



January 2007

# Men, Women, Job Sprawl and Journey to Work in the Philadelphia Region

Rachel Weinberger

*University of Pennsylvania*, [rrw@pobox.com](mailto:rrw@pobox.com)

Follow this and additional works at: [http://repository.upenn.edu/cplan\\_papers](http://repository.upenn.edu/cplan_papers)

---

Weinberger, Rachel, "Men, Women, Job Sprawl and Journey to Work in the Philadelphia Region" (2007). *Departmental Papers (City and Regional Planning)*. 41.

[http://repository.upenn.edu/cplan\\_papers/41](http://repository.upenn.edu/cplan_papers/41)

Postprint version. Published in *Public Works Management and Policy*, Volume 11, Issue 3, January 2007, pages 177-193.

Publisher URL: <http://dx.doi.org/10.1177/1087724X06297345>

This paper is posted at ScholarlyCommons. [http://repository.upenn.edu/cplan\\_papers/41](http://repository.upenn.edu/cplan_papers/41)

For more information, please contact [libraryrepository@pobox.upenn.edu](mailto:libraryrepository@pobox.upenn.edu).

---

# Men, Women, Job Sprawl and Journey to Work in the Philadelphia Region

## **Abstract**

The observation that increasing dispersion of employment opportunities leads to decreased travel times is reflective of a short-rem/phenomenon. Census-reported journey-to-work travel time is examined for the greater Philadelphia region, showing that more people are commuting by automobile, a mode usually associated with shorter journey times, but are reporting longer trip times. The finding is counterintuitive as it coincides with a period when new jobs were established in outlying areas and the region experienced a net loss in jobs. The study concludes that as job opportunities disperse into lower density areas, Philadelphia's existing high-capacity systems are underutilized, and transportation systems throughout the region that were designed for relatively low demand are becoming overwhelmed in time. The net effect is a breakdown of both the urban mass transit systems and the suburban and rural highway networks, the latter because of overuse and the former because of underuse.

## **Comments**

Postprint version. Published in *Public Works Management and Policy*, Volume 11, Issue 3, January 2007, pages 177-193.

Publisher URL: <http://dx.doi.org/10.1177/1087724X06297345>

# MEN, WOMEN, JOB SPRAWL, AND JOURNEY TO WORK IN THE PHILADELPHIA REGION

RACHEL WEINBERGER  
University of Pennsylvania

*The observation that increasing dispersion of employment opportunities leads to decreased travel times is reflective of a short-term phenomenon. Census-reported journey-to-work travel time is examined for the greater Philadelphia region, showing that more people are commuting by automobile, a mode usually associated with shorter journey times, but are reporting longer trip times. The finding is counterintuitive as it coincides with a period when new jobs were established in outlying areas and the region experienced a net loss in jobs. The study concludes that as job opportunities disperse into lower density areas, Philadelphia's existing high-capacity systems are underutilized, and transportation systems throughout the region that were designed for relatively low demand are becoming overwhelmed in time. The net effect is a breakdown of both the urban mass transit systems and the suburban and rural highway networks, the latter because of overuse and the former because of underuse.*

**Keywords:** *travel time; journey to work; job sprawl; transportation planning*

The observation that increasing dispersion of employment opportunities leads to decreased travel times is reflective of a short-term phenomenon. It is an illusory notion. Using the Philadelphia region as a case study, this article documents changes in travel behavior that point to this conclusion. As job opportunities disperse into lower density areas, Philadelphia's existing high-capacity systems are underutilized, and transportation systems throughout the region that were designed for relatively low demand become overwhelmed in time. Philadelphia-region commuters report increased journey-to-work travel times from 1990 to 2000. The finding is counterintuitive as it coincides with a period when new jobs were established in outlying areas and the region experienced a net loss in jobs.

A brief history of cities shows how advances in transportation and communications technology facilitated the growth of cities into regions. In the period prior to the 1850s, most cities were only as big as a reasonable walk to work. For the most part, there was commerce at the city center, and, to a degree, people resided in the residual area around this central business district. Thus, a reasonable walk to work was the same as a reasonable walk to the center. In time, certain businesses moved into the residential areas as well. This development, which moved some jobs out of the center, now made a reasonable walk to work farther out from the center, which expanded the city's boundary. With the introduction of trains and street cars,

*Rachel Weinberger is an assistant professor in urban and regional planning at the University of Pennsylvania. Her work focuses on the use of transportation to facilitate density and on the development of the least resource-intensive transportation systems to achieve local and global community objectives.*

**As job opportunities disperse into lower density areas, Philadelphia's existing high-capacity systems are underutilized, and transportation systems throughout the region that were designed for relatively low demand become overwhelmed in time.**

---

AUTHOR'S NOTE: Thanks to Richardson Dilworth and Scott Gabriel Knowles for inviting me to participate in the Physical Philadelphia Course and for their help with this article. Thanks also to Tara Krueger for her help in researching this article and to the two very conscientious reviewers for their insightful comments and editorial suggestions.

PUBLIC WORKS MANAGEMENT & POLICY, Vol. 11 No. 3, January 2007 1-17

DOI: 10.1177/1087724X06297345

© 2007 Sage Publications

cities expanded further, and many families moved to street-car suburbs. What had previously been a reasonable walk to work became a reasonable journey to work. Both measures of reasonableness were measures of time rather than distance. The two are related, but they are not the same. As before, certain jobs moved to these new suburbs and created new “centers” that created new opportunities for employment and therefore new locations that fit the criteria of a reasonable journey to work. With automobiles—and equally importantly the national highway infrastructure—the reach of a city grew to a reasonable drive.

This pattern persists because it is in the context of journey to work that people make decisions about where to live. Indeed, much of the research in urban economics revolves around the idea that household location decisions are largely driven by access to employment opportunities as people try to minimize the distance (as measured by time) between their homes and their job sites. At the same time, businesses need to locate in such a way that ensures they have access to their suppliers, their customers, and their workers. It is well nigh impossible to answer the question of which came first. However, it is the complex interaction between businesses trying to locate near an adequate workforce and people trying to locate near acceptable employment opportunities that defines one of the key spatial components of human interaction. Variations in urban form are the result of natural regional endowments and myriad public policies including transportation, housing, zoning, and tax policy. These give rise to the physical form of regions. The patterns of development we see today are a result of these interactions.

How these patterns of development affect populations varies across socioeconomic and demographic groups within regions and may well vary across regions. For example, it has long been observed that the time spent in transit from home to work differs between men and women. Explanations for this phenomenon will be reviewed in a later section. Another example, the spatial mismatch hypothesis, posits that transportation and housing policies favored movement to the suburbs by the middle class and that as many jobs followed, poorer people were left in the inner cities. Without spatial access to suburban jobs, those left in the city become poorer still (Kain, 1968). The robustness of that theory depends on the idea that there is spatial segregation in types of jobs and that there are separations in who qualifies for particular jobs.

