Home Relocation and the Journey to Work

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Abstract

Relocation decisions are complex. Each household has a bundle of attributes that make a location attractive to it, including the ability to access different activity locations easily, neighborhood quality, house amenities etc. Relocating households have an opportunity to find housing closer to their work. Using data collected in the Twin Cities area, we investigate how distance to home and travel time to home change among individuals who have changed their residence since they started their current job. Comparing the home-to-work distance after the move to the previous-home-to-work distance, we find that the average home to work distance is reduced as a result of the move. We also find that the reduction depend on the previous home to work distance as well as the previous homes' proximity to downtown Minneapolis. The findings show that households that are either very close to their work, or very close to downtown, or both did not significantly increase or decrease their commute after relocation. This suggests that access to work as well as access to the opportunities that proximity to downtown offers (to jobs, urban spaces, etc.) are important in the decision making process.

Introduction

Relocation decisions are complex. Each household has a bundle of attributes that make a location attractive to it, including the ease with which other activity locations can be accessed, the neighborhood quality, house amenities etc. Early models of urban structure framed the question of where people locate using a monocentric city model where location decisions are then framed as tradeoffs between transportation costs to jobs at the center and land costs (1; 9; 12). Cities have always been much more complex than these models, and recent changes include suburban jobs increasing job accessibility of far out suburbs. Residential preferences also look beyond access to jobs, to neighborhood quality, school district, attributes of the home and so on; qualities which are not necessarily dependent on access to jobs. But in spite of these other considerations, studies

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have shown some stability in travel time expenditures (7; 15) making the home-work connection an interesting area of study.

Central to the home - work connection is the decision by individuals and households on where to live and where to accept employment. While in most cases home choice and work choice are done at different time points, over the life of the individual, adjustments to the commute by relocating homes and/or by relocating jobs are common. The behaviorial questions surrounding the location decisions are complex. It is our interest in this study to investigate what the work-home commute outcomes are during relocation and what they tell us about the relocator's motives.

The stability of travel times over a long period of time is observed as the employment landscape in major metropolitan areas has been changing by suburbanizing jobs and housing. This stability has been explained as arising from rational location decisions both by firms and individuals to keep travel time constant (7). Levinson (5) has also posited that the increasing accessibility that arises from jobs that have followed suburbanizing homes has helped create this stability.

The stability of travel times has been used to support the existence of a travel time budget (15). The travel time budget hypothesis is that individuals have a set amount of time allocated to travel per day. It implies that rising congestion, which leads to decreases in travel speed, would reduce the time allocated to travel to discretionary activities, or shorten distances. Individuals can change activity locations so as to reduce travel time in one sphere to use it in another. Commuting decisions for instance that seek to reduce or maintain travel time in the face of rising congestion, would allow for stability in the time allocated for travel for other activities. In the context of relocation decisions then, intolerance to exceeding the budget would lead relocators to maintain (or reduce) their commute time so that the time budget for other activities is maintained as well (or increased). In their review of the literature on Travel Time Budget, Mokhtarian and Chen (10) call the idea of a travel time budget a theme that is persistent in the literature but elusive to pinpoint.

A position forwarded by Redmond and Mokhtarian (13), has been that people do not necessarily try to reduce travel time but have preferences for particular commuting times. This view holds that commuting has positive utiltiy components that arise from traveling and activities that can be accomplished while traveling. Mokhtarian and Salomon (11) also present that individuals have an ideal travel time which varies by person and individuals adjust their travel so as to increase or decrease their travel time to meet this ideal. If true, relocation decisions would seek to maintain (not reduce) as travel time increases due to increasing congestion provided the initial conditions were idea.

Studies have also looked at whether relocation decisions have changed the home the home to work commute. In their case study of the housing changes of an employer in Southern California, Wachs et. al. (14) for example find that trip lengths of the employees of the firm they studied did not increase substantially over a period of six years. Clark and Burt (2) note a higher probability to relocate when the home to work distance is long. Looking at how commuting distances change, Clark et. al. (3) find that households that have high commutes to begin with shorten their commutes, and that women were more likely to shorten their commutes after a move than men. Levinson (4), using metropolitan Washington data, investigates if recent movers have shorter com-

mutes, and whether those that moved to new homes had longer commutes. His findings suggest that those who move, on average, maintain their commute durations.

