

Return and Onward Migrations of the Young Labor Force in Taiwan: Evidence from the Data of the 1990 Census

Ji-Ping Lin* Kao-Lee Liaw**

(ABSTRACT)

This paper is to identify and assess the determinants of 1985-90 interprefectural return and onward migrations of the young non-native labor force (aged 25-29 in 1990) in Taiwan, by applying a three-level nested logit model to Appendix h previous migration outcome and (2) the responsiveness to economic opportunities. The following are the main findings. First, disappointments are more likely to result in return migrations, whereas onward migrations are more prone to be induced by the pursuits of newly emerged or better opportunities; however, a large proportion of returnees remain subject to the effects of market forces. Second, the U-shaped effect of previous migration distance in the return/onward model not only supports the disappointment hypothesis, but also reveals its effects on the depreciation of location-specific capital left behind and on the ability to finance further move. Third, return migration is selective of the less educated labor force as opposed to the very strong positive pattern of its onward counterpart. Fourth, agricultural workers are particularly prone to re-migrate and choose return option from prefectures with a high non-agricultural share of total employment. Fifth, the relative sensitivity of male and female labor force could be explained to be substantially affected by the patriarchal ideology; within this value system, breadwinners are (1) more prone to move onward, (2) less prone to return, and (3) more responsive to the pushes and pulls of market forces than non-breadwinners,

Key words: return migration, onward migration, disappointment hypothesis, responsiveness hypothesis, location-specific capital

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台灣年輕勞動力回流及重覆流動： 1990 年普查資料分析

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(中文摘要)

本文利用行政院主計處 1990 年戶口及住宅普查資料，運用三層式巢狀邏輯模型，分析及評估 1985-90 年間台灣年輕勞動力回流及重覆流動之決定因子。為解釋回流及重覆勞動力流動，除了一般的學理依據之外，本文論述亦強調所謂的「失望假說」及「反應假說」之重要性，本研究主要發現如下。第一、對前次流動結果感到“失望”者於決定再次遷徙時較易選擇回流流動，然有一部分回流流動和連續流動原因類似，即追逐較佳機會所致。第二、前次流動在回流／連續流動模型之 U-型效應不只支持“失望假說”，亦顯示“家鄉”的區域性資本之貶值效應。第三、回流者通常係教育程度較低者，但該負向教育選擇性不若連續流動的正向教育選擇性般強烈。第四、不在本籍之農事工作者較不在本籍之非農事工作者有較高再流動之傾向，且當決定再次流動時，前者較易選擇回流流動。第五、女性勞動力再次流動亦可能受到所謂的「父權意識型態」之影響，致使家計負責人（大都為男性）較非家計負責人有較高的流動傾向，且於再次流動時較易選擇連續流動，並對勞動市場之推－拉作用亦較非家計負責人敏感。

關鍵字：回流流動、連續流動、失望假說、反應假說、區域性資本

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I. Introduction

The central theme of this paper will emphasize two views on the causes of repeat migrations of the labor force that have different policy implications. Reasons for stressing these two views are mainly based on the existing theories (Morrison, 1971; Yezer and Thurston, 1976; Da Vanzo, 1981; Herzog and Schlottmann, 1982; Grant and Vanderkamp, 1986) and the empirical findings on repeat migration (e.g. Miller, 1977; Long, 1988; Newbold and Liaw, 1994).

The first view is based on the disappointment hypothesis (Grant and Vanderkamp, 1986). In this view, repeat migration is considered as an action of correcting previous migration mistake. A high level of repeat migration is taken as evidence of the inefficiency of migration process, which can be rectified by a policy that improves the quality of information about the economic opportunities in different markets. Thus, the success of such a policy will result in a reduction of unnecessary repeat migrations, especially those that occur soon after previous moves.