This article mirrors previous research that sought to understand the gender differences in travel time in terms of the spatial mismatch hypothesis (Chapple & Weinberger, 1998; Weinberger, 2005). The research deconstructs elements of travel time, examining questions of race, income, and industrial segmentation (i.e., the notion that the kinds of industries that typically employ women are distributed differently than those industries that employ men). This is accomplished by contrasting the travel behavior of men and women while controlling for mode choice, personal and household income, and other demographic variables. As an important focus of this research is on the spatial distribution of jobs, the work focuses on Philadelphia, a region recently characterized by job sprawl—only 17% of the employment opportunities in the Philadelphia region are found in Center City, the main central business district (Stoll, 2005).

The findings indicate that spatial patterns of “women’s” work versus “men’s” work do not explain gender differences in travel time in the Philadelphia region. The findings do illustrate that the current trend in spatial distribution of all work is leading to the undesirable condition of increasing travel time per trip, even while fewer trips are being made. The loss of productivity of the transportation system bodes ill for the region’s prospects in maintaining or reestablishing economic advantage. It is of paramount importance to understand how the publicly built environment is used by, and is useful to, different socioeconomic groups so that public policy can be directed in a just and equitable manner.

**The findings do illustrate that the current trend in spatial distribution of all work is leading to the undesirable condition of increasing travel time per trip, even while fewer trips are being made.**

## Literature Review

### THEORY

There is no single overarching theory that works to explain the choices people make with respect to where they live and work. Labor economists, for example, suggest that people will

travel longer distances for greater remuneration—the long trip would not be economically rational for low pay. Urban economists, on the other hand, argue that wealthier people (ostensibly those who have been remunerated better) will outbid their poorer counterparts for housing locations nearer their places of employment, with a resultant shorter travel time.

By and large, it is the case that men's travel time is greater than women's travel time. Two theories have been advanced to explain this discrepancy. The first theory, falling under the rubric of human capital, asserts that women have less earning power than their male counterparts. It is therefore not economically rational for them to travel equal distances for less remuneration (Madden, 1981; Rutherford & Wekerle, 1988; Singell & Lilleydahl, 1986). As women are likely to drop out of the labor market, it is theorized that it is not in the employer's interest to invest in training and other career development that would equalize employment opportunities. Consistent with this theory is the notion that women's primary sphere of responsibility continues to be the home and that women therefore limit the radius of their job searches to areas that would permit them to return home quickly, thus ensuring a shorter journey to work by definition. Some researchers have considered this corollary yet a third theory (cf. MacDonald 1999). The second theory, a labor market segmentation theory, asserts that the spatial distribution of industries that employ women is more dispersed than the distribution of industries that typically employ men. With a more dispersed distribution pattern, the probability that a woman will find a job closer to home is increased (Hanson & Johnston, 1985; Hanson & Pratt, 1995). It is unclear the direction of causality as it may be the case that if women intentionally limit the radius of their job search more so than men, then the jobs that are more dispersed (which are often also lower paying) will be taken by women and thereby become characterized as industries that typically employ women.

### **Empirical Studies of Family Structure and Industrial Segmentation**

The ethnographically driven study by Pratt and Hanson (1991) concludes that suburban women with household responsibilities experienced time constraints that severely restricted their job searches to a small range of local opportunities. Their finding is consistent with other studies that argue women's household responsibilities create time constraints that keep them close to home (e.g., Erickson, 1977; Johnston-Anumonwo, 1992; Madden, 1981; Madden & White, 1980; Preston, McLafferty, & Hamilton, 1993). Madden (1981) showed that men with the longest work trips and women with the shortest both came from two-earner households with children, and she thus suggested that the family structure and division of labor contributes to the disparity in travel time. Singell and Lilleydahl (1986) postulate that men subordinate their housing location decisions to their work locations, whereas women will subordinate their job search to their home location. Others also find that the presence of children is correlated with a reduced trip time for women but not for men (Singell & Lilleydahl, 1986; Turner & Niemeier, 1997). Johnston-Anumonwo (1992) observes that women in two-worker households without children still assume greater household responsibilities and have shorter commutes. Other research challenges this finding. Gordon, Kumar, and Richardson (1989), using the National Personal Transportation Survey as the basis of their analysis, found no relationship between work trip length and presence of children. Similarly, White (1986) and England (1993) found that married women with or without children may have the longest commutes. Finally, Chapple and Weinberger (1998) and Weinberger (2005) showed that women with children aged 5 or younger had the longest commutes among women in their study and that women without any children traveled the least. Women in the San Francisco Bay area who were the only income earners in their households showed no difference in travel time when compared with male sole earners in a study based on 1990 census data (Chapple & Weinberger, 1998), but they showed lower travel times than male sole earners in 2000 (Weinberger, 2005).

Other research explains the different commute times in terms of the location of jobs available to women, which may be more uniformly distributed over the metropolitan area (Blumen

& Kellerman, 1990; Hanson & Johnston, 1985). Jobs available to women may be concentrated in suburban areas, where they are filled by “captive” female labor forces (England, 1993; Nelson, 1986; Rutherford & Wekerle, 1988) and where commute times were at one time observed to be shorter (Giuliano & Small, 1993; Levinson & Kumar, 1994). Other evidence shows that female-dominated industries also concentrate in central business districts, as with clerical work (Hwang & Fitzpatrick, 1992). Hanson and Johnston (1985), looking at the female-dominated administrative support sector and the male-dominated manufacturing sector, found that the female-dominated sector was more evenly distributed spatially. Singell and Lilleydahl (1986) and Hanson and Pratt (1995) found that women in male-dominated industries had commute times of similar length to men. There is evidence that women’s job-search strategies may rely more heavily on spatially situated social networks than their male counterparts (Chapple, 2001; Hanson & Pratt, 1995), thus limiting their radii by default rather than by intention. Although there have been declines in gendered occupational and industrial segmentation, particularly to 1990 (Chapple, 2001; Chapple & Weinberger, 1998), the integration of professions seems to have slowed (Weinberger, 2005).