We start with the premise that the commute cost plays an important role in relocation decisions. Relocating presents an opportunity to reduce commute time which the household would have to balance with a host of other requirements for their new location including housing cost. It also provides an opportunity to increase the likelihood that the new location has higher accessibility to a variety of other activities. Here we use proximity to downtown minneapolis as a proxy for higher accessibility to jobs, schools, and urban spaces. We classify the proximity to downtown into three categories based on distance - those that previously lived within 0-5 miles (0-8.05Km), 5-12 miles (8.05-19.31Km) and over 12 miles (19.31Km) out. We hypothesize that:

- the advantages from relocation will be larger for people who live farther away from their current work than to those who live close to their work.
- those who are close to their work are likely to maintain their commute distance after relocation.
- multi-member households are unlikely to achieve the distance savings that single member households can achieve.
- proximity to the CBD will be attractive to single and younger households.

In the following sections we will discuss the data and data collection effort, followed by the analysis and results of the analysis.

Survey and Data

A two phase online survey was administered to gather data on job finding, home finding and the social and technology networks that help people in the process . Postcards were sent to eight Zip code areas in the Twin Cities to 5000 people in each batch. Reminders postcards were sent a week following the original mailing in each case to solicit a response. The survey offered a $5.00 gift card to participants who completed the survey as well as a drawing for a prize (an iPod).

On first mailing 192 and 205 cards were returned due to wrong addresses from each phase. Overall there were 268 and 297 respondents in phase 1 and 2 respectively (5.88% of postcards that reached their destination). The areas were chosen to have economic and racial mix of respondents, as well as a city and suburban mix in the respondent pool. The distribution of demographic variables in the sample and that for the State of Minnesota is given in Table 1.

Each individual was asked about where they worked and lived, where they previously worked and lived as well as when they moved to their current home and when they started their work. In addition the respondents were also asked about their reason for moving, the type of housing they have chosen, and a host of other questions related to their demography and other travel activities.

Table 1: Summary of Survey Subjects

Variable	Group	Survey	Minnesota
Sex	Male	39.8%	49%
	Female	60.2%	51%
Age (MN data for those between 18-65)	mean	38.9	39.2
Household	Renter	22.5%	25.4%
	Owner	77.4%	74.6%
Education (MN data for those 25 and older)	Less than high school	0.4%	9.3%
	High school	16.6%	50.6%
	Associates degree	14.1%	9.6%
	Bachelor's degree	45.7%	20.8%
	Grad/Professional degree	23.1%	9.6%
Household Income	Mean	$ 76,550	$ 81,644
	Median	$ 68,000	$ 66,809
Race	White	90.3%	89.4%
	Black	3.4%	3.5%
	American Indian	0.2%	1.1%
	Asian	3.2%	2.9%
	Other	3.0%	3.1%

Analysis

The analysis looks at how home to work distances and travel time have changed for the subset of respondents whose previous homes were within 50 miles of downtown Minneapolis, and whose current home to work distance has increased or decreased by 20 miles or less. We limit the analysis to those within 50 miles of downtown Minneapolis to ensure that we look at moves that were local, and to separate out long distance moves. Travel times between previous home and work and current home to work were calculated using SONG (System of Network Growth) (6; 8) under Stochastic User Equilibrium.

Figure 1 shows the distribution of previous home to work distances in the sample we are using, Figures 2 and 3 show the current home to work distance and the distribution of the difference for each individual respectively.

The data shows that the average home to work distance after the move is shorter than the previous home to work distance. Taking the difference in previous home to current work (d_o) and current home to current work (d_1), and comparing the mean to 0 using a standard t-test yields a difference of 1.16 miles (p-value=0.000, CI(0.49.1.82)). Dividing the sample into people who have listed "being close to work" as their top reason for moving to their current location and testing the reduction in distance shows that this group has a larger reduction in home to work distance (2.87 miles) than the rest of the respondents (0.98 mi). Statistically the two means were different (p-

