

EXTENDED COMMUTING AND MIGRATION IN THE TAIPEI METROPOLITAN AREA

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I. Introduction

The purpose of this paper is to examine the relationship between extended commuting and migration in the Taipei metropolitan area. Specifically, we are interested in two aspects of this relationship. One is the relative size or contribution of extended commuting and migration to the labor force of the Taipei metropolitan area. The other is whether extended commuting and migration are alternatives for every type of labor group. We suspect that different groups may have different preferences because they are subject to different constraints.

Extended commuting has been defined as workers' movements across county boundaries from non-metropolitan to metropolitan areas (Taaffe et al., 1980 ; Fisher and Mitchelson, 1981). The intensity of extended commuting has been taken as a basic measurement of the expansion of metropolitan fields into remaining inter-metropolitan peripheries or areas that lie between metropolitan areas (Berry and Gillard, 1977). In this paper, our focus is on the relationship between extended commuting and migration rather than the process of urbanization. Therefore, we slightly modify the definition of extended commuting. Here, we divide the Taiwan area into three units: Taipei city; Taipei's periphery; and other areas. Workers who journey daily across the unit boundaries are defined as extended commuters. Similarly, workers who have moved across the unit boundaries in the preceding year are described as migrants. With these definitions, we make it possible to compare extended commuting and migration. Moreover, we are allowed to explore their relationship in all direc-

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tions. In turn, we are able to obtain a thorough picture about their relationship for policy consideration and to test their substitutability under different situations.

The relationship between commuting and migration has drawn a lot of attention since 1950. Both commuting and migration are deemed to have a positive function in balancing disequilibrium in labor markets. They, however, have different dysfunctional features for the destination or place of origin. A drastic increase in the volume of commuting might threaten cities with a drastic shrinkage of their tax bases and an increased cost for a more elaborate transportation system for the municipality (Schnore, 1954). On the other hand, the selectivity of migration may lead to disorganization in the places of origin and insufficiency of infra-structure in the destination places. Therefore, the relative levels of commuters and migrants have important policy implications. It seems to us that these comments are more valid for the comparison between extended commuting as defined above and migration, rather than the comparison between commuting within units and migration.

Several types of relationships with regards to levels between commuting and migration have been suggested by previous research. It has been suggested that recurrent daily movements between home and work supplement migration and enhance the stability of community structure (Liepmann, 1944). It has also been suggested that commuting might tend to supersede migration as a mean of adjustment, since the lengthening commuting radius of the automobile has reduced the amount of migration necessary within local areas (Hawley, 1950). Another logical assumption is that commuting reduces long distance migration while increasing short distance mobility (Goldstein and Mayer, 1964). Since we rely on one cross-section survey, we are unable to examine the dynamic relationship between commuting and migration. Rather, we hypothesize that extended commuting supersedes migration because Taiwan has a rather good transportation system which makes lengthening commuting possible.

On the micro-level, it has widely been assumed that commuting, job, and residence-relocation can substitute for each other (Yapa et al., 1971). The choice between commuting and migration has been proposed to be governed by the concept of "commuting tolerance" (Reitsma and Vergoossen, 1988) or the least effort principal (Carroll, 1952; Zipf, 1947). However, it has been shown that the least effort principal is applicable only in the intra-urban areas (Clemente and Summers, 1975). Moreover, it has been criticized that the principal confuses the basic desire of minimizing traveling cost in time and money with external limiting conditions, such as type of industry, wage level, and size of city (Schnore, 1954). Nevertheless, it has been suggested that 45 minutes of traveling or 10 miles of commuting

distance is the limit beyond which people tend to consider moving (Goldstein and Mayer, 1964; Reitsma and Vergoossen, 1988). In view of Taiwan's current traffic conditions, we assert that one to one and a half hours of commuting time is tolerable to most people.

In this paper, we suspect that extended commuting and migration are alternatives for each other for two reasons. Initially, we found that daily journeys to work for extended commuters are beyond tolerable criteria stated above. Although a small portion of extended commuters may travel less than 10 miles, they must travel more than 40 minutes to reach their work places because there is no subway or other transportation systems which can avoid traffic jams in the Taipei metropolitan area. The majority of extended commuters must travel more than one hour to their work places. This is especially true for commuters between Taipei city and other areas. Obviously, these extended commuters are not governed by the least effort principal. On the contrary, we suspect that they are constrained by other factors such as costs of housing and living.

Secondly, previous research points out that migrants are positively selected both in developed and less developed countries (Shaw, 1975; Greenwood, 1975; Ritchey, 1976; DeJong and Fawcett, 1981; Browning and Feindt, 1969; Browning, 1971; Fuller, 1981; Wilson, 1988). In Taiwan, we find that migrants mainly come from the young and unmarried groups (Chen and Speare, 1989). On the contrary, older and married people with school-age children are tied by social links to their current residence (Toney, 1976). They thus must rely on commuting.

In brief, there are two theses in this paper. Initially, we hypothesize that extended commuters might supersede migrants. Secondly, we hypothesize that extended commuters and migrants might come from different groups.