Inspired by previous theoretical studies and empirical findings on migration, the second view is to stress that repeat migrations are an outcome of the response of previous migrants to the adjustment process of market over time. In this view, a high level of repeat migration is thus considered as the responsiveness of the labor force to the changing spatial pattern of the demand for labor, in the sense that previous migrants

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continue to move to places where new economic activities are emerging or better opportunities become available. Therefore, repeat migrations serve a role of promoting the efficiency of market adjustment and there is no need to propose a policy aiming at intervening the phenomena of pervasive repeat migrations. This view will be termed as the responsiveness hypothesis in this paper.

By decomposing repeat migration into return migration and onward migration, previous research suggests that information-related and economic factors are less important in explaining return migration, because of the intervening effects of location-specific capital left behind and the familiarity of previous migrants with their "home" region. In spite of this, return migrants still respond to the economic conditions of home region in a rational way. By contrast, onward migrants are found to be more aware of and sensitive to the spatial economic opportunities than return migrants, suggesting that onward migrants relatively are more sensitive to the spatial economic variations. In addition, onward migrants tend to behave more like migration risk-takers as opposed to the risk-avoiding tendency of returnees (Da Vanzo, 1981 and, 1983; Newbold and Liaw, 1994; Newbold, 1996).

However, as noted by Morrison and Da Vanzo (1986), the characteristics of repeat migrants, either return or onward, tend to vary with the tempo of making a subsequent move. It was found that those who rapidly return tend to differ distinctly from those who rapidly move onward and those returnees with longer absences. Fast return migration tends to select those with less human capital and those whose previous moves turned out to be disappointing or unsuccessful in the labor market, whereas non-fast return migration is less selective or even nonselective. By contrast, onward migration, either fast or non-fast, is selective of the more educated, mostly with salaried professional and managerial occupations. Therefore, the determinants of repeat migration may vary with different sources of migration data. Since the repeat migration of a disappointed previous migrant tends to occur quickly following the initial move, the data from a cross-sectional survey that yield re-migration information within a shorter time interval like one year period (Lin et al, 1999) tend to support the disappointment hypothesis. By contrast, longitudinal data are more suitable for the study of the responsiveness of previous migrants to the market forces, because of its temporal depth.

Compared with annual surveys and longitudinal data, census data tend to have less temporal specificity to allow critical tests of both viewpoints. Moreover, because of lacking the information on the timing of migration, the 5-year-period census data will include both cases of fast and non-fast repeat migrations. Therefore, it is expected that the effects of information-related factors, such as previous migration distance and education, on return migration revealed by the census won't be very distinctive. Note that the information recorded in the census is right-censored (e.g. information on occupation is measured in 1990 rather than in 1985), it has a potential danger of misinterpreting the effect of a specific variable on the decision of repeat migration. Despite this shortcoming, the census data have a very broad spatial coverage and the advantage of containing the whole population, enabling us to conduct a comprehensive analysis on repeat migration.

This paper is to identify and assess the determinants of 1985-90 interprefectural return and onward migrations of the young (aged 25-29 in 1990) labor force in Taiwan, by applying a three-level nested logit model to the rich data of the 1990 census. Since disappointments are more likely to result in return migrations, and onward migrations are more prone to be induced by the pursuits of newly emerged or better opportunities, the separation of repeat migrations into return and onward types is expected to throw clearer lights on the determinants related to the disappointment and responsiveness hypotheses, respectively.

This paper is structured as follows. Section 2 describes the data and a three-level nested logit model, consisting of the departure, return/onward, and onward destination choice models. Section 3 discusses the selection of explanatory variables. Section 4, 5, and 6 reports the empirical findings from the three models, respectively. Section 7 is the conclusion.

II. Data and Statistical Model

The data set is a multidimensional tabulation disaggregated from the full records of the 1990 Taiwanese census. The geographic units for defining migration are the 23 prefectures of Taiwan, including 7 major cities and 16 "hsien". As a proxy for the prefecture of birth, "native domicile" is used to define the nativity status (native-born

versus non-native) of a person. In this paper, those residing in their prefecture of native domicile in 1985 are defined as natives, otherwise non-natives. The population in question (or potential migrants, *PM*'s) are the Taiwanese *non-native* young labor force aged 25-29 in 1990¹. A non-native is classified as a *repeat migrant* if her/his 1985 and 1990 prefectures of residence are different, otherwise as a stayer². A repeat migrant is classified as a *return migrant* if she/he migrated back to her/his prefecture of native domicile in 1985-90, otherwise as a *onward migrant*³.