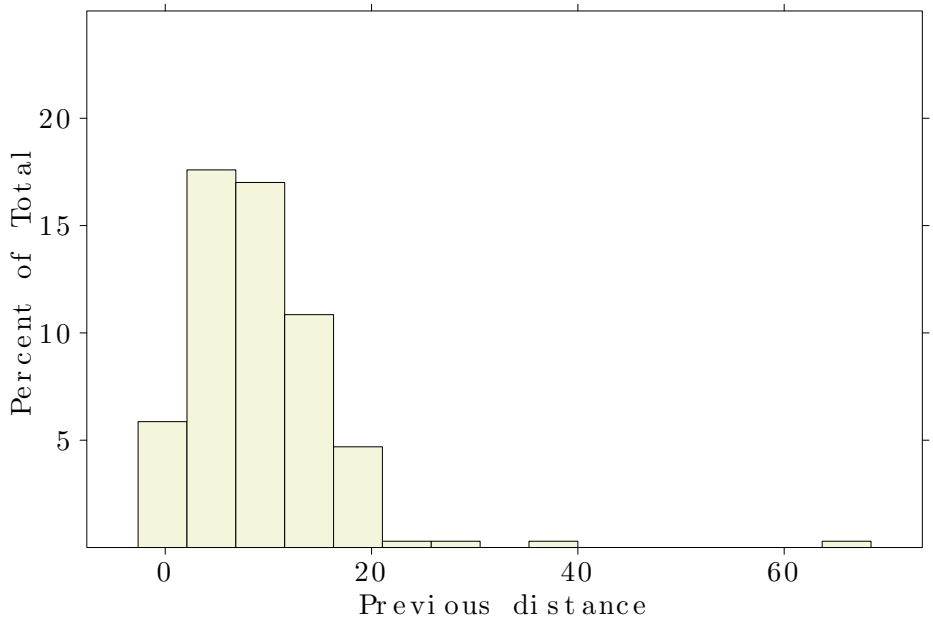

Figure 1: Distribution of Previous home to work distance

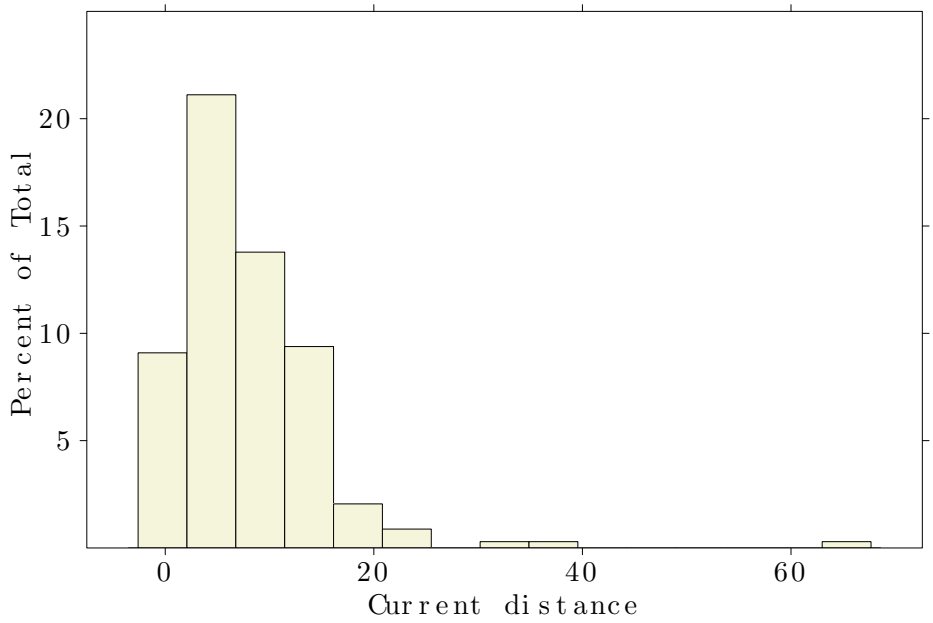

Figure 2: Distribution of Previous home to work distance

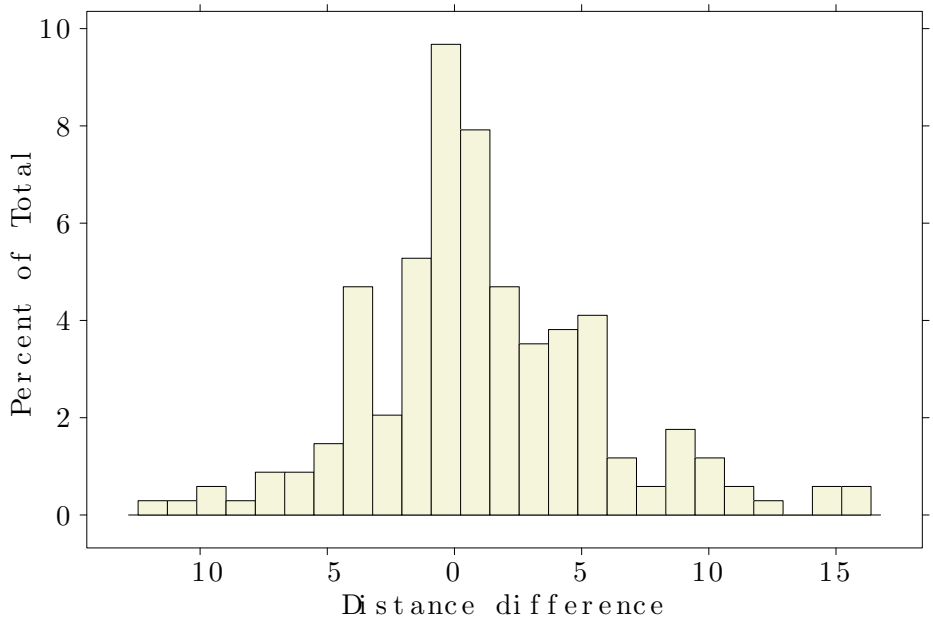

Figure 3: Distribution of Previous home to work distance

value =0.027). There were no other differences in the distance saved based on the reason cited for picking current location.

