas</i>						
White	20.6		24.4		3.8	18.3
Black	25.1**	4.5	24.2	-0.2	-0.9	-3.5
Hispanic	20.1	-0.5	21.9	-2.5	1.8	8.9
<i>Public transit from minority areas</i>						
White	31.9		31.2		-0.7	-2.3
Black	38.7**	6.8	38.2**	7.0	-0.5	-1.4
Hispanic	35.9	4.0	36.6	5.4	0.7	1.9

**p < 0.05 (statistically different from whites at the 0.05 level).

dominantly minority areas—were not supported by this residential area analysis. The average commute distances of workers in minority areas are both shorter and increasing more slowly than for workers in other areas. And, perhaps most importantly, average commute times for black and Hispanic workers in minority areas *decreased* slightly between 1977–78 and 1985.

Longitudinal Examination of Non-moving Commuters

We next examined the commute patterns of workers who could be tracked in both time periods.⁹ This is a useful way of examining the commute patterns of individual workers, particularly the commutes of minority workers living in mixed and predominantly minority areas who were unable (or unwilling) to move in response to metropolitan employment dispersion.

This analysis of the commute patterns of these non-moving workers in 1977–78 and 1985 revealed two general trends: average commute distances were relatively stable over time, while average commute times decreased (Table 7). While white, black and Hispanic workers in this sub-sample experienced declines in average commute time between 1977–78 and 1985, the declines were larger for minority workers than for whites; the average commute time decreased about half a minute for white commuters and about 2 minutes for blacks and Hispanics.

Controlling for commute mode in the longitudinal sample, we again see that public transit commuters fared relatively poorly during the study period. While commuters driving alone and ride-sharing experienced a general pattern of increasing commute distance and decreasing commute time, public transit users, regardless of race/ethnicity, experienced just the opposite: decreasing average commute distance, increasing average commute time, and, hence, decreasing average commute speed.

Breaking this longitudinal sample down by residential area type, we again see no pattern of minority commutes increasing relative to

whites (Table 8). In all cases, the average commute times of black and Hispanic workers decreased, both absolutely and *vis-à-vis* white commuters. Only one of the measured changes in average commute time and distance was statistically significant at the 0.05 level, and that was an estimated commute time *decrease* of 3 minutes for black workers living in racially/ethnically mixed areas.

Commuting and Joblessness

Finally, we noted at the outset that a potential problem with using commute time and distance to measure the spatial mismatch hypothesis is that minority workers may respond to an increasing commute burden by dropping out of the labour market. To test this hypothesis, we compared the commute patterns of workers earning wages in both time periods with those earning wages in 1977–78 but not in 1985. The results were unequivocal; in every case, the average commute times and distances of workers leaving the labour market were, not longer, but shorter than those for workers earning wages in both time periods (Table 9).

To test whether race/ethnicity, commute characteristics, or residential area were significantly related to a worker leaving paid work between 1977–78 and 1985, we performed a series of logistic estimations of the likelihood of leaving paid work (Table 10). The results show that, controlling for age, education, income and sex, minority workers employed in 1977–78 were no more likely to leave paid work by 1985 than white workers.¹⁰ And, while residence in a predominantly minority area was negatively correlated with remaining in the labour force, commute time was positively correlated with remaining employed. In other words, long commutes in this sample *decreased* the probability of leaving paid work between 1977–78 and 1985.¹¹

One possible interpretation of this result, consistent with the spatial mismatch hypothesis, is that workers with shorter commutes were more likely to leave paid work because

Table 7. Longitudinal commute distance and time changes by commute mode between 1977-78 and 1985

