

Income and Commuting Time in the Seoul Metropolitan Area

Ho Yeon Kim*

Abstract : We examine the major factors governing the travel time for commuters in the Seoul metropolitan area. To identify the determinants of the commuting time for residents with jobs in the city centre, a multiple regression analysis is performed using household survey data. The results reveal that commuters in Seoul place higher value on time than on living space. Thus, we may conclude that recent trends in income segregation in Seoul are not the result of increased housing demand but of dispersed jobs and better amenities offered in the suburbs.

Keywords : income segregation, commuting time, Seoul metropolitan area

1. Introduction

In many cities of the developing world, suburbanization progressed rapidly as the use of automobiles became pervasive with increasing income and as people began to pursue amenities no longer found in the inner city area. Seoul is no exception. Several sub-centres emerged over the last few decades, while new satellite cities grew around the metropolitan area. Although there are some signs of improvement in terms of self-sufficiency, the satellite cities still serve mainly as dormitory towns for those who commute to Seoul proper, despite the efforts to make them fully fledged cities. Some critics have voiced concerns over the impending hollowing out of the capital, in

which the high-income class flee to the suburbs.

An insight into this issue could be gained by investigating how people with disparate income levels choose their place of residence. This is surely an open and intriguing empirical question and begs for scrutiny because, in theory, many types of income segregation may emerge. The high-income group faces higher opportunity costs of commuting time. At the same time, demand for housing generally increases with income. The consequence is a tug-of-war between two forces pulling in opposite directions.

Alonso (1964) and Muth (1969) showed how location choices of households can lead to income segregation, which was supported by Solow (1973) who believed that the rich become the outer

* Associate Professor School of Economics, Sungkyunkwan University

suburban group while the poor occupy the urban centre, essentially because housing is a normal good. Similarly, Benito and Oswald (2000) found that highly educated home owners in Great Britain commuted over longer distances: the wage rate had a positive relation with commuting times when other factors were controlled for.

Wheaton (1977), on the other hand, showed that such segregation does not necessarily exist by estimating income elasticities for land consumption and the cost of travel across income classes in the San Francisco Bay area. Interestingly, Benito and Oswald, in the same study mentioned above, identified an inverse relationship between commuting time and the hourly wage when the wage was made endogenous. It is purportedly because one is willing to reduce commuting time to enjoy more leisure and supply more hours of work.

With regard to Seoul, Lee and McDonald (2003) investigated the limiting effects by marital status of women on their commuting time and distance, which largely supports the so-called entrapment hypothesis. Not much could be said about the role of income, however, as there was no direct information available. In this exercise, we measure the relative income elasticity of housing demand and travel cost for Seoul commuters by examining the differences in travel time across income classes.

2. Results and discussion

We identify the major determinants of commuting time, controlling for individual characteristics and paying special attention to the

role of income. The data come from the 1996 Seoul Commuter Survey conducted on 198,267 households in the capital region, comprising Seoul, Incheon, and the surrounding province of Gyeonggi-do. Our data set is unique in that actual household income was made public. Although there exist more recent data from 2002, the income variable was not released because of tightened confidentiality. Lee and McDonald (2003), who used the 1995 Population Census data, had to resort to the number of rooms, home-ownership and education levels as proxies for income.

In this study, we confine our analysis to 10,018 full-time workers who commuted to the two adjacent wards of Jung-gu and Jongno-gu, which have long been recognized as the central business district (CBD) of Seoul. This conforms to the notion of a monocentric city where people work in the CBD and travel to and from there in a radial fashion. In order to accommodate possible nonlinearities, income, age and household size variables are grouped appropriately and compared against a chosen benchmark category.

Table 1 presents summary statistics on the eight categories of explanatory variables: household income, age, household size, type of dwelling, housing tenure, sex, occupation, and mode of transportation.¹ Group by group, there is no significant variation in terms of mean travel time, except for mode of transportation. We run a multiple regression to see how personal characteristics influence commuting behaviour. The goal is to extract the pattern of trade-offs between time cost of commuting and size of living space.