Table 2: The distance advantage of moving

Group (reason for moving)	N	Mean of $(d_0 - d_1)$	Confidence Interval
Top reason is "Being close to work"	41	$2.87mi$	(1.39,4.36)
Top reason is not commute related	134	$0.98mi$	(0.20,1.76)

To analyze the interactions between proximity to work and proximity to downtown Minneapolis and the urban centers of the Twin Cities area, we classify the location of the previous home into one of nine possible categories. The categories are based on the home's proximity to downtown Minneapolis and to the persons work. The location can be very close to downtown (0-5miles), at a medium distance from downtown (5-12 miles), and farther out from downtown Minneapolis (greater than 12 miles) and we apply the same distance measures to the work place. Table 3 shows the nine possible areas that people are classified into. This classification is used in Models 1 and 2 below.

While closeness to work reduces the person's commute, being in the inner ring of the Twin Cities metropolitan area gives access to a large pool of potential employment locations, more urban space, city life, etc. The classification scheme will help us identify the balance that relocators try to hit between their home to work distance and their closeness to the center of the metropolitan area.

We hypothesize that the reduction of distance that one achieves depends on their preferred balance between the attributes the location offers and the transportation costs of being in that location. We model the reduction in home to work distance and travel time that is achieved against the original location they were in, whether the major reason for picking their current location was to be close to work, and demographic variables of the respondents using ordinary least squares regression. The demographic variables will inform us about the life circumstance of the respondent that constrain their choice. We also include whether the respondent was a renter when making the relocation decision, and whether they were buying or renting their next residence.

The regularities that are found will inform us of where the interests of the movers is in terms of balancing their home to work and home to downtown area. The difference in distance as well as difference in travel time are both relatively normally distributed. Since we take the difference to be the previous home to work distance (time for model 2) minus current distance (time for model 2), positive values indicate reduction in distance, and negative values indicate increases in distance after the move.

Table 3: Previous home location relative to downtown Minneapolis (by time and distance)

	Distance from downtown		
Distance	$0-5mi$	$5-12mi$	$>12mi$
$0-5mi$ $(0-8.05Km)$	37 (area 1)	18 (area 2)	6 (area 3)
$5-12mi$ $(8.05-19.31Km)$	29 (area 4)	42 (area 5)	10 (area 6)
$>12mi$ $(\geq 19.31Km)$	12 (area 7)	18 (area 8)	23 (area 9)

	Distance from downtown		
Time	$0-5mi$	$5-12mi$	$>12mi$
$0-10min$	31	19	6
$10-20min$	31	44	12
$\geq 20min$	15	15	20

The results are given in Table 4. The only location choice purpose that leads to a distance saving than average is the explicit intention to reduce travel time. All other reasons for picking the new location (combined in 4 as the base condition) did not have a significant impact in explaining the reduction in distance.

The model suggests that after controlling for the explicit intention to reduce travel distance to work, the location combination of the respondent (3) is important in determining if time savings are achieved. Looking at model 1, after controlling for the intention of the move, there was not a significant reduction in distance when the person was either very close to Downtown Minneapolis to begin with (regardless of their distance to work) or very close to their work (regardless of their proximity to Downtown). Similarly, at medium distances from downtown and work, there was no reduction in the travel distance. In the remaining three cases, where the individual was farther away from either downtown or their work or both (areas 6,8 and 9) a significant reductions in distance were realized. Table 5 summarizes the effect by area.