	Commute distance			Commute time			Percentage change
	1977-78	1985	Percentage change	1977-78	1985	Percentage change	
<i>All commuters</i>							
White	11.0	11.2	1.8	23.0	22.6	-1.7	
Black	9.7	9.6	-1.0	26.3	24.3**	-7.6	
Hispanic	11.0	10.2	-7.3	22.8	20.9	-8.3	
<i>Drive-alone</i>							
White	11.5	12.1**	5.2	22.7	22.0**	-3.1	
Black	10.1	10.5	4.0	24.3	22.0**	-9.5	
Hispanic	11.5	10.6	-7.8	22.2	19.7**	-11.3	
<i>Ride-share</i>							
White	13.6	14.7**	8.1	26.8	27.8	3.7	
Black	12.1	12.3	1.7	28.1	26.0	-7.5	
Hispanic	11.9	11.9	0.0	22.0	17.8	-19.1	
<i>Public transit</i>							
White	10.4	10.4	0.0	30.6	38.2**	24.8	
Black	8.2	7.0	-14.6	33.9	35.9	5.9	
Hispanic	9.3	9.0	-3.2	24.5	35.3	44.1	

**P < 0.05 (statistically significant change between from 1977-78 at the 0.05 level).

Table 8. Longitudinal commute distance and time changes by area type between 1977-78 and 1985

	Commute time			Commute distance		
	1977-78	1985	Percentage change	1977-78	1985	Percentage change
<i>Predominantly white areas</i>						
White	23.0	22.6	-1.7	11.0	11.2	1.8
Black	22.6	21.9	-3.1	9.3	11.1	19.4
Hispanic	22.6	22.2	-1.8	11.1	11.4	2.7
<i>Mixed areas</i>						
White	23.7	23.0	-3.0	11.1	11.3	1.8
Black	26.0	23.1**	-11.2	10.4	10.2	-1.9
Hispanic	23.6	21.2	-10.2	11.9	11.2	-5.9
<i>Predominantly minority areas</i>						
White	21.0	22.4	6.7	8.6	9.7	12.8
Black	26.7	25.0	-6.4	9.5	9.2	-3.2
Hispanic	21.8	20.4	-6.4	9.4	8.6	-8.5

**P < 0.05 (statistically significant change from 1977-78 at the 0.05 level).

Table 9. A comparison of 1977–78 commute patterns by 1985 labour market status by race/ethnicity

	1977–78 Commute time/distance (employed in 1985)	1977–78 Commute time/distance (no 1985 wages)	Minutes/ miles (+ / -)	Percentage difference
<i>1977–78 Commute time</i>				
White	24.2	22.7	- 1.5	- 6.2
Black	26.5	25.6	- 0.9	- 3.4
Hispanic	23.4	22.8	- 0.6	- 2.6
<i>1977–78 Commute distance</i>				
White	11.8	10.0	- 1.8	- 15.3
Black	10.2	8.9	- 1.3	- 12.7
Hispanic	11.9	9.9	- 2.0	- 16.8

of dispersion of low-skilled jobs to outlying areas. However, we found no statistically significant relationship between commute length and job turnover among black or Hispanic workers or among workers living in predominantly minority areas.

5. Conclusion

In contrast to the aggregate, cross-sectional approach of most previous studies of the spatial mismatch hypothesis, this work has used a unique data set to examine racial/ethnic variations of commuters inside and outside minority neighbourhoods, and to examine the commute patterns of individual minority workers over time. Based on these examinations, we find little evidence in the commuting data presented here to support the spatial mismatch hypothesis.

Contrary to basic tenets of the hypothesis, the average commute times of minority workers were relatively stable or declining between 1977–78 and 1985, and neither average commute times nor distances increased relative to whites over the study period. Further, where longer commutes for minority workers were observed, they were explained by slower commute speeds relative to whites, and not by longer commute distances. Black workers, in particular, were hurt by a high reliance on relatively slow public transit for the journey to work; blacks

were three times more likely than whites to commute on transit, and transit commute times averaged 75 per cent longer than driving alone. Even among low-skilled workers, we found no systematic variation in commute distance by race or ethnicity. The average commute distances of black and Hispanic workers in predominantly minority areas were shorter than for workers in other areas; and, while the average commute distance of minority workers in minority areas has increased over time, the average commute distance for workers living in other areas has increased even faster. Further, between 1977–78 and 1985, the average commute times of black and Hispanic workers in minority areas, despite a growth in average commute distance, actually decreased slightly. Among non-moving commuters examined in both time periods, the average commute times of minority workers decreased both absolutely and relative to white commuters. And finally, commute distance and time were not found to be significantly related to leaving paid work between 1977–78 and 1985.