To formulate the statistical model of explaining the behaviors and identifying the determinants of repeat labor migration in 1985-90, we stratify the choice set of a non-native into a three-level hierarchy (Herzog and Schlottmann, 1982). *At the top level*, the non-native faces the choice of being a repeat migrant or a stayer. If the non-native decides to migrate, the choice at *the middle level* is either to return or to move onward. In case the non-native decides to make an onward migration, the choice at *the bottom level* is to select a specific destination in the set of the remaining prefectures. Based on a discrete choice theory (Ben-Akiva and Lerman, 1985; Kanaroglou et al, 1986), the probabilities of making the choices at the three levels can be linked to the observable attributes of both the choice-makers and the alternatives in the choice set via a three-level nested logit model, consisting of a departure model at the top level, a return/onward model at the middle, and an onward destination choice model at the bottom (Newbold and Liaw, 1994).

1. Departure model: the top level

The probability of a non-native i departing from her/his prefecture of residence o , $P_i(o)$, is formulated as:

¹ The so-called "Chinese Mainlanders" and foreigners are excluded out of this research. Reasons for excluding them are discussed in Lin and Liaw (1998).

² A shortcoming of the census data is that using the 1985 and 1990 prefectures of residence to distinguish migrants from stayers always results in an undercount of migrations, especially fast repeat migrations. Because of this shortcoming, the study based on the census data tends to understate the importance of disappointment hypothesis.

³ It is important to note that because census can not capture the incidences of fast repeat migration (operationally defined as an action of migration quickly occurs again after the initial move) in 1985-90, the level of migration revealed by the census tends to be underestimated.

$$(1.a) \quad P_i(o) = \frac{\exp(V_{oi})}{1 + \exp(V_{oi})}, \quad V_{oi} = B_a + B_b X_{oi} + B_c I_{oi};$$

where V_{oi} represents the difference in utility between the rest of the country and prefecture o perceived by the non-native i ; B_a is the coefficient of constant term, B_b is a row vector of unknown coefficients associated with the column vector X_{oi} , the elements of which consist of the personal characteristics of i and the place attributes of o as well as their interactions; B_c is the coefficient of the so-called inclusive variable I_{oi} , which is defined as

$$(1.b) \quad I_{oi} = \text{Ln} \left(\sum_{i \in \text{the } P^{\text{Ms}}} [1 + \exp(V_{Ri})] \right);$$

note that I_{oi} represents the attractiveness of the rest of the country perceived by the non-native i and that its coefficient B_c is theoretically bounded between 0 and 1. The values of I_{oi} in (1.b) is aggregated from the return/onward model in (2.a). The meaning of V_{Ri} is defined in the return/onward model.

2. Return/onward model: the middle level

Under the condition that the non-native i decides to migrate, the probability of the non-native i returning to her/his prefecture of native domicile R , $P_i(R)$, is also formulated by a binary logit probability:

$$(2.a) \quad P_i(R) = \frac{\exp(V_{Ri})}{1 + \exp(V_{Ri})}, \quad V_{Ri} = C_a + C_b X_{Ri} + C_c I_{Ri};$$

where V_{Ri} is the difference in the utility of returning to native domicile R and making onward migration, perceived by the non-native migrant i ; C_a is the coefficient of constant term, C_b is a row coefficient vector associated with column vector X_{Ri} , which elements consist of the personal characteristics (e.g. sex and education) of i and the ecological variables (the socioeconomic attributes like income level and employment growth) of native domicile R ; C_c is the coefficient of the inclusive variable I_{Ri} and is theoretically bounded between -1 and 0; the inclusive variable I_{Ri} , which values are aggregated from (3), is formulated as below:

$$(2.b) \quad I_{Ri} = \text{Ln} \left(\sum_{d \in D} \exp(V_{di}) \right);$$

note that I_{Ri} represents the aggregate attractiveness of the prefectures excluding R and O perceived by migrant i , and that $1 - P_i(R)$ simply represents the conditional probability of choosing onward option. Note that V_{di} is defined in the onward destination choice model.