II. Data and Method

The primary source of data for this paper is from the October round of a monthly labor force survey conducted by the Directorate General of Budget, Accounting and Statistics (DGBAS) in Taiwan in October 1988. The survey is intended to be representative of the non-institutional population of Taiwan. It involves a two-stage stratified sample design. In the first stage, village level units (Tsun's and Li's) were selected from a list stratified according to degree of urbanization and industrial composition, as indicated in household registration data. In the second stage, households were systematically selected within the sample Tsun's

and Li's. In total, 516 Tsun's or Li's and about 18,000 households were selected, which is equivalent to an overall sampling fraction of 4 per thousand.

In this paper, analysis is limited to persons aged 15 and over and employed because only these persons are asked both the labor force questions and reasons for moving. Since each of these persons has been given a weight, we are thus able to inflate the sample to the total population of Taiwan. These weights are adjusted to match the population by age and sex as recorded in the household register. Throughout this paper, weighted results will be presented with the exception of logit analyses. The unweighted numbers and estimates of sampling errors are available in the appendix.

In this survey, a person is defined as a migrant if he or she moved across a city or township boundary within the year preceding the survey. For each migrant, the city or township of origin and the city or township of destination are identifiable. However, to make the analysis more manageable, we will focus only on migration in the Taipei metropolitan area. We have divided Taiwan into three areas: Taipei City, Taipei's periphery, and all other areas. The periphery of Taipei includes Keelung city and the townships in the northern large metropolitan area, as defined by Liu (1974), excluding those which are within Taipei city itself. There are six migration streams between these three areas:

1. Migration from Taipei's periphery to Taipei city;
2. Migration from other areas to Taipei city;
3. Migration from Taipei city to Taipei's periphery;
4. Migration from other areas to Taipei's periphery;
5. Migration from Taipei city to other areas;
6. Migration from Taipei's periphery to other areas.

Similarly, a person who journeys daily across the three area units defined above is classified as an extended commuter. Therefore, there are six types of extended commuters.

1. Commuting from Taipei to Taipei's periphery.
2. Commuting from Taipei to other areas.
3. Commuting from Taipei's periphery to Taipei.
4. Commuting from Taipei's periphery to other areas.
5. Commuting from other areas to Taipei.
6. Commuting from other areas to Taipei's periphery.

When each sampled case is appropriately weighted, we estimate that there are

8,384,587 cases who are employed and aged 15 and over in the Taiwan area. According to the statistics of ministry of Interior, on average there were 8,108,000 employed persons in the year 1988 (CEPD, 1989). Therefore, the sample estimate is 3.4% greater than the official statistics. We thus are inclined to consider that the sample estimate is quite reliable.

However, we find that there are 1,271,309 persons whose residence or work place is missing. Or there are only 7,113,278 weighted cases included in this study. The missing cases account for 13.5% of the weighted sample. The missing rate is relatively high because questions about work places are not strictly edited. The loose editing in this regards reflects that the questions are not scheduled to be coded and processed by DGBAS. They are coded and added to the labor force data in this study.

III. Volume of Migrants and Extended Commuters

Although extended commuting has a function of retaining population in the places of origin, its relationship with population change has been reported as not prominent or strong (Taaffe et al., 1980; Fisher and Mitchelson, 1981). Nevertheless, the population trend of the three units in Taiwan is shown in Table 1 to provide background information for further discussion of commuting and migration.

In the past forty years, Taiwan has completed the processes of population transition. In the 1950-1960 period, its annual average growth rate was as high as 5.9% (see Table 1). Since then, it steadily declined because of economic development and a strong family planning program. By 1987, its average annual growth rate was as low as 1.1%.

It seems that population increases resulting from population transition were mostly absorbed by urban areas. From 1940 to 1970, the average annual growth rate for Taipei city was about five percent. The increase of population in Taipei's periphery lags by about 10 years. The increase also lasted for 30 years, but it was at a faster pace, ranging from 5.5% to 6.7%.

What we are concerned with here is the differential declining in growth rates for Taipei city and its periphery. The average annual growth rate for Taipei city has been retained at a 2% level since 1970. On the other hand, Taipei's periphery has experienced a steady decline in the growth rate. It decreased from 6.0% in the period 1970-80 to 3.1% in the period 1980-85. It further decreased to 1.3% in the 1985-87 period. Although, it is un-

derstandable that the decline in growth rates reflects an overall decrease in the fertility rate, it is important to know how migration and extended commuting behave under such conditions of the population trend.

Table 1: Growth of the Taipei Metro Area and Other Areas, 1940 to 1987

Year	Population (in 1000's)				Average Annual Growth **			
	Taipei* city	Peripheral townships	Other areas	Total	Taipei City	Taipei Periphery	Other areas	Total
1940	392	334	5146	5872				
1950	646	400	6508	7554	5.1	1.8	2.4	3.7
1960	1097	762	8933	10792	5.4	6.7	3.2	5.9
1970	1770	1300	11606	14676	4.9	5.5	2.7	5.1
1980	2220	2331	13254	17805	2.3	6.0	1.3	4.0
1985	2508	2711	14039	19258	2.5	3.1	1.2	2.8
1987	2637	2781	14255	19673	2.5	1.3	0.8	1.1

* Using constant boundaries as redefined in 1968.

These have remained the same through 1987.

** Based on the formula : $r = 100 * (\text{EXP}(\ln(P_2/P_1)/n) - 1)$,

where n = no. of years.