There did appear to be a mismatch between white and minority commuters during this study period, but a mismatch of commute mode rather than space; workers commuting on public transit had, on average, much longer (75 per cent) commutes than other workers, and minority workers, particularly blacks, were much more likely to depend on public transit. For those commuting

Table 10. Logistic estimations of 1985 labour market status for residents employed in 1977-78 and living in the same residence in 1977-78 and 1985, by race/ethnicity and residential area type

Model (0 = No 1985 income, 1 = Income in 1985)	All	White	Black	Hispanic	White area	Mixed area	Minority area
N =	6520	5567	848	297	2560	3355	961
Somers' D	0.656	0.659	0.634	0.579	0.674	0.643	0.641
P > Chi ²	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
<i>Independent variables</i>							
Intercept	-0.143	0.021	2.081	-1.133	-1.183	0.829	0.625
Age (years)	0.160***	0.144***	0.087	0.281***	0.209***	0.095**	0.161**
Age ² (years)	-0.003***	-0.003***	-0.002***	-0.004***	-0.004***	-0.002***	-0.003***
Annual income (\$1000)	0.004	0.002	0.039**	0.047	0.011	-0.004	0.030**
Black (1 = yes)	-0.070	n/a	n/a	n/a	0.019	-0.159	-0.050
Commute distance (miles)	-0.004	-0.003	-0.014	0.001	-0.001	-0.005	-0.012
Commute time (minutes)	0.008**	0.006	0.012	0.007	0.005	0.011**	0.002
Education (years)	0.056***	0.066***	0.006	0.004	0.047**	0.076***	0.005
Hispanic (1 = yes)	0.008	n/a	n/a	n/a	1.096	-0.095	0.025
Minority area (1 = yes)	-0.247*	-0.280	-0.371	-1.851	n/a	n/a	n/a
Mixed area (1 = yes)	-0.053	-0.036	-0.313	-1.970	n/a	n/a	n/a
Public transit (1 = yes)	0.062	0.177	-0.234	-1.613**	-0.052	0.133	-0.152
Ride-share (1 = yes)	-0.004	0.017	-0.316	0.051	0.157	-0.053	-0.429**
Sex (1 = male)	0.017	-0.003	-0.200	0.612	0.040	0.069	-0.305

*P < 0.1; **P < 0.05; ***P < 0.01.

by private vehicle, the commute patterns of black and Hispanic workers—even those residing in predominantly minority areas—were remarkably similar to whites.

These findings raise some interesting questions for policy-makers. Ongoing metropolitan dispersion of employment has made the private automobile an indispensable employment tool; the data clearly show the difficulty that traditional public transit faces in adequately serving the journey to work. The importance of the automobile in providing employment access to low-skilled, low-waged labour can hardly be overstated; 1990 census data show that nearly 60 per cent of workers living in households in poverty now commute to work alone (Pisarski, 1992). That commuters dependent on public transit are at a distinct disadvantage in accessing employment, especially to dispersed suburban job sites, points to policies to help carless job-seekers get access to automobiles. Yet a number of current transport policies are aimed at improving traditional public transit service between central cities and suburban employment sites and at discouraging single occupant commuting in favour of public transit. Such transit-oriented policies, given the findings here, are not likely to improve the employment outcomes of minority workers.

The differences in employment and income between white and minority workers are clear, while the differences in commute distance are not. If there is a transport component to the mismatch in employment outcomes between white and minority workers, it is a mismatch, not of space, but of commute mode that might be more accurately termed 'the automobile mismatch'.