The results of the regression are reported in Table 2. Overall, the variables jointly present a plausible picture of the spatial configuration in

Table 1. Data used and descriptive statistics

Characteristic	Variable	Definition	Occurrence	Mean time (min.)	Benchmark
	TRAVTIME	Commuting time	10,018	46.41	
Household income	INC < 50	Below 500,000 won	171	48.47	√
	INC < 150	500,000-1,500,000	3,091	47.42	
	INC < 250	1,500,000-2,500,000	4,131	46.34	
	INC < 350	2,500,000-3,500,000	1,764	46.21	
	INC < 450	3,500,000-4,500,000	581	43.55	
	INC > 450	Over 4,500,000 won	280	42.07	
Age (year)	AGE < 25	Below 25	1,410	44.70	√
	AGE < 35	25-35	2,968	46.63	
	AGE < 45	35-45	3,266	47.68	
	AGE < 55	45-55	1,702	45.38	
	AGE > 55	Over 55	672	45.42	
Household size	HHSIZE = 1	Single household	168	41.57	√
	HHSIZE = 2	Two persons	737	45.53	
	HHSIZE = 3	Three members	1,962	47.29	
	HHSIZE = 4	Four members	4,603	47.08	
	HHSIZE > 4	More than four members	2,548	45.08	
Type of dwelling	APT	Apartments	4,599	49.28	√
	NONAPT	Single unit houses	5,419	43.96	
Tenure	OWN	Own a house	7,393	46.93	√
	RENT	Renting a house	2,625	44.94	
Sex	MALE	Male commuter	7,794	47.58	√
	FEMALE	Female commuter	2,224	42.29	
Occupation	SALESERV	Sales and service	1,946	44.71	√
	PROTECH	Professional & technologist	2,087	47.04	
	ADMOFFI	Administration & office worker	5,384	46.72	
	MFG	Manufacturing, etc.	601	46.86	
Mode of transportation	WALK	Walk to work	225	16.51	√
	DRIVE	Drive to work	2,654	53.31	
	CARPOOL	Use carpools to work	429	41.67	
	BUS	Take buses to work	2,762	48.38	
	SUBWAY	Take subway to work	3,812	43.12	
	TAXI	Take taxis to work	136	28.08	

Note: Data are from 1996 for 10,018 commuters in Seoul, Incheon, and Gyeonggi-do.

Seoul, where younger residents with growing families move out to the suburbs to become owners of apartment homes, and drive or use mass transportation to get to work. More importantly, as

they get older and wealthier, other things being equal, they gravitate towards the city centre in order to reduce the time wasted on commuting. While their occupations appear to play little role, it

Table 2. Regression results

Dependent variable		ln (TRAVTIME)	
Independent variables			
	β	t-value	p-value
Constant	2.5756	39.0721	0
INC < 150	-0.0378	-0.9350	0.3498
INC < 250	-0.0930	-2.2997 *	0.0215
INC < 350	-0.1078	-2.5879 *	0.0097
INC < 450	-0.1720	-3.8038 *	0.0001
INC > 450	-0.1881	-3.7356 *	0.0002
AGE < 35	-0.0224	-1.2272	0.2198
AGE < 45	-0.0529	-2.7475 *	0.0060
AGE < 55	-0.0732	-3.5073 *	0.0005
AGE > 55	-0.0324	-1.2394	0.2152
HHSIZE = 2	0.0508	1.1371	0.2555
HHSIZE = 3	0.0905	2.1566 *	0.0311
HHSIZE = 4	0.0861	2.0891 *	0.0367
HHSIZE > 4	0.0946	2.2769 *	0.0228
APT	0.1079	9.5308 *	1.9E-21
OWN	0.0358	2.8730 *	0.0041
MALE	0.0722	4.9182 *	8.9E-07
PROTECH	0.0208	1.2700	0.2041
ADMOFFI	0.0192	1.3769	0.1686
MFG	0.0341	1.4208	0.1554
DRIVE	1.1633	32.1309 *	0
CARPOOL	0.9306	21.9130 *	0
BUS	1.1097	30.9896 *	0
SUBWAY	0.9399	26.3932 *	0
TAXI	0.5315	9.5179 *	2.2E-21
N		10,018	
F		70.7533	
R ²		0.1452	
Adj. R ²		0.1432	