Table 4: Reductions in travel distance after moving

		Model 1			Model 2		
		Distance reduction			Trave time reduction		
Variable		Estimate	Std. Error	Sig	Estimate	Std. Error	Sig.
Intercept		1.897	2.258		1.8262	3.386	
Location chosen	1=Closer to work	1.825	0.831	*	3.444	1.25	**
Previously renting	1=Yes	-1.146	0.884		-2.222	1.339	.
Currently renting	1=Yes	0.548	0.913		0.380	1.389	
Location (see 3)	Area 2	-1.525	1.462		-2.181	2.175	
	Area 3	0.698	2.169		1.877	3.290	
	Area 4	1.283	1.168		4.9563	1.7854	**
	Area 5	1.773	1.097		5.0689	1.6539	**
	Area 6	3.777	1.577	*	7.0437	2.2621	**
	Area 7	0.033	1.701		3.8855	2.3776	
	Area 8	3.332	1.415	*	5.6475	2.2672	*
	Area 9	5.833	1.233	***	9.5162	1.9810	***
Sex	1=Male	1.098	0.725		1.1945	1.0915	
Age	25-34	-0.429	1.684		0.2573	2.5164	
	35-44	-1.842	1.804		-0.8540	2.6847	
	45-54	-1.216	1.773		-0.2255	2.6883	
	≥ 55	-0.898	1.938		0.4361	2.9277	
Household size	two	-0.036	0.904		0.8753	1.3635	
	>two	-0.508	0.958		-0.8543	1.4536	
Household income	35000-50000	-2.255	1.450		-4.6193	2.2108	*
	50000-75000	-1.435	1.363		-4.3345	2.0820	*
	75000-100000	-0.127	1.524		-1.8764	2.3118	
	> $100000	-1.452	1.509		-4.0979	2.2765	.
Multiple R-squared		0.269			0.287		
F-statistic		2.545 on 22 and 152 DF			2.741 on 22 and 150 DF		
P-value		0.000			0.000		

Significance *** 0.000 ** 0.01 * 0.05 . 0.1

On average those in area 6, 8 and 9 had a home to work savings of 3.8, 3.3 and 5.8 miles (6.12, 5.31, and 9.33 Km). While it would be expected that those who had long commutes would reduce their distances more, there is an additional effect modifying role played by the re-locator's proximity to downtown. Those further out from their work but were close to downtown did not change their home to work distance substantially (Area 7). Those further out from both downtown and their work had the largest reductions in travel distance. The model suggests that relocating decisions by people who are very close to downtown, or very close to their work don't seem to garner much reduction (or increase) in the home to work distance, while those located farther away from either are more likely to reduce their work commute distance quite significantly. This suggests there is a *regression to the mean*.

The results of model two also share the results of model but with two additional areas where travel time savings are achieved as the result of the move. When home to work distances were between 10-20 minutes, regardless of the distance to downtown, travel time savings were achieved (similar amounts for area 4 and 5 - approximately 5 minutes, and 2 minutes more when the area is also distant from downtown). Similar to Model 1, time savings were also realized in areas 8 and 9. The relative magnitude of savings are greater in area 9 than any other area in both models 1 and 2.

Table 5: Changes in commute distance by previous home location

	Distance from Downtown		
Proximity to work	$0-5mi$	$5-12mi$	$\geq 12mi$
$0-5mi \ \ (0-8.05Km)$			
$5-12mi \ \ (8.05-19.31Km)$			+
$\geq 12mi \ \ (\geq 19.31Km)$		+	+
Time			
$0-10min$			
$10-20min$	+	+	+
$\geq 20min$		+	+

In both models 1 and 2, age, sex, and household size, and job tenure (dropped) did not explain the observed reduction in commute distance and time. Changes in distance were also not explained by previous or current tenure status (rent/own), or household income. There was a moderate effect, in travel time differences where previous renters had increased their travel time. Relative to the lowest income group, those with household incomes greater than or equal to $35,000-$75,000 increased their travel time approximately four and a half minutes, similar to the wealthiest households.

The models do not show an effect in reduction by household structure or gender of the respondent. Interaction terms between these tow variables also came out insignificant in both models. Overall, the model indicates a reduction or maintenance of previous home to work distances as well as travel times.

Conclusion

We find that relocators that lived farther away are interested in reducing their travel distances upon moving than their counterparts who live closer to their work. In the latter case, the data suggests a change in the home to work data is not observed, indicating a reasonable attempt at maintaining current commute distances. Looking at the location of individuals relative to the Minneapolis CBD also suggests that relocation motivates a reduction in travel distance when the previous home is located farther from the CBD. This suggests that access to work as well as access to the opportunities that closeness to downtown offers (to jobs, urban spaces, etc.) are important in the decision making process.

The models do not find differences in commute adjustments that arise due to the presence of other family members in the household. The models however only look at people who have changed their residence since they took their last job. It is possible that those that changed jobs since they moved into their current homes have a different adjustment in distance because of the where appropriate areas of employment are located. That people are actively avoiding an overall trend of increasing their travel time can help explain the long term stability of travel times.

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