Notes

1. The metropolitan samples were substantially larger in the 1970s, but financial constraints caused many of the surveyed units to be dropped in the mid 1980s. As a result, the data set used here was limited by the size of the 1985 sample and contains only the 44 086 common units surveyed in both 1977–78 and 1985.

Metro area	1977–78 Sample	1985 Sample
Boston, MA	15000	4000
Dallas, TX	5000	3000
Detroit, MI	14000	7000
Fort Worth, TX	5000	3000
Los Angeles, CA	15000	7000
Minneapolis, MN	5000	4000
Philadelphia, PA (1978)	16000	7000
Phoenix, AZ	6000	4000
San Francisco, CA (1978)	16000	7000
Washington, DC	15000	7000
Total	112000	53000

2. At the time of this study, 1985 was the most recent year that AHS data were available for this cohort of metropolitan areas.
3. Of critical importance here is the location of new low- and moderately-skilled jobs likely to match the skills and experience of minority workers. For example, while the jobs-to-residents ratio in central cities may remain relatively high, the growth and concentration of high-skilled occupations in the central business districts of large cities may well mask a simultaneous dispersion of lower-skilled light manufacturing, warehousing and back-office occupations to the suburbs.
4. The frequently cited central-city/suburb dichotomy does not accurately reflect the spatial distinction between minority workers in urban ghettos and outlying job growth on the suburban fringe. In Los Angeles, for example, Latino residents in East Los Angeles, though only 4 miles from downtown, reside outside the central city and are classified as suburban residents. Latinos in San Pedro on the Palos Verdes Peninsula, some 24 miles from downtown, reside within the Los Angeles city limits and are classified as central-city residents.
5. Relatively higher unemployment levels would result, for example, if the friction of distance to new employment limited information about suburban jobs or if the cost of commuting to and from distant low-wage employment resulted in unacceptably low (or negative) real wages.
6. The racial/ethnic composition of each zone was estimated from the survey data and each zone was designated as follows: 130 zones where 90 per cent or more of the surveyed residents in 1985 were white were classified

as 'white', 59 zones where 50–89 per cent of the surveyed residents in 1985 were white were classified as 'mixed' and 39 zones where 0–49 per cent of the surveyed residents in 1985 were white were classified as 'minority'.

7. For this analysis, the characteristics of each household head in the 1977–78 sample were compared to the first adult listed for the same housing unit in 1985; if the person was the same sex and race in both years, and was either 7, 8 or 9 years older in the 1985 sample, we assumed that this was the same person.
8. The relatively weak explanatory power of these models, particularly for commute distance, demonstrates the difficulty of estimating commute length based on social or demographic factors. This should not be surprising given the complex web of factors that people consider in choosing where to live and where to work. In addition to residential discrimination faced by minority workers, many other factors—housing cost, neighbourhood characteristics, school quality, crime rates, the job locations of two or more workers, the long-run decline in auto and transit out-of-pocket costs, etc.—can induce workers to choose longer commutes. That individuals do not try to minimise commute length is contrary to traditional location theory, which posits that individuals seek some optimal trade-off between housing and commuting costs in choosing where to live (Alonso, 1964). That people may frequently choose longer commutes runs counter to a central premise of the spatial mismatch hypothesis, which is that minority employment outcomes are inversely related to the separation of home and work.
9. This longitudinal sample is limited to commuters living in the same residence in both 1977–78 and 1985.
10. The logistic regressions do show important racial/ethnic variations in the human capital variables (age, education, etc.) between white and minority workers. These findings are consistent with research on racial/ethnic variations in labour force participation and job turnover; in most cases, human capital measures are a better predictor of labour force participation among whites than among blacks or Hispanics (Kletzer, 1994).
11. Because commute distance and time are colinear, each of the logistic estimations in Table 10 was run separately with commute distance excluded as an independent variable and then with commute time excluded. In no case was commute distance or time found to

be significantly related to leaving wage work.

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