3. Onward destination choice model: the bottom level

Under the condition that the non-native i decides to depart and to make onward migration, the probability of choosing a specific destination d from the choice set D (the set of all possible destinations excluding R and O), $P_i(d)$, is formulated by a multinomial logit probability, reading as

$$(3) \quad P_i(d) = \frac{\exp(V_{di})}{\sum_{d' \in D} \exp(V_{d'i})}, \quad V_{di} = B_d X_{di}, \quad d \in D;$$

where V_{di} represents the utility of destination d perceived by the non-native i ; B_d is a row coefficient vector associated with column vector X_{di} which elements consist of the observable explanatory variables (including the ecological variables of d and the interaction terms of personal characteristics of i with the ecological variables of d).

4. Estimation method and the assessment of explanatory power

The input data sets for the three models are multidimensional tabulations of the young adult non-natives in the labor force. The unknown coefficients are estimated by the maximum quasi-likelihood method through the Newton-Raphson algorithm (McCullagh, 1983; Liaw and Ledent, 1987). The estimation method is applied sequentially from the bottom to the top level. Since the number of observations for each model is very large⁴, the estimates of unknown coefficients can be empirically considered as being normally distributed, and the t-ratio of an estimated coefficient (i.e.

⁴ In the departure branch, there are 122,191 observations representing 320,898 non-natives aged 25-29 in the labor force. In the return/onward branch, there are 48,911 observations representing 65,850 non-native young migrants. The estimation results of onward destination choice are based on 668,157 bundles of 21 observations (corresponding to 21 potential destinations) representing 39,339 onward migrants.

the estimated coefficient divided by the corresponding asymptotic standard error) with a magnitude of more than 1.96 can be viewed as statistically significant.

The goodness of fit of a specification of the model is measured by the Rho-square defined as $\Delta^2 = 1 - L / L_o$, where L is the logarithm of maximum quasi-likelihood of the specification in question, and L_o is the logarithm of maximum quasi-likelihood of the null model (i.e. the model including only the constant term). Although this statistic is theoretically bounded between 0 and 1, the ceiling of it is empirically much less than one so that a value of 0.2 can represent an ideal fit (McFadden, 1974).

This research presents the estimation result of the “best model”, namely, the model in which all the explanatory variables are of statistically significant and substantively meaningful. To assess the relative explanatory power of the subsets of explanatory variables in the best model, we delete each subset in turn from the best model and compare the resulting decreases in Rho-square defined as $\Delta^2 - \Delta^2(R)$, where Δ^2 and $\Delta^2(R)$ are the corresponding Rho-square of the best model and the reduced model, respectively. The assessment principle is: the greater the decrease in the Rho-square, the more important the deleted subset of explanatory variables⁵.

III. Hypotheses and Selection of Explanatory Factors

The selection of explanatory factors is in close relation to the hypothesis that we wish to test in the model. Since the personal factors and prefectural attributes affecting primary migration (migration of the natives) can also affect return and onward migrations, the explanatory factors used to explain primary migration in Lin and Liaw (1998) are also used in this study. For detailed descriptions, please refer to the Appendix part.

In addition, the *distance to native domicile* is incorporated as an additional explanatory factor in the departure and return/onward models. This factor is used as a proxy for the previous migration distance of the non-natives, although a non-native might have migrated more than once so that the last move might not be from the prefecture of native domicile. The effects of this factor may be *non-monotonic*, because

⁵ Note that this assessment method does not take into account the dimension of degree of freedom. For details, see Lin and Liaw (1998).

it is related not only to the reliability of information used in previous migration, but also to the costs of previous migration and the speed at which the location-specific capital in native domicile depreciates. Due to *the budget constraint* (Lin et al, 1999), it may also affect the ability to finance a repeat migration. Its expected effects are presented below.