## **Data and Method**

### **DATA**

The analysis presented in this article is based on the 1990 and 2000 5% Public Use Micro Sample (PUMS) collected and distributed by the U.S. Census Bureau. The PUMS data contain detailed individual household and person data including gender, race, age, travel time to work, transportation mode, occupation, and industry of employment. PUMS data are reported for respondents of the census long form and so contain all of the detail represented by that questionnaire. To protect the privacy and anonymity of the respondents, geographic detail, such as census block group or census tract, is removed. Instead, the records contain unique Public Use Micro Area (PUMA) designations and Place of Work Public Use Micro Area (POWPUMA) designations that identify the place of residence and place of employment for each employed person in the sample. The PUMAs are relatively large aggregations including approximately 100,000 people, which render them less effective as a unit of analysis for this kind of research, but the richness and detail of the PUMS data represent the best opportunity for this kind of comparison. The 9 Philadelphia region counties are represented by 39 PUMAs in 2000 and 35 in 1990. One PUMA was omitted because it is partially contained within Gloucester County but extends well into neighboring Salem County, outside of the greater Philadelphia region. POWPUMAs are typically larger; frequently they are aggregates of several PUMAs.

Records were retained for men and women employed in the regular civilian labor force who both reside and work within the study area. The Philadelphia metropolitan statistical area is rather self-contained; 95% of the resident labor force also works within the 9-county area.

The 1990 data set contains 93,000 records representing 2.25 million people; the 2000 data set contains 83,000 records representing 2.03 million people. This represents about a 1% decline in the region’s labor force.

### **CONSTRUCTED CONTROL VARIABLES**

In addition to the male-female differential, average journey to work travel times vary across at least four other dimensions: race/ethnicity, residential density, household financial responsibility, and a characteristic of industry referred to as sex-based dominance. The first is constructed from two census variables describing race and ethnicity. Race and Spanish origin are defined in five mutually exclusive categories: non-Hispanic White, Black, Asian, Hispanic, and Other. Residential density is defined dichotomously as urban or suburban depending on the density of the PUMA; PUMAs of residential density greater than 3,000 persons per square

mile (1,158 per square kilometer) are considered urban. The income burden variable was developed as a proxy to measure household financial responsibility. Income burden is defined as the individual's income divided by the household's income. Finally, the industry variable is reclassified into one of three groupings: male dominated, female dominated, or neutral. The classification rule considers the proportions of men and women in the labor force and compares it to the proportions of men and women in the industry under consideration. If the ratio of the percentage of women in an industry to the percentage of women in the labor force exceeds the threshold of 1.25, it is considered female dominated; if that same ratio is below 0.75, the industry is considered male dominated. Otherwise, it is considered neutral. The mathematical expression below describes the variable:

$$\text{female dominated if } \frac{\text{Percent women in the industry}}{\text{Percent women in the labor force}} > 1.25;$$

$$\text{male dominated if } \frac{\text{Percent women in the industry}}{\text{Percent women in the labor force}} < 0.75;$$

otherwise neutral.

### **Data Summary and Findings**

#### **LABOR FORCE PARTICIPATION AND EDUCATION**

In the 2000 census, of women older than 16 in the Philadelphia region, 58% described themselves as active participants in the civilian labor force, 4% were unemployed, and 42% described themselves as not in the labor force. Of those who were employed, 69% were in full-time jobs in 1999. Philadelphia men worked at a higher rate: 70% reported being active in the labor force, and 84% of those had full-time employment.

In 2000, residents of the Philadelphia region showed higher levels of educational attainment than in 1990. In 1990, 85% of the Philadelphia area labor force had completed a high school degree or better. Seventeen percent had obtained at least a bachelor's degree, and 10% had a master's, professional degree, or doctorate. By 2000, 20% had bachelor's degrees or better, and 13% held higher degrees.

#### **TRAVEL TIME BY SEX**

The travel time analysis is based on the reportings of full-time workers. Differentiating only on sex of the labor force participant, the analysis indicates that journey to work travel time for both men and women increased during the past 10 years (see Table 1). There are slight but persistent differences of 1.5 minutes in 1990 and 1.0 minute in 2000.

Although the average differences do not appear to represent a meaningful amount of time, the remainder of this article systematically disassembles these averages, shedding light on how different groups of people use the transportation system to accomplish the goal of reaching their work. How people use the system gives us some insight into how well the system works for them.

#### **PLACE OF RESIDENCE AND PLACE OF WORK**

As was true in 1990, the proportionate rates of labor force participation by residence area are very similar for men and women. For example, 5.3% of the labor force resides in the northeastern part of Montgomery County, it is also true that 5.28% of the male participants in the labor force and 5.33% of the female participants live in that same PUMA. An analysis by

**Table 1: Travel Time Difference by Sex, 1990 and 2000**

	<i>Men</i>	<i>Women</i>	<i>Difference</i>
1990	25.3	23.8	1.5
2000	27.3	26.3	1.0
Difference	2.0	2.5	

**Table 2: Most Common Place of Work and Travel Time**

	<i>Percentage Working in POWPUMA</i>				<i>Travel Time</i>			
	<i>1990</i>		<i>2000</i>		<i>1990</i>		<i>2000</i>	
	<i>Men (%)</i>	<i>Women (%)</i>	<i>Men (%)</i>	<i>Women (%)</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Philadelphia County	32.5	32.4	32.5	32.4	30.3	30.0	31.9	32.2
Montgomery County	17.2	16.8	17.2	16.8	24.4	21.7	28.0	26.3
Bucks County	9.6	9.1	9.6	9.1	22.0	18.6	23.7	20.2
Delaware County	8.7	8.8	8.7	8.8	23.7	20.7	25.9	23.7
Mercer (Trenton)	4.1	4.8	4.1	4.8	21.6	20.4	22.9	21.9
Mercer (other)	3.2	3.2	3.2	3.2	24.1	22.6	25.6	23.6

NOTE: POWPUMA = place of work public use micro area.

PUMA shows that the greatest distributional difference is less than 1% in each micro area. But looking at gendered labor force participation by area shows that in 2000, women in the western part of the city of Philadelphia are much more likely to be in the labor force than other women in the region (56% of workers from that part of the region compared to 49% in the entire region are women), and women in Chester County are far less likely to work (39% of the workers from Chester County are women and only 32% from the westernmost PUMA of the county). The 1990 data show some differences as well, but they are not so pronounced. The 1990 labor force in two Philadelphia districts (i.e., two of the same districts identified in the 2000 data, northwest of Center City) shows a greater-than-average labor force participation by women, and several outer suburban areas show a greater-than-average labor force participation by men.

More than 75% of both men and women worked in 6 of 21 POWPUMAs in 1990. That proportion increased to more than 80% in 2000. Because Philadelphia, and Center City in particular, lost jobs,<sup>1</sup> what could seem like a concentrating trend in fact represents increasing geographic dispersion in the region. Table 2 lists the six most popular workplace destinations.