Source: 1940 to 1970 from Paul K.C. Liu,

"Economic Aspects of Rapid Urbanization in Taipei."

1980 : 1980 Taiwan-Fukien Demographic Fact Book.

1985 : 1985 Taiwan-Fukien Demographic Fact Book.

1987 : 1987 Taiwan-Fukien Demographic Fact Book.

Table 2 shows the volume of migrants and extended commuters in 1988. When volumes of some migration streams are compared, we find that the phenomenon of population spilling from Taipei city into its periphery disappear (Chen and Speare, 1989). Movement between Taipei and its periphery is balanced at the level of about 30 thousand persons in each direction. We don't know whether population spilling from Taipei to its periphery is temporarily or permanently disrupted. On the other hand, both of them gain substantial population from other areas. Taipei city gains about 70 thousand in population from other areas, while its periphery gains only about 35 thousand. Obviously, the differential migration volume accounts for differential growth rates.

Table 2: Percentage Distributions of Migrants and Commuters by Places of Origin and Destination

Places of origin / residence	Places of Destination / work			Total
	Taipei	Periphery	Other areas	
Migrants				
Taipei	--	30,347 (51.9)	28,050 (48.0)	58,397 (99.9)
Periphery	30,264 (67.0)	--	14,889 (33.0)	45,153 (100.0)
Other areas	98,086 (66.4)	49,608 (33.6)	--	147,694 (100.0)
Total	128,350 (51.1)	79,955 (31.8)	42,939 (17.1)	251,244 (100.0)
Commuters				
Taipei	1,214,015 (95.3)	31,901 (2.5)	28,219 (2.2)	1,274,135 (100.0)
Periphery	150,602 (20.3)	563,149 (75.9)	28,272 (3.8)	742,023 (100.0)
Other areas	39,506 (0.8)	16,276 (0.3)	5,041,338 (98.9)	5,097,120 (100.0)
Total	1,404,123 (19.7)	611,326 (8.6)	5,097,829 (71.6)	7,113,278 (100.0)

Source : 1988 October round Labor Force Survey.

According to Speare et al. (1988), the magnitude of commuting to Taipei city has declined due to the rapid growth of satellite cities and the movement of industries into these cities. The 1980 census data showed that 73.6% of the workers in Taipei City also lived in the city, which was an increase of 10% over the proportion observed in the 1972 Labor Force Survey conducted by the Taiwan Provincial Labor Force Survey and Research Institute. Data shown in Table 2 suggests that the trend in the decline continued in the 1980's. In 1988, 86.4% of the workers in Taipei city also resided in Taipei, which is a 12.8% increase over the proportion observed in the 1980 census.

Nevertheless, the volume of extended commuters still outnumbers that of migrants. Although it is hard to compare the number of migrants with that of extended commuters because the former reflects a flow in a particular time period and the latter is a stock at a point in time, data from Table 2 suggest that extended commuting has gone beyond the supplementary role in the Taipei metropolitan area. In 1988, there were 150 thousand people daily commuting from the periphery to Taipei city, which is about five-times the number of migrants with a similar origin and destination. Meanwhile, 28 thousand residents of the periphery commuted daily to work in other areas, which is about twice as large as the volume of its counterpart migrants. The volume of extended commuters to Taipei city and other areas constitutes 20.3% and 3.8% of the periphery's labor force, respectively. This implies that the periphery acts as a domestic residence area for Taipei City. For Taipei city, the volume of extended commuters is only slightly greater than that of migrants. There are about 32 thousand people who daily commute to work in its periphery, which is 1.6 thou-

sand greater than the counterpart migrants. Meanwhile, the number of extended commuters to other areas is 28 thousand, which is only 169 persons greater than the counterpart migrants. In total, the extended commuters constitute 4.7% of Taipei's labor force.

On the other hand, it is not surprising to find that our first thesis is not applicable to other areas because of distance. Instead, commuting plays only a supplementary role to migration. In 1988, there were 98 thousand people who moved from other areas to Taipei city, which is about 60 thousand more than the counterpart commuters. Meanwhile, the numbers of migrants who moved from other areas to Taipei's periphery were about 50 thousand which is 33 thousand greater than the counterpart commuters. Overall, 99% of the other areas' residents work in their own areas. Although, extended commuters accounts for only 1% of the labor force in other areas, its absolute number is rather substantial. Since these commuters must daily travel more than one hour to their work places, it is interesting to check who they are in the next section.

Answers to the question of losing tax bases can also be derived from Table 2. For Taipei city, the loss in the tax base is rather substantial. There are about 60 thousand residents of Taipei city who work outside of its boundaries. Meanwhile, about 190 thousand workers of Taipei city come from its periphery and other areas. Therefore, Taipei city loses only 130 thousand taxable persons which is about 10% of Taipei's residents. On the contrary, Taipei's periphery is benefited by extended commuting. There are 179 thousand residents of Taipei's periphery who work outside of its boundary. Whereas only 50 thousand workers of the periphery come from Taipei and other areas. So the periphery gains about 129 thousand taxable persons.