Note: * indicates significance at the 0.05 level.

seems that the aforementioned entrapment hypothesis on female workers is supported here as well. The explanatory power is rather poor at 0.14, but such a low value is not uncommon when categorical data are used as explanatory variables,

and should pose little problem as long as no forecasting is attempted.²

Admittedly, some sample selection bias is bound to exist. Lee and McDonald (2003) reckon that the model should not include such endogenous

variables as residential location, workplace location and choice of travel mode. Including such variables would produce biased results because of their interrelated nature. For example, a change in marital status may change the choices of location and travel mode, and, hence, commuting time. Pointing to this kind of endogeneity, Cooke and Ross (1999) excluded the mode of travel. There are no clear-cut criteria, however, with which to judge the endogeneity of certain variables. The mode of transportation is often viewed as a determining and not as a resultant factor for selecting the place of residency; for instance, many people choose to live near subway stations.³

3. Conclusion

While the majority of jobs still remain in the traditional CBD in the northern part of the capital, the southern section of Seoul is generally regarded as offering a superior living environment, and the river Han now epitomizes a great divide between haves and have-nots. At the same time, signs of “gentrification” are also showing up as more efforts are made to rejuvenate the core area. This study showed that commuters in Seoul place higher value on time than on living space. Thus, we may conclude that recent trends in income segregation in Seoul are not the result of increased housing demand but of dispersed jobs and the better amenities offered in the suburbs. When viewed together with the recent boom of high-rise residential buildings in central quarters, this implies that as long as high-paying jobs are retained in the CBD, there will always be people willing to trade

living space for easier access to the city centre.

Note

1. The house size was excluded due to a strong positive correlation with household income. This also indicates that housing is a normal good.
2. Comparable figures in similar studies are 0.07 in Cooke and Ross (1999), 0.16 in Benito and Oswald (2000), and 0.08 in Lee and McDonald (2003).
3. We performed a regression without travel mode to address the said concern. The relative magnitude of influence for other explanatory variables nonetheless remained unchanged.

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교신: 김호연, 서울시 종로구 명륜동 3가 53, 성균관대학교
경제학부, Tel: 02-760-0463, Fax: 02-744-5717, E-
mail: hykim@skku.edu

Correspondence: Department of Economics,
Sungkyunkwan University, Seoul 110-745, Korea,

Tel:+82 2 760 0436, Fax:+82 2 744 5717, E-mail:
hykim@skku.edu

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서울 대도시권 통근자의 소득이 통근시간에 미치는 영향

김호연*

요약: 본 논문에서는 서울대도시권 통근자들의 통근시간에 영향을 미치는 요소들에 대해 살펴보았다. 도심에 소재한 직장으로부터 출퇴근하는 주민들의 이동시간을 결정짓는 요인을 판별하기 위하여, 가구통행실태조사 자료를 이용한 다중회귀분석을 실시하였다. 분석 결과에 따르면 통근자들은 주거공간이 규모보다 시간의 가치를 보다 중시하는 것으로 나타나, 최근의 소득계층별 분리 현상은 주택 수요의 증가보다 직장의 지리적 분산 및 교외지역의 쾌적성에 기인한다는 추론을 가능케 한다.

주요어: 소득계층별 분리, 통근시간, 서울대도시권

* 성균관대학교 경제학부 부교수