With the exception of women working in Philadelphia who reported longer commutes than men in 2000 (regardless of where they live), every other POWPUMA shows women reporting shorter commutes. The greatest differences are in the most suburban areas, with Bucks County residents showing a gender differential of almost 3.5 minutes in 1990 and workers in Delaware County showing a 3.0 minute differential. The 2000 data are aggregated to match the 1990 POWPUMAs, but further disaggregation shows differences in 2000 as great as 5.5 minutes in the southeastern part of Bucks County and 4.5 minutes in the southwestern part of Montgomery County.

Consistent with the theory that women's work is distributed more evenly with the population, the distribution of men and women who work and reside in the same POWPUMA is such that, overall, women are far more likely than men to work within the same POWPUMA where they live. In 1990, 59% of men lived in the same POWPUMA where they worked, whereas 67% of women could make the same claim. By 2000, the percentage had dropped for both sexes, but the trend remained. Men worked and lived in the same area 45% of the time, whereas women did so 57% of the time. For every POWPUMA, in both censuses (except one in 1990), women were more likely than men to work in the same POWPUMA where they lived. Table 3 shows



**Table 3: People Living and Working in the Same Area by County**

County	Percentage Working in Their County of Residence			
	1990		2000	
	Men (%)	Women (%)	Men (%)	Women (%)
Philadelphia	78	84	75	79
Chester	62	73	68	74
Mercer	50	56	59	64
Delaware	54	62	44	48
Montgomery	64	72	40	48
Bucks	54	65	41	47
Gloucester	31	48	38	47
Burlington	49	55	38	41
Camden	32	38	27	31

**Table 4: People Living and Working in the Same Area by County: Travel Time (TT) Differences Across Time and Gender**

County	TT				TT Differences Across Time		TT Differences Across Gender	
	1990		2000		2000—1990		Men's TT— Women's TT	
	Men	Women	Men	Women	Men	Women	1990	2000
Philadelphia	26.4	27.6	27.7	29.3	1.4	1.7	-1.2	-1.6
Chester	19.2	18.8	21.5	20.7	2.3	2.0	0.4	0.8
Mercer	16.3	15.7	16.8	16.0	0.5	0.4	0.7	0.8
Delaware	18.5	18.0	19.4	17.5	1.0	-0.6	0.4	2.0
Montgomery	18.8	17.2	17.2	15.8	-1.7	-1.4	1.6	1.4
Bucks	17.9	15.9	18.3	15.6	0.4	-0.3	2.0	2.7
Gloucester	13.2	11.2	13.7	12.5	0.5	1.3	2.0	1.1
Burlington	13.9	13.2	16.7	15.6	2.8	2.4	0.7	1.1
Camden	14.6	13.4	17.6	14.9	3.0	1.6	1.2	2.7

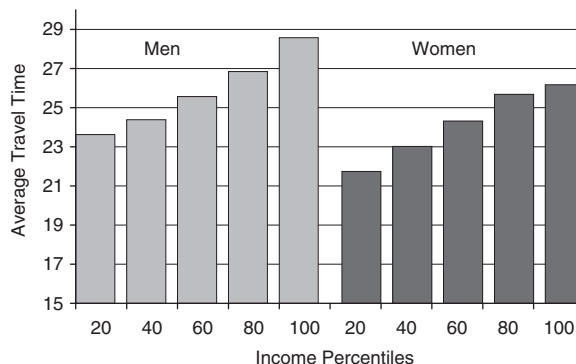
the proportion of men and women who live and work within the same area, with the results aggregated to county levels. Table 4 shows the differences in travel time across sex and time (1990 to 2000) for people who both live and work within the same POWPUMA.

From 1990 to 2000, women who both lived and worked in Delaware County, Montgomery County, and Bucks County and men who lived in Montgomery County reported a shorter travel time to work. Travel times for most men and women (83% and 70% of the samples, respectively), however, are longer.

### INCOME AND FAMILY STRUCTURE

*Income.* Looking at average travel time by income in quintiles in 1990, both women and men increased their travel time as their personal wage income increased. In 2000, the pattern is less clear. Although women's travel time still increases with income, men's is shortest for wage earners in the second quintile, and for both sexes the range is cut nearly in half. Where there had been a 5.0 minute average difference between the highest and lowest earners in 1990, the difference was reduced to just less than 3.0 minutes for men and to 3.4 minutes from the highest women earners to the lowest. This observation, illustrated in Figure 1, begins to undermine the idea that remuneration will continue to be a reliable indicator of travel time.

1990



2000

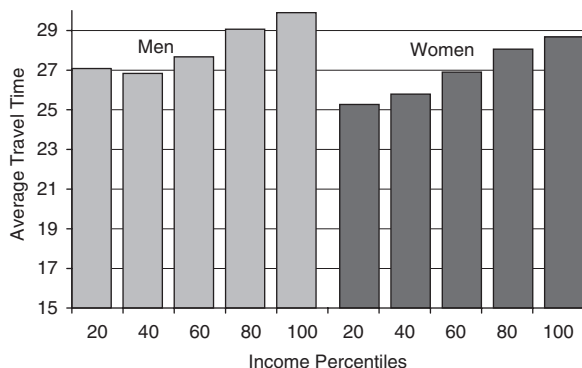
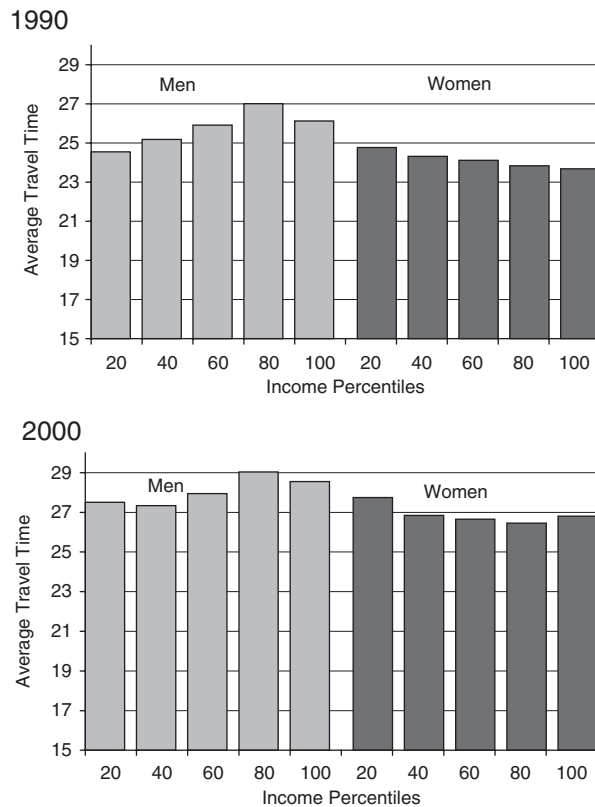


Figure 1: Travel Time by Wage Income, 1990 and 2000

Household income is a poorer predictor of travel time. Figure 2 shows that women's travel time tends to decrease with an increase in household income, and men's travel time tends to increase. The trend is clear, but there are important exceptions. For example, men in the highest earning households have a lower travel time than men in the next lower income bracket, and women in the highest income bracket can expect to travel longer than most other women, the exception being women in the poorest income bracket. This could suggest that as household income increases, given that men are still typically the primary bread winners,<sup>2</sup> women's financial contributions become less critical, allowing women to be more selective in the jobs they take. If their job location requires a long commute, they may have more flexibility in their choice of whether or not to take the position or look for a different job that better meets their location criterion. This finding supports the idea that women, for whom household responsibility is primary, are more likely to limit their job search radii.