In Table 3, the commuting patterns described above are further controlled by mobility status. It thus allows us to know more about movers' commuting behavior. Data shown in Table 3 suggest that local moves and migration have different effects on extended commuting. Residential adjustment within the units slightly increases the proportion of working in the units, with the exception that for other areas it is 0.4% less than that for non-movers. On the other hand, migration has mostly a negative effect on proportions working at the destination. It is interesting to note that migrants to the three units display different commuting patterns.

For those moving to Taipei city, 88% to 90% of them work in Taipei, which is 6 to 7% lower than the proportion for non-movers. The majority of the remainder work in other areas regardless of their origin. For migrants to other areas, they all return to work at their

origin if they fail to work at their destination. The failure rates range from 11% to 20%. It thus results in a lower proportion working in other areas than that of non-movers. For migrants who move to Taipei's periphery, proportions of working at their destination vary by their origin. 81.6% of migrants coming from other areas work in Taipei's periphery which is 5.7% greater than non-movers of the periphery. For the rest, 9% work in Taipei and other 9% in other areas. On the other hand, the majority (55.8%) of migrants moving from Taipei city return to work in Taipei. Therefore, the proportion working at their destination is as low as 38.4%, which is about one half of the proportion for non-movers. Since there are only 20% of non-movers who work in Taipei, it seems there are more and more migrants who use Taipei's periphery as the location of their domestic residence. It reflects that living and housing costs are becoming more expensive in Taipei city.

Table 3: Percentage Distributions of Workers by Places of

Work, Residence and Mobility Status

Place of residence and mobility status	Place of Work			Total	N
	Taipei	Taipei's periphery	Other areas		
Taipei					
1) Total workers	95.3	2.5	2.2	100.0	1,274,135*
2) Non-mover	95.4	2.7	1.8	100.0	979,484
3) Mover within Taipei	97.7	1.3	1.0	100.0	180,670
4) Mover from periphery	88.2	2.4	9.4	100.0	22,474
5) Move from other areas	89.8	2.6	7.4	100.0	85,316
Taipei's periphery					
1) Total workers	20.3	75.9	3.8	100.0	742,023*
2) Non-mover	20.6	75.9	0.4	100.0	630,088
3) Mover within periphery	14.6	82.6	2.8	100.0	45,289
4) Mover from Taipei	55.8	38.4	5.7	100.0	16,718
5) Mover from other areas	9.2	81.6	9.1	100.0	34,384
Other areas					
1) Total workers	0.8	0.3	98.9	100.0	5,097,120*
2) Non-mover	0.7	0.2	99.1	100.0	4,588,314
3) Mover within other areas	1.0	0.4	98.7	100.0	241,653
4) Mover from Taipei	20.4	--	79.6	100.0	25,016
5) Mover from Taipei's periphery	--	11.0	89.0	100.0	12,876

* Containing cases with missing data on residence and mobility status.

Source : 1988 October round Labor Force Survey

We suspect that the differential commuting patterns for migrants are subject to influ-

ence from moving-motivation itself and its composition. So the commuting patterns of migrants moving into Taipei and its periphery are further controlled by moving motivation. Data shown in Table 4 confirm our suspicion. The short-distance movements between Taipei and its periphery are strongly influenced by housing reasons. Initially, we find that moving due to housing is the major component of the two streams. It constitutes 47.7% and 67.5% of moving from Taipei's periphery to Taipei and its counter-stream, respectively. Secondly, we find that movers due to housing have low to moderate proportions of working at their destination. There are only 32% of migrants moving from Taipei to its periphery working at their destination. On the contrary, 60% of the migrants return to work in Taipei. These results indicate that the periphery is the domestic residence for Taipei city. Meanwhile, we have noted that only 73% of migrants, moving from the periphery to Taipei due to housing, work in Taipei. For other reasons for moving, migrants all work at their destination. So moving due to housing is the only source for a lower proportion of working at the destination.

Table 4: Percentage Distribution of Workers by Places of work, Residence and Moving Motivation

Place of residence and moving motivation	Place of work			Total	N
	Taipei	Taipei's periphery	Other areas		
TAIPEI					
Mover from periphery					
Job	100.0	--	--	100.0	7,622
Education	100.0	--	--	100.0	239
Marriage	100.0	--	--	100.0	1,641
Housing	73.0	5.6	21.4	100.0	9,831
Other	100.0	--	--	100.0	3,141
Mover from other areas					
Job	92.9	0.6	6.4	100.0	63,662
Education	76.8	5.2	18.0	100.0	3,534
Marriage	70.7	16.7	12.5	100.0	10,048
Housing	100.0	--	--	100.0	5,537
Other	81.0	--	19.0	100.0	2,535
TAIPEI'S PERIPHERY					
Mover from Taipei					
Job	18.6	80.0	1.4	100.0	3,519
Education	--	--	--	--	--
Marriage	100.0	--	--	100.0	1,150
Housing	59.9	32.0	8.0	100.0	11,278
Other	100.0	--	--	100.0	771
Mover from other areas					
Job	7.8	85.7	6.5	100.0	30,142
Education	27.2	33.2	39.6	100.0	2,983
Marriage	--	--	--	--	--
Housing	--	100.0	--	100.0	1,133
Other	--	100.0	--	100.0	1,106

Source : 1988 October Round Labor Force Survey

On the other hand, commuting patterns for migrants moving from other areas to Taipei and its periphery are mainly influenced by job concerns. Those who move because of job reasons constitute 74.6% and 87.7% of the stream from other areas to Taipei and its periphery, respectively. Moreover, their proportions of working at their destination are rather high, ranging from 85.7% to 92.9%. Because of these two phenomena, the two streams have rather high proportions of working at the destination.