Since the quality of information used in the previous migration tends to deteriorate with longer migration distance, a previous migrant who came from a more distant prefecture is more likely to be disappointed and hence to re-migrate. According to the disappointment hypothesis, the distance to native domicile can be expected to have a *positive effect* on the probability of making repeat migration.

Through its effect on the ability to preserve the value of location-specific capital in the native domicile, the distance to native domicile can also be expected to have a strong *negative effect* on the propensity of making return migration⁶. Like other forms of capital, the location-specific capital left in the native domicile tends to depreciate with the duration of absence. One way to avoid or slow down this depreciation for a previous out-migrant is to maintain ongoing contacts with relatives/friends in the native domicile, including frequent mutual visits. In Taiwan, such direct contacts tend to decrease sharply with an increase in distance and may become rather infrequent beyond 50 or 100 kilometers⁷. Thus, to the extent that the attraction of location-specific capital left behind is crucial for return migration, return propensity is expected to decrease sharply with the distance to native domicile up to about 50 or 100 kilometers⁸. Beyond these distances, the magnetic effect of location-specific capital may be neutralized and eventually overwhelmed by the disappointment (or information) effect so that the propensity to return may remain low for some distances and then increase with the distance to native domicile.

On the other hand, since location-specific capital in the native domicile does not

⁶ This negative effect may be somewhat strengthened by the fact that for a return migrant, the distance to native domicile represents not only the previous migration distance but also the current migration distance, which has a positive effect on the out-of-pocket moving cost of current migration and is hence expected to have a negative effect on the propensity to make a return migration, *ceteris paribus*. The out-of-pocket moving cost, especially over short distances, tends to be rather small according to the cost-benefit calculation (Sjaastad 1961).

⁷ The main reason is not due to the constraint of transportation system. Rather, it is mainly due to the fact that the average range of daily life in Taiwan is relatively much shorter than that in North America. For example, as revealed by the 1990 Taiwanese census, the commuting distance of the labor force is barely over 50 kilometers.

⁸ For fast repeat migrations, the effect of the depreciation of location-specific capital left in previous residence tends to be relatively unimportant for different levels of previous moving distance, because of the shortness of the duration of absence (i.e. the shortness of the depreciation period). For details, see Lin et al (1999).

have a direct effect on the propensity to make onward migration, the effect of the distance to native domicile on onward migration is expected to reflect only the disappointment effect. Namely, the longer the distance of previous migration, the greater the propensity of making onward migration⁹. Therefore, the strong attractiveness of location-specific capital in the native domicile over short distances implies that the return/onward ratio tends (1) to be rather high at a short distance and then (2) to decrease sharply with an increase with previous migration distance. By *countering* the disappointment effect, it also implies that the departure propensity (the sum of return migration propensity and onward migration propensity) may be a rather weak positive function of the distance, unless the distance is quite large (say, beyond 200 kilometers).

Also note that if previous migration distance is quite long, the behaviors of repeat migration may be affected by the budget constraint: the longer the previous migration distance, the less the resources left for a migration after the initial move. Since a return migrant can benefit from the help of relatives/friends in the native domicile, the main effect of budget constraint is mainly limited to onward migration. However, the effect of budget constraint may not be important for *non-fast onward migrants*, because they might have gained sufficient benefits from previous migration which facilitate to overcome such a constraint. As a result, the return/onward ratio is expected to increase with an increase in the distance to native domicile at relatively long distances.

IV. Findings from the Departure Model

Estimation of the departure model is based on the 122,191 records representing 320,898 non-native young adults in the labor force. The estimation results of the best departure model is summarized in Table 1, while the aggregate observed and predicted departure rates by a set of explanatory variables are shown in Table 2. By comparing the observed and predicted figures in Table 2, the best departure model does fit the data very well, although the corresponding Rho-square is only 0.0660. The observed overall departure rate of the young non-natives was as high as 21%, which was slightly more

⁹ When dealing exclusively with fast repeat migrations, the positive relationship between onward migration propensity and previous moving distance may be reversed at relatively long distances due to the effect of budget constraint. For details, see Lin et al (1999).

than two times the rate of their native counterparts (Lin and Liaw, 1998), suggesting the non-natives indeed were rather footloose.