This is only true for those who are secondary earners. Indeed, the difference in travel time persists but becomes much smaller as women's and men's responsibility for their household's income increases. In 2000, the difference in travel time between men and women who were the only income earners in their households was negligibly different at 10 seconds.

*Family structure.* Historically, the presence or absence of children has been looked at to establish household responsibility. Counter to the theory that women with young children would limit their job searches, in 1990 and 2000 both men and women with small children



**Figure 2: Travel Time by Household Income, 1990 and 2000**

(younger than 5 years old), on average, report a longer commute than people with no children home or only children 5 years old or older. In fact, people without children, on average, report the shortest journey to work.

Women with full responsibility for their household's income and who had small children reported a much longer journey to work than their counterparts with no children; approximately 8.0 minutes of difference is reported in both years, with a 3-minute increase overall for these women from 1990 to 2000. Journey to work for men who had full responsibility for their household's income and small children was slightly higher than journey to work for men who had no children, less than 0.5 minutes difference in 1990 and just more than 3.0 minutes in 2000. However, these men's travel times were much lower than the travel time of their female counterparts, who had a 7.0 and 5.0 minute longer commute in 1990 and 2000, respectively. The differences in travel time by household financial responsibility and presence and age of children for 2000 are shown in Table 5.

Women with no children in all wage income brackets have shorter journeys to work than women with children. Women with children younger than 5 at home, in all income brackets, have longer journeys to work than women with only children older than 5. Men in the highest earning bracket with small children at home have longer commutes than other men, but there is no real pattern that distinguishes men with young children from other men. Travel time by wage income and presence of children for men and women is shown in Table 6. The table shows only data for 2000.

One of the confounding factors is that suburbanites, who travel shorter distances than their urban counterparts, tend to make up a large proportion of childless families. A detailed analysis

**Women with full responsibility for their household's income and who had small children reported a much longer journey to work than their counterparts with no children.**

**Table 5: Travel Time by Presence of Children, Household Financial Responsibility, and Sex**

<i>Share of Household Income</i>	<i>Men</i>			<i>Women</i>		
	<i>Full</i>	<i>Less Than Half</i>	<i>More Than Half, Not All</i>	<i>Full</i>	<i>Less Than Half</i>	<i>More Than Half, Not All</i>
	No children	26.7	27.1	28.1	27.6	25.4
Children younger than 5 only	30.0	30.3	30.4	35.3	29.8	29.3
Children in both ages	28.8	28.7	30.0	34.1	28.5	30.5
Children 5 or older only	28.6	28.2	29.0	30.8	25.5	29.4
Total	27.3	27.5	28.7	28.7	25.8	28.1

**Table 6: Travel Time by Presence and Age of Children and Wage Income Quintile, 2000**

<i>Wage Income Quintile</i>	<i>Men</i>					<i>Women</i>				
	<i>0-20</i>	<i>21-40</i>	<i>41-60</i>	<i>61-80</i>	<i>81-100</i>	<i>0-20</i>	<i>21-40</i>	<i>41-60</i>	<i>61-80</i>	<i>81-100</i>
	No children	26.6	26.7	27.7	28.5	28.8	24.5	25.0	26.5	27.6
Children younger than 5 only	30.1	26.1	28.7	32.2	33.0	28.4	30.6	29.2	31.6	31.0
Children in both ages	28.1	28.8	26.1	30.4	32.5	28.6	29.9	29.1	30.1	31.8
Children 5 or older only	28.0	27.1	27.8	29.1	30.5	26.0	26.2	27.4	28.3	28.9
Total	27.1	26.8	27.7	29.1	29.9	25.3	25.8	26.9	28.1	28.7

indicates that households with children only younger than 5 are equally likely to live in urban as suburban PUMAs. Workers in households with no children are more likely to live in suburban PUMAs (69% of suburbanites in the labor force reported having no children vs. 60% of urbanites, and 62% of workers with no children reported living in the suburbs vs. 48% in the urban PUMAs). Households with children between 5 and 17 years old are more likely to live in the suburbs (53%), but workers in higher density PUMAs are more likely to report having children (39% vs. 32%). The disproportionately high number of childless families in the suburbs is counter to the usual assumption that families with children will move to suburbs where they are likely to find better schools.

#### INDUSTRIAL SEGMENTATION

In 2000, there were 128 industries classified as male dominated, 95 neutral industries, and 44 female dominated industries. These numbers are only slightly different from 1990, when there were 120 male-dominated, 70 neutral, and 46 female-dominated industries. Typical female-dominated industries include elementary and secondary schools, hospitals, insurance carriers, physicians' offices, nursing care facilities, banks, department stores, and child care services, all of which tend to collocate with population. These 8 industries employed 126,000 men and 352,000 women in the Philadelphia region in 2000. Typical male-dominated industries include construction; public order/public safety; computer systems design; automotive repair and maintenance; architectural, engineering, and related services; automobile dealers; trucking; and postal service. These 8 industries employed 234,000 men and 60,000 women in 2000.