IV. Selectivity of Extended Commuters and Migrants

Previous research has suggested that migrants are positively selected. Migrants are younger, unmarried, male, and better educated. Similarly SES has also been found to be related to distance commuted to work (Duncan, 1956; Goldstein and Mayer, 1964; Kain, 1962; Taaffe et al., 1980; and Wheller, 1967). It has been criticized that these reports are confined to metropolitan areas. The conclusions above are not applicable to less urbanized areas (Clemente and Summers, 1975). Here, we are interested to know whether the conclusion of positive selectivity is applicable to which types of extended commuters. Furthermore, we would like to know whether migrants and extended commuters as a group differ from each other.

Before we proceed to check the relationship between extended commuters and migrants, a brief description of their SES characteristics is deserved. According to data shown in Table 5, all types of migrants are younger than those who remain in their places of origin or destination. Their mean age ranges from 24.9 to 32.3 years old. The mean ages for the two long-distance migration streams are the lowest ones—24.9 and 26.1 years old. Meanwhile, the mean ages for those who remain in the three units (immobile workers) are between 33.4 and 37.0 years old. For extended commuters, their mean ages range from 31.0 to 37.4 years old. Three out of six types of commuters are older than both their counterpart migrants and immobile workers (stayers), including commuters journeying between Taipei and its periphery. The other three types are older than migrants only.

In this survey, positive selectivity is observed for both migrants and extended commuters. Both of them are better educated than immobile workers in their places of origin and destination with only one exception. The exception occurs in the migration stream from the periphery to other areas. In this stream, only 25.3% of the migrants have senior high and above education, which is the lowest figure among the 15 categories listed in Table 5. We suspect it consists of a large proportion of return migrants who fail to successfully live

in the periphery. On the other hand, both migrants and extended commuters are mostly better educated when Taipei city is the place of either origin or destination. The proportions with senior high and above education are between 65.2% and 84.3% for the four streams and four types of extended commuters. Here we have noted that migrants are mostly better educated than extended commuters. This most likely reflects that migrants are younger than extended commuters and the younger generation is better educated.

Table 5: Socio-economic Characteristics of Migrants and Extended Commuters

	T to P (1)	T to O (2)	P to T (3)	P to O (4)	O to T (5)	O to P (6)	T to T (7)	P to P (8)	O * to O (9)
% MARRIED									
Migrants	54.7	21.9	59.4	63.1	28.5	42.2	--	--	--
Commuters	63.8	53.5	62.8	67.4	40.4	56.8	55.3	60.7	69.3
% MALE									
Migrants	59.5	53.4	49.4	60.5	57.9	62.2	--	--	--
Commuters	64.8	74.9	62.5	82.3	65.6	66.3	59.9	61.1	61.6
% SENIOR HIGH									
Migrants	71.2	67.0	69.1	25.3	72.7	51.0	--	--	--
Commuters	69.0	84.3	66.7	56.0	65.2	39.4	66.2	35.8	36.3
% WHITE COLLAR									
Migrants	69.4	68.5	80.9	43.1	65.6	42.1	--	--	--
Commuters	61.3	74.6	74.1	52.9	70.4	48.5	77.0	37.8	37.7
MEAN AGE									
Migrants	31.4	24.9	28.7	32.3	26.1	26.3	--	--	--
Commuters	37.4	32.9	33.9	35.9	31.9	31.0	34.4	33.4	37.0

Source : 1988 October round Labor Force Survey

* T = Taipei City

P = Taipei's periphery

O = Other areas

In table 5, we find that commuters and migrants have larger proportions of white collar workers than that of workers in Taipei's periphery and other areas. The proportions, however, are smaller than that of workers in Taipei city. It is also noted that most types of commuters have larger proportions of white collar workers than their counterpart migrants. The exceptions occur with migrants moving between Taipei and its periphery. Since commuters are older than migrants, we suppose that as one's age increases his chances of receiving more in-service training and of promotion increase. As a result, there are larger proportions of white collar workers for extended commuters than for migrants. In addition,

the variation of white-collar-worker proportions is also affected by characteristics of origin or destination. According to Table 5, we find that if Taipei city is involved either as an origin or destination, then the proportions of white collar workers are high for both migrants and commuters. They range from 61.3% to 80.9%.

Previous research suggests that males are more inclined to commute longer distances (Lonsdale, 1966). A similar result is observed in Table 5. For extended commuters, the proportion of males ranges from 62.5% to 82.3%. They are greater than the proportions for immobile workers which vary from 59.9% to 61.6%. Meanwhile, migrants have the lowest proportion of males among the three types of mobility status with the exception of those moving from other areas to Taipei's periphery. Their proportion of males is only between 49.4% and 62.2%.