The most important factors in the departure model are *marital status and sex*. The estimated coefficients of the dummy variables for marital status and their interactions with sex suggest that the migration behaviors of the young non-natives were affected not only by the incidence of *change in marital status*¹⁰ but also by the norm of Taiwan's *patriarchal society*. The positive coefficients of Married (0.239), Divorced/Separated (0.238), and Widowed (0.477) indicate that the married, divorced/separated and widowed young adults were more prone to re-migrate than those who remained single. Since the young adults in the 25-29 age group in 1990 were in the 20-24 age group in 1985, those who were in any one of the non-single marital statuses in 1990 were most likely to have experienced a change in marital status during 1985-90. Therefore, these positive coefficients suggest that change in marital status tended to increase the propensity of re-migration. The effects of the patriarchal society are revealed by the large positive coefficients of the interaction terms, Married*Female (0.706) and Divorced/ Separated*Female (0.965), which indicate that the enhancing effect of either getting married or becoming divorced/separated on re-migration propensity tended to be much stronger for females than for males. The observed departure rates were quite consistent with the multivariate results (Table 2): 29% for the married females versus 21% for the married males; 36% for the divorced/separated females versus 20% for the divorced/separated males.

In addition to enhancing the positive effect of change in marital status on the re-migration propensities of females, the norm of patriarchal society in Taiwan also affected *the relative sensitivity* of breadwinners (mostly males) and non-breadwinners to the market forces. The positive coefficient of Breadwinner (0.520) reveals that breadwinners were more migratory than non-breadwinners in general. Furthermore, the negative coefficients of Employment Growth (-0.034) and Employment Growth* Breadwinner (-0.085) indicate that the retention effect of employment growth was much stronger on breadwinners than on non-breadwinners, whereas the positive coefficient of

¹⁰ It is very important to note that because the young non-natives aged 25-29 were in the prime age of marriage during 1985-90, those whose marital status being recorded as non-single (i.e. married, divorced/separated, and widowed) at the time of census mostly likely had experienced the incidence of marital status change in 1985-90.

Rural Unemployment Rate*Breadwinner (0.111) shows that the push effect of high unemployment rate was statistically significant on only the breadwinners of rural prefectures. Therefore, these findings can be considered as a consequence of the fact that under the patriarchal system of Taiwan, breadwinners are expected to assume much more *responsibility for familial economic well-beings* than are non-breadwinners.

The best departure model provides substantial supports on *the responsiveness hypothesis*. First, consistent with the findings from North American censuses (Long, 1988; Newbold and Liaw, 1994), the increasingly positive coefficients of the dummy variables representing higher levels of education (0.125 for Junior High, 0.136 for Senior High, 0.486 for College, and as high as 1.033 for University) indicate that the re-migration propensities increased with educational attainment and were particularly high at the university level. Since the better educated tended to have better information and were less likely to be disappointed by the outcome of the previous migration, their stronger propensities to re-migrate could not be due to greater disappointment. Rather, the higher propensities should be attributed to their greater willingness to move to places with better or newly emerged opportunities. Second, the estimated coefficients of labor market variables indicate (1) that the non-natives in general were more likely to out-migrate from the prefectures with low employment growth, (2) that the non-natives in the service sector had a rather strong tendency to remain in a prefecture where many service jobs had presumably been created by a large local government expenditure per capita. Third, the increasing importance of Taipei City as a World City in the late 1980s, offering many high-skilled jobs, was reflected by its strong capacity to retain its college- and university-educated non-natives. Fourth, the expansion of the large-scale Science Park in Hsinchu City (Taiwan's Silicon Valley) in the 1980s was also reflected by its strong power to retain its non-natives.

The best departure model also provides some supports for *the disappointment hypothesis*, partly due to the inclusion of fast repeat migrants in the census. First, the positive coefficient (0.231) of the variable