The distribution of workers among male-dominated, female-dominated, and neutral industries is very even in the Philadelphia region, with 35% of the labor force employed in neutral

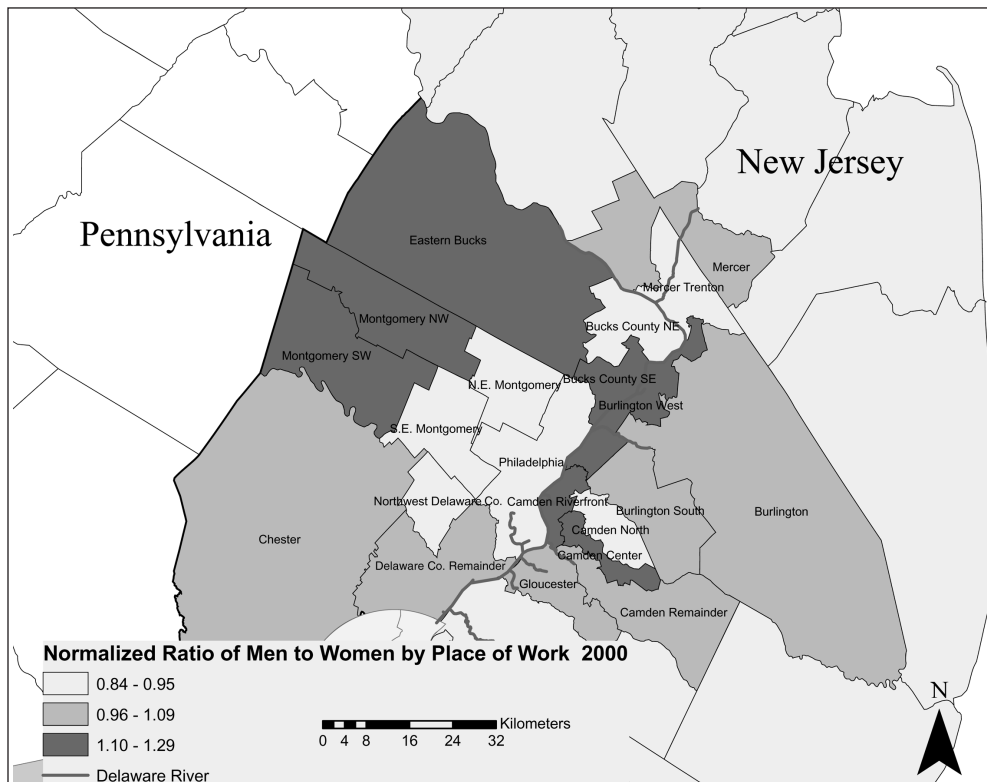


Figure 3: Normalized Ratio of Men to Women by Place of Work

industries, 34% in female-dominated industries, and 32% in male-dominated industries.<sup>3</sup> The 1990 distribution was equally flat.

Where the regional employment opportunities are located, and how these industries are distributed geographically, should begin to tell the story of why average commute times for men and women differ. Female-dominated industries are in fact well distributed throughout the region. There are slight concentrations of employment in female-dominated industries (by both men and women) in the northeast POWPUMA of Bucks County, in the north part of Camden County, in northeastern Montgomery, and in Philadelphia (where women are over-represented in the labor force). On the other hand, male-dominated industries are concentrated along the waterfront in the POWPUMAs identified as Southeastern Bucks County, Western Burlington County, and along the Camden Riverfront. In all, 30% of the jobs held by residents of the region are in Philadelphia. Another 30% are in 9 POWPUMAs that have disproportionately high concentrations of male-dominated industries. This pattern is illustrated in Figure 3. Because men's jobs are more highly concentrated while their residences are equally distributed, they should by definition have to travel longer to reach their job sites.

Reported travel time data tell another story, however. Whether employed in male-dominated, neutral, or female-dominated industries, women still have shorter travel times than men. The gap narrowed by 2000, but this evidence suggests that sex membership trumps industry type as a determinant of travel time. Ironically, both men and women employed in female-dominated industries showed higher travel times than those employed in male-dominated industries. Contrary to expectations, in 2000, men's travel time decreased by industry classification in the order of female dominated, neutral, and male dominated; in 1990, the sequence was female dominated, male dominated, and neutral. For women, the

**Because men's jobs are more highly concentrated while their residences are equally distributed, they should by definition have to travel longer to reach their job sites.**

**Table 7: Travel Time by Race and Sex, 1990 and 2000**

	1990			2000		
	Men	Women	Difference	Men	Women	Difference
White	25.2	22.7	2.5	27.5	25.4	2.1
Black	29.2	29.5	-0.3	32.0	32.4	-0.4
Asian	28.2	26.6	1.6	28.3	26.7	1.7
Hispanic	23.6	22.3	1.3	28.0	26.6	1.3
Other	26.2	24.3	1.9	26.7	25.9	0.9
Total	25.8	24.2	1.6	28.1	26.9	1.2

NOTE: All differences are significant at  $p < .0001$ .

2000 ordering was neutral, female dominated, and male dominated. This order was a change from 1990, when women's longest trips were to jobs in neutral industries, male-dominated industries, and finally female-dominated industries.

#### CONTROL VARIABLES: TRAVEL TIME BY RACE, MODE, RESIDENTIAL DENSITY, AND INCOME

The previous sections analyzed travel time by income, family structure, and industrial segmentation. The next sections review these analyses controlling for race, mode choice, residential density, and income.

*Race.* Differences by race show that African American women had the longest travel time in both census years. These women had an average commute of 29.5 minutes in 1990 and 32.4 minutes in 2000. After African American women, the group with the greatest commute time was African American men, with commutes of 29.2 and 32.0 minutes in 1990 and 2000. The greatest travel time differences in both years were between White men and women, at 2.5 and 2.1 minutes in 1990 and 2000, respectively. Table 7 shows travel time by men and women by race.

The finding that African American men and women travel on average 5 and 7 minutes longer than White men and women suggests that African Americans do not have equal access to housing opportunities or job opportunities or both in the Philadelphia region.

*Mode.* Although the numbers of both men and women commuting by automobile have dropped between 1990 and 2000, the proportion of both groups using automobiles for their journey to work has increased. Women are more likely to use public transit. Of women, 15% used transit to arrive at work in 1990, compared to 9% of men; in 2000, it was 12% of women and 8% of men. Not surprisingly, people who commute by public transportation have longer journeys than those who travel by automobile, but even with this difference women are still tending to have lower travel times. Table 8 shows mode choice in the two time periods. Table 9 shows travel times by mode.