From Table 5, we can also note that extended commuters have greater proportion for being married than migrants. The proportions for extended commuters range from 40.4% to 67.4%. For migrants, it varies only from 21.9% to 63.1%. The differential results reflect that extended commuters have more social ties than migrants. Meanwhile, we also find that there are no consistent relationships between extended commuters and immobile workers. If a long-distance journey to work is needed, there are lower proportions of being married for extended commuters than for stayers.

The description above suggests that the characteristics of extended commuters differ from that of migrants. However, we have also noted that the socio-economic variables described above are somewhat correlated. Therefore, a series of logit analyses are needed to see whether each of them has an independent effect on probabilities of being an extended commuter or a migrant and whether the probability of being extended commuters significantly differs from that of migrants. In the analyses, extended commuters and migrants are compared with workers/stayers at their places of origin. Finally, each type of extended commuters will be compared with its counterpart stream of migrants, since it has been suggested that commuting is a prelude of migration (Fisher and Michelson, 1981). Five socio-economic variables are selected as independent variables. They are age, sex, education, occupation, and marital status. All of them are dichotomized. A code 1 is assigned to younger persons aged less than 35, male, white collar workers, married, or persons with senior high and above education. Other variables are given a code of 0.

Results of the logit analyses for extended commuters versus those who work and reside at their origin are shown in Table 6. It indicates that occupation is an important vari-

able. It has a significant effect on the probability of being extended commuters for four out of six types of extended commuters. It is interesting to note that it has a negative effect on becoming extended commuters who journey out of Taipei city. Blue collar workers are more inclined to journey out of Taipei. On the contrary, for commuters journeying from the periphery and other areas to Taipei, occupation has a positive effect. White collar workers have a greater probability of becoming extended commuters journeying to Taipei city.

Table 6: Results of the Logit Estimation for Various Types of Extended Commuters Versus Stayers

	T to P	T to O	P to T	P to O	O to T	O to P @
Constant	1.74 (31.58)**	2.04 (26.40)**	0.76 (26.29)**	1.62 (25.08)**	2.54 (47.72)**	2.93 (37.83)**
Age	-0.10 (-1.72)	0.02 (0.25)	-0.001 (-0.05)	-0.03 (-0.55)	0.07 (1.34)	0.25 (3.23)**
Sex	0.06 (1.18)	0.20 (2.89)**	0.06 (2.20)**	0.22 (3.62)**	0.17 (3.58)**	0.10 (1.46)
Occupation	-0.16 (-3.02)**	-0.18 (-2.90)**	0.29 (10.36)**	0.04 (0.78)	0.33 (6.64)**	0.13 (1.90)
Marital status	0.04 (0.65)	0.04 (0.56)	0.03 (1.13)	0.02 (0.42)	-0.23 (-4.59)**	-0.04 (-0.52)
Education	0.16 (2.88)**	0.22 (3.18)**	0.21 (7.47)**	0.18 (3.18)**	0.06 (1.23)	-0.01 (-0.21)
Likelihood Ratio X^2	24.03	36.37	63.42	27.27	27.36	25.22
DF	26	26	26	26	26	26
P	0.57	0.09	0.000	0.40	0.39	0.51
Cases	4,250	4,210	2,905	2,432	20,315	20,238

Source : 1988 October round Labor Force Survey

@ T = Taipei city

P = Taipei's periphery

O = Other areas

* Significant at 0.05 level

** Significant at 0.01 level

Figures in parentheses are Z scores.

Why are the outward extended commuters from Taipei city composed of more blue collar workers? We suspect that it is due to the fact that most new manufacturing plants are now located outside the city. This suspicion is confirmed by the data from industrial and commercial censuses. In Table 7, we find that in the Taiwan area as a whole and Taipei

city, numbers of manufacturing plants increased about 60% in the ten-year period from 1976 to 1986. Meanwhile, there was a 109% increase in Taipei's periphery. The growth is especially striking for one satellite city and four townships. Their growth is more than 200% and occur mostly in the five-year period from 1981-1986. Geographically, most of them are located to the south of Taipei city and are along either a railroad or an express highway.

Table 7: Numbers of Manufacturing Plants for Taipei, its periphery and Taiwan 1976, 1981, 1986

	1986 (1)	1981 (2)	1976 (3)	(1)/(3)	(2)/(3)
Taipei's Periphery	21,772	14,740	10,417	2.09	1.41
Keelung City	745	643	492	1.51	1.31
Sanchung City	5,456	4,659	4,180	1.31	1.11
Panchiau City	2,657	1,880	1,263	2.10	1.49
Chungho City	1,121	707	566	1.98	1.25
Hsinchuang City	3,824	2,466	1,177	3.25	2.10
Hsintien City	624	318	304	2.05	1.05
Yungho City	343	242	204	1.68	1.19
Shulin Township	1,911	961	541	3.53	1.78
Hsichun Township	570	208	166	3.43	1.25
Tucheng Township	1,297	732	294	4.41	2.49
Luchou Township	1,353	677	354	3.82	1.91
Wuku Township	836	540	401	2.08	1.35
Taishan Township	620	402	238	2.61	1.69
Juifan Township	96	100	63	1.52	1.59
Tanshui Township	319	205	174	1.83	1.18
Taipei Municipality	10,275	9,034	6,558	1.57	1.38
Taiwan Area	113,639	91,499	69,517	1.63	1.32

Sources : 1. The Report on 1976

Industrial and Commercial census, published by the Committee on Industrial and Commercial Censuses of Taiwan-Fukien District of the Republic of China, Executive Yuan.