*Density and mode.* People residing in urban PUMAs, those that are a density greater than 3000 persons per square mile, tend to have a longer travel time than their neighbors in less dense areas. The difference is derived to some degree from the differences in mode and race. The average difference is 2.6 minutes, but it is greater between women than men. Urban women travel on average over 4 minutes more than their suburban counterparts. The difference in men's travel is less than half that at 1.5 minutes. Difference in travel time for auto commuters is as little as 1.2 minutes, but suburban residents who travel by public transit have a considerably longer trip, traveling on average over 51 minutes to work compared to their urban counterparts who travel just under 43 minutes. Urban and suburban cyclists travel about the same time, but urban walkers are typically willing to walk about 4 minutes longer than their suburban counterparts. While suburban women typically make shorter trips than suburban men, the case is reversed for urban women who have slightly higher travel times than do urban men. Ironically, because African American women tend to have the longest travel times, and

**The finding that African American men and women travel on average 5 and 7 minutes longer than White men and women suggests that African Americans do not have equal access to housing opportunities or job opportunities or both in the Philadelphia region.**

**Table 8: Mode Choice**

	1990		2000	
	Men (%)	Women (%)	Men (%)	Women (%)
Automobile	84	78	85	81
Public transit	9	15	8	12
Other	7	7	7	7
Total	1,005,924	665,132	943,214	696,131

**Table 9: Travel Time by Mode**

	1990			2000		
	Men	Women	Difference	Men	Women	Difference
Automobile	24.9	22.0	2.8	27.1	25.0	2.2
Public transit	41.9	39.3	2.5	46.1	43.8	2.3
Other	10.3	10.0	0.3	9.5	9.3	0.2
Total	25.3	23.8	1.5	27.3	26.3	1.0

they tend to live in Philadelphia, the densest part of the region, this difference may be better explained by race than the choice of an urban versus suburban domicile.

*Mode, race, and income.* A comparison along the dimensions of mode, race, and income shows that for automobile and public transport users, in the high- and low-income quintiles, men's travel times are longer than women's, with one exception. Hispanic women on public transportation in both income quintiles have longer travel times than their male counterparts. However, the sample size for this subset is quite small, and so no inference is made. Similarly, when comparing high- and low-income earners who drive, within all race/ethnicity groups, the higher-income groups have a longer travel time. Again with one exception, low income Black women have a slightly longer travel time than Black women in the high-income quintile. There is a statistical difference between high-income Black men and women on public transit, but the travel time varies by less than 1 minute, rendering the difference relatively meaningless. These differences are shown in Table 10.

## REGRESSION

To understand how these variables interact with each other to explain travel time, four ordinary least squares regression models were estimated to explain men's and women's travel time in 1990 and 2000. The models included variables to represent age, personal salary or wage income, share of responsibility for household income, number of children in the household, number of children younger than 5 in the household, two dummy variables to represent travel mode to work, two dummies to represent race, and the industry dominance index variable. As shown in Table 11, the models best explained women's travel behavior in 1990 and 2000, with some loss in explanatory power for men in 1990. The model performed most poorly for men in 2000.

Table 12 shows the standardized coefficients for the model variables. The table shows some things that are expected a priori but also gives evidence that the region is changing. Age is associated with a decrease in travel time—as we get older our journeys to work can be shorter—in three of the models, but it is associated with an increase in travel time for men. The number of hours worked per week is negatively associated with travel time—an unexpected result—with an inconsistent sign; in 2000, women traveled longer distances to work when they worked fewer hours. Salary income, responsibility for household income, and homeownership are consistently positively associated with increased travel times. Number of

**Table 10: Travel Time by Mode, Race, and Income**

Race/Ethnicity	Income Quintile	Men	Women	Differences		
				Across Gender	Across Income (women)	Across Income (men)
Public transportation						
Non-Hispanic White	Low	41.7	39.9	1.80	8.8	7.9
	High	49.6	48.7	0.90		
Black	Low	46.8	43.8	3.03	-0.7	2.0
	High	48.8	43.1	5.70		
Asian	Low	45.7	39.6	6.12	2.6	8.5
	High	54.2	42.2	12.00		
Hispanic	Low	38.4	44.8	-6.43	30.2	4.5
	High	42.9	75.0 <sup>a</sup>	32.1		
Automobile						
Non-Hispanic White	Low	25.1	21.3	3.80	5.8	3.9
	High	29.0	27.1	1.90		
Black	Low	28.8	26.7	2.10	2.3	0.8
	High	29.6	29.0	0.60		
Asian	Low	27.3	23.5	3.80	3.1	-0.3
	High	27.0	26.6	0.40		
Hispanic	Low	29.0	22.6	6.40	2.3	-2.4
	High	26.6	24.9	1.70		

NOTE: All differences are significant at  $p < .001$ .

a. Based on a very small subsample.

**Table 11: Regression Results (Explanatory Power)**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	SE
1990 men	.397	.157	.157	15.779
1990 women	.469	.220	.220	14.752
2000 men	.374	.140	.140	18.233
2000 women	.425	.181	.181	17.401

small children increases travel time; number of children decreases travel time except for men in 1990. The industry dominance index is negatively associated with travel time, but in the case of Philadelphia the causality is unclear. The two modal dummy variables are consistent across the models adding to one's travel time relative to bike and walk modes. Finally, the two race dummy variables have consistent signs across the models; White people tend to have shorter travel times than do African Americans.

The estimated parameters are given in Table 13, but it is the standardized coefficients that give the greatest insight into the importance of the factors. The two mode dummy variables make the greatest contribution to explaining travel time in all of these models. But race in 2000, for both men and women, begins to be a very important predictor. In those models, the dummy race variable (1 = African American) ranks third in importance. For women in the 1990 model, the race variable ranked fourth after salary income. The industry dominance variable, although consistent with the earlier findings, does not prove to be among the most important variables in any of the four models.

**As jobs move out of Philadelphia into a more dispersed area, there is an overall greater distribution of job opportunities for men and women.**

**Conclusion**

The evidence presented suggests that the travel time “advantage” that women have maintained is eroding for multiple reasons. As jobs move out of Philadelphia into a more dispersed



**Table 12: Standardized Coefficients**

	1990		2000	
	Men	Women	Men	Women
Age	0.001	-0.033	-0.016	-0.052
Hours worked per week	-0.043	-0.018	-0.007	0.010
Salary income	0.047	0.075	0.025	0.054
Responsibility for household income	0.033	0.041	0.013	0.030
Number of children	0.025	-0.032	-0.008	-0.027
Number of small children	0.000	0.026	0.022	0.030
Mode dummy (auto)	0.303	0.293	0.326	0.333
Mode dummy (public transit)	0.525	0.624	0.497	0.589
Industry dominance index	-0.004	-0.014	-0.010	-0.023
Home ownership	0.045	0.026	0.036	0.026
Race dummy White	-0.041	-0.034	-0.009	-0.028
Race dummy African American	0.012	0.045	0.045	0.056

**Table 13: Estimated Parameters**

	1990		2000	
	Men	Women	Men	Women
Constant	13.239	12.914	10.207	11.032
Age	0.002	-0.045	-0.026	-0.085
Hours worked per week	-0.089	-0.052	-0.017	0.028
Salary income (000)	0.027	0.083	0.009	0.036
Responsibility for household income	1.996	2.350	0.963	2.022
Number of children	0.367	-0.511	-0.131	-0.480
Number of small children	-0.002	1.163	0.865	1.456
Mode dummy (auto)	13.635	11.278	17.419	15.630
Mode dummy (public transit)	29.780	27.250	34.936	32.284
Industry dominance index	-0.152	-0.560	-0.471	-1.116
Home ownership	1.831	0.982	1.656	1.128
Race dummy White	-1.829	-1.294	-0.429	-1.174
Race dummy African American	0.572	1.833	2.580	2.641

area, there is an overall greater distribution of job opportunities for men and women. Thus, men are increasingly finding work within their counties (and county subdivisions) of residence. Women continue to make inroads into employment sectors that have been previously closed to them. This combination of factors brings travel time by sex into closer alignment.