2. The Report on 1981, 1986

Industrial and Commercial Censuses Taiwan-Fukien Area, the Republic of China, published by Directorate-General of Budget, Accounting and Statistic, Executive Yuan.

Education is another important variable on the probability of being extended commuters. It has positive significant effects on four out of six types of extended commuters. Two of them are extended commuters journeying between Taipei and its periphery. Better educated persons have a greater probability of becoming extended commuters. This conclusion is also true for extended commuters journeying from Taipei and its periphery to other

areas.

Table 6 also suggests that sex is an important variable on the probability of being extended commuters. Males are more inclined to be extended commuters. The six coefficients are all positive. Among them, four coefficients are significant at either the 0.05 or 0.01 level and most of them are considered as involving long-distance journey.

Data shown in Table 6 also suggests that the effects of age and marital status on probability of being extended commuters are related to the direction of journey. Although each of them has a significant effect on only one type of extended commuters, signs of the coefficients vary with types of journey direction. Commuters journeying from other areas to Taipei metropolis are younger and unmarried. On the other hand, other types of extended commuters are mostly older and married.

In brief, occupation, sex, and education are important variables on the probability of being extended commuters. Size or signs of their coefficients are subject to influence from either distance of journey or characteristics of origin and destination. In addition, the influence of characteristics of origin and destination can be extended to variables of sex and age.

The selectivity of migrants is somewhat different from that of extended commuters. We find that age is the most important variable for migration selectivity. Its effects on all of the six streams listed in Table 8 are significant either at the 0.05 or 0.01 level. Their coefficients are all positive. Or younger people have significantly greater probability of becoming migrants. However, as mentioned before, the result is not applicable to short-distance extended commuters.

The migration selectivity in terms of marital status is slightly different from that for extended commuters. In five out of six streams, unmarried people are more inclined to be migrants. For long-distance migration, the effect of marital status is even significant at the 0.01 level. Another stream -- migration from other areas to Taipei's periphery also consists of significantly more unmarried people. These results are similar to what we have found for extended commuters journeying from other areas. Nevertheless, it is again not applicable for other types of extended commuters. As we described before, the coefficients for most of extended commuters from Taipei and its periphery are positive, although they are not significant.

Table 8: Results of the Logit Estimation for Migrants Versus Stayers

	T to P	T to O	P to T	P to O	O to T	O to P @
Constant	2.28 (24.79)**	2.41 (19.69)**	2.63 (20.31)**	2.65 (22.12)**	2.55 (44.65)**	2.85 (38.69)**
Age	0.23 (2.42)*	0.44 (3.52)**	0.46 (3.68)**	0.35 (3.05)**	0.34 (5.74)**	0.39 (5.10)**
Sex	-0.03 (-0.40)	0.05 (0.76)	0.01 (0.15)	0.04 (0.43)	0.12 (3.26)**	0.12 (2.32)*
Occupation	-0.11 (-1.28)	-0.06 (-0.82)	0.28 (3.02)**	0.08 (0.85)	0.16 (4.33)**	-0.03 (-0.61)
Marital status	0.01 (0.16)	-0.22 (-2.68)**	-0.02 (-0.23)	-0.03 (-0.36)	-0.41 (-9.01)**	-0.28 (-5.10)**
Education	0.004 (0.05)	-0.10 (-1.36)	0.02 (0.23)	-0.24 (-2.42)*	0.03 (0.84)	-0.04 (-0.78)
Likelihood Ratio X^2	20.91	19.29	33.39	21.18	37.48	19.88
DF	26	26	26	26	26	26
P	0.75	0.82	0.15	0.73	0.07	0.80
Cases	4,546	4,559	5,034	5,022	23,604	23,493

Source : 1988 October round Labor Force Survey

@ T = Taipei city

P = Taipei's periphery

O = Other areas

* Significant at 0.05 level

** Significant at 0.01 level

Figures in parentheses are Z scores.

Although, education is an important variable for the selectivity of extended commuters, it is not an important one for the selectivity of migrants. It has significant effect only on the stream of migrants moving from the periphery to other areas. Moreover, it has a negative instead of a positive effect on the two urban to rural streams, although only one of them reaches a 0.05 significant level.

For the remaining two variables -- sex and occupation, the selectivity of migration is similar but not as important for the selectivity of extended commuters, and has only minor differences. As shown in Table 8, males are more inclined to become migrants, although only two coefficients reach a significant level. Migrants moving out of Taipei city are composed of more blue collar workers. For other streams, white collar workers have greater probabilities of becoming migrants. Again, we find that only two coefficients are significant.

In brief, the discussion above suggests that the selectivity of migration and extended commuting differ mainly in two aspects -- age and marital status. Extended commuters are older and married, while migrants are younger and unmarried. To confirm this result, extended commuters are directly compared with their counterpart migrants. Since commuting has been suggested as a prelude for migration, migrants are assigned with code 1, and extended commuters code 0.