Yet perhaps alarmingly, the region is registering increases in travel time. The average 2.45 minute increase in travel time is consistent with our experience of increasing congestion. However, it is inconsistent with increases in auto mode share as auto users historically have had lower travel times than users of public transportation. Furthermore, it should call into question why, in a region that is losing jobs, there would be increased congestion.

The answer lies in the distributional pattern of jobs and the adequacy of the transportation system to bring workers to them. As extensions to the transportation system have increased accessibility to outlying areas, there has been a shift of activity. Jobs and, in turn, housing shift to what appear to be equally accessible areas. Yet as these shifts in activity overwhelm existing capacity, the short-term gains are quickly erased. Montgomery County, for example, which experienced a marked increase in jobs and where both men and women showed decreases of within-county travel time, is very likely using inherited capacity. If the trend in job growth continues, travel time will increase in Montgomery County as it has throughout the region.

The difficulty in confronting this trend is exacerbated by the fact that there is a gap between the levels of travel demand that can be best served by high-capacity modes and those better served by private automobiles. Demand in the lower density outlying areas is too great to be well served by private autos yet not great enough to require high-capacity solutions. By continuing the pattern of jobs following housing and housing following jobs outward to the farther reaches of the region, we can continue to take advantage of unused or inherited capacity, but only for a very short amount of time. Indeed, it is that approach that has led to huge increases in land consumption in Pennsylvania with very little population growth.

A regional strategy to refocus development in the core—which can be well served by high-capacity transit alternatives—will accommodate new growth, relieve existing pressure on the highway and road system, and help protect the region's open space resources.

### Notes

1. Of the 223,000 jobs lost, 41% were lost in Philadelphia County.
2. In 1990, among full-time employed members of the labor force, men earned 152% of women's salary. Women caught up a bit by 2000, at which time men earned 143% of women's salary.
3. This stands in sharp contrast to the distribution of workers in the San Francisco Bay area, where more than 46% of the labor force is in neutral industries, with the remainder split fairly evenly between male-dominated and female-dominated industries (Weinberger, 2005).

### References

- Blumen, O., & Kellerman, A. (1990). Gender differences in commuting distance, residence and employment location. *Professional Geographer*, 42, 54-71.
- Chapple, K. (2001). Out of touch of bounds: How job search strategies shape the labor market radii of women on welfare in San Francisco. *Urban Geography*, 22, 617-640.
- Chapple, K., & Weinberger, R. (1998). Is shorter better? An analysis of gender, race, and industrial segmentation in San Francisco Bay area commuting patterns. In *Women's Travel Issues: Proceedings from the Second National Conference* (pp. 409-423). Washington, DC: U.S. Department of Transportation.
- England, K. (1993). Suburban pink collar ghettos: The spatial entrapment of women? *Annals of the Association of American Geographers*, 83, 225-242.
- Erickson, J. (1977). An analysis of the journey to work for women. *Social Problems*, 24, 428-435.
- Giuliano, G., & Small, K. (1993). Is the journey to work explained by urban structure? *Urban Studies*, 30, 1485-1500.
- Gordon, P., Kumar, A., & Richardson, H. (1989). Gender differences in metropolitan travel behavior. *Regional Studies*, 23, 499-510.
- Hanson, S., & Johnston, I. (1985). Gender differences in work-trip length: Explanations and implications. *Urban Geography*, 6, 193-219.
- Hanson, S., & Pratt, G. (1995). *Gender, work and space*. New York: Routledge.
- Hwang, S.-S., & Fitzpatrick, K. (1992). The effects of occupational sex segregation and the spatial distribution of jobs on commuting patterns. *Social Science Quarterly*, 73, 550-564.
- Johnston-Anumonwo, I. (1992). The influence of household type on gender differences in work trip distance. *Professional Geographer*, 44, 161-169.
- Kain, J. F. (1968). Housing segregation, Negro employment, and metropolitan decentralization. *Quarterly Journal of Economics*, 82, 2.
- Levinson, D., & Kumar, A. (1994). The rational locator. *Journal of the American Planning Association*, 60, 319-333.
- MacDonald, H. (1999). Women's employment and commuting: Explaining the links. *Journal of Planning Literature*, 13, 267-283.
- Madden, J. (1981). Why women work closer to home. *Urban Studies*, 18, 181-194.
- Madden, J., & White, M. (1980). Spatial implications of increases in the female labor force: A theoretical and empirical synthesis. *Land Economics*, 56, 432-446.
- Nelson, K. (1986). Labor demand, labor supply and the suburbanization of low-wage office work. In A. J. Scott & M. Storper (Eds.), *Production, work, territory: The geographical anatomy of industrial capitalism* (pp. 149-171). Boston: Allen and Unwin.
- Pratt, G., & Hanson, S. (1991). Time, space and the occupational segregation of women. *Geoforum*, 22, 149-157.
- Preston, V., McLafferty, S., Hamilton, E. (1993). The impact of family status on Black, White, and Hispanic women's commuting. *Urban Geography*, 14, 228-250.

- Rutherford, B., & Wekerle, G. (1988). Captive rider, captive labor: Spatial constraints on women's employment. *Urban Geography*, 9, 116-137.
- Singell, L. D., & Lilleydahl, J. (1986). An empirical analysis of the commute to work patterns of males and females in two-earner households. *Urban Studies*, 24, 119-129.
- Stoll, M. (2005). *Job sprawl and the spatial mismatch between Blacks and jobs*. Washington, DC: Brookings Institution.
- Turner, T., & Niemeier, D. (1997). Travel to work and household responsibility: New evidence. *Transportation*, 24, 397-419.
- Weinberger, R. (2005, January). *Is shorter still better? An updated analysis of gender, race, and industrial segregation in San Francisco Bay area commuting patterns*. Paper presented at the 85th annual meeting of the Transportation Research Board, Washington, DC.
- White, M. J. (1986). Sex differences in urban commuting patterns. *American Economic Review*, 76, 368-373.