The results of the logit analyses for migrants versus extended commuters are shown in Table 9. It indicates that in terms of age the probability of being a migrant significantly differs from that of extended commuters with only one exception. The exception occurs to the stream moving from other areas to Taipei's periphery. Although migrants of this stream are younger than the extended commuters, the difference does not reach a 0.05 significant level. For other streams, migrants are all significantly younger than extended commuters.

Table 9: Results of the Logit Estimation for Migrants Versus Extended Commuters

	T to P	T to O	P to T	P to O	O to T	O to P _e
Constant	0.49 (4.65)**	0.28 (1.95)	1.45 (11.12)**	0.65 (4.70)**	-0.07 (-0.83)	-0.15 (-1.34)
Age	0.36 (3.14)**	0.35 (2.37)*	0.42 (3.31)**	0.40 (2.83)**	0.26 (2.99)**	0.13 (1.07)
Sex	-0.14 (-1.45)	-0.16 (-1.55)	-0.05 (-0.61)	-0.23 (-1.94)	-0.02 (-0.25)	0.06 (0.62)
Occupation	0.09 (0.80)	0.09 (0.74)	0.04 (0.42)	0.16 (1.28)	-0.19 (-2.79)**	-0.12 (-1.31)
Marital status	-0.01 (-0.14)	-0.25 (-2.34)*	-0.03 (-0.36)	0.07 (0.62)	-0.19 (-2.55)**	-0.27 (-2.94)**
Education	-0.20 (-1.80)	-0.28 (-2.37)*	-0.11 (-1.09)	-0.38 (-2.92)**	0.03 (0.39)	-0.06 (-0.67)
Likelihood Ratio X^2	14.55	27.29	29.84	20.79	37.34	25.53
DF	21	19	23	20	22	17
P	0.85	0.10	0.15	0.41	0.02	0.08
Cases	177	150	627	142	376	188

Source : 1988 October round Labor Force Survey

@ T = Taipei city

P = Taipei's Periphery

O = Other areas

* Significant at 0.05 level

** Significant at 0.01 level

Figures in parentheses are Z scores.

Data of Table 9 basically give support to our previous result that single people are more inclined to be migrants. Although only three coefficients which reach a 0.01 or 0.05 significant level, five out of six coefficients have a negative sign. It is interesting to note that marital status has a significant effect on the two long-distance streams. This is in accord with the selectivity of migrants.

The effect of moving direction is also observed for the variable of education. Although coefficients for most of the movement types are negative, only two of them are significant at either 0.05 or 0.01 level. They are the movements from Taipei and its periphery to other areas. These phenomena suggest that less well-educated persons are possibly return migrants from Taipei metropolis to other areas.

V. Summary and Discussion

Basically, data shown in this paper render support to the two hypotheses listed in this paper. Initially, we found that volume of extended commuters supersede that of migrants. We estimate that there were 250 thousand people who daily commute in and out of Taipei city. Meanwhile, there were only 186 thousand migrants who moved in and out of Taipei city in the preceding year. In addition we found that 24.1% of Taipei's periphery residents worked outside of the unit. An overwhelming majority of them worked in Taipei city. It implies that the periphery is often used as the domestic residence for Taipei city workers. Thus there is a substantial loss in the tax base from Taipei city to its periphery.

Secondly, we have found that extended commuters and migrants come from different groups. Migrants are positively selected from their origins. They are younger and mostly unmarried. This is especially true for long-distance migration. The selectivity of extended commuters is somewhat different. The most important variable is occupation. Blue collar workers are more likely to journey daily out of Taipei city to work in its periphery and other areas. On the contrary, there are more white collar workers who commute from Taipei's periphery and other areas to work in Taipei city or from the periphery to other areas. Age and marital status for most types of extended commuters do not differ from that of their counterpart stayers.

When migrants are directly compared with extended commuters, we find that migrants are younger than extended commuters. Of marital status and education, migrants are unmarried and with less education, although their differences mostly do not reach the 0.05 signifi-

cant level. It seems that direction and distance of movements are related to the effect of these two variables.

In brief, our data suggest that migrants and extended commuters do come from different groups. Since they differ in terms of age and marital status, we thus believe that their differences reflect differences in social constraints instead of the least effort principal.

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臺北都會區之遷徙與通勤

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(中文摘要)

本研究的目的是探討都會區遷徙與通勤之相互關係。探討的重點有二：一為兩者在量方面的關係，我們猜測臺北都會區通勤的數量已步入超越遷徙人數的階段。其二為遷徙者與通勤者之間是否具有替代的關係，或者是通勤者與遷徙者是來自不同的群體。

民國七十七年十月份的勞動力調查資料在分析以後，其結果顯示，臺北都會區之通勤人數已遠超過遷徙人數。其次我們也發現，遷徙者與通勤者是來自不同的群體。對遷出地而言，遷徙者是正性選擇，他們比遷出地居民年輕，大多未婚。這種選擇性在長程遷徙者中尤其顯著。而通勤者之選擇性則不同。他們的年齡與婚姻狀況與居住地一般居民雷同，所從事的職業卻有顯著的不同，臺北市之藍領階級供職於外圍城鎮或其他地區者顯著多於一般居民。反過來，從外圍城鎮與其他地區到臺北市工作的通勤者，其白領階級的比例則顯著多於居住地之一般居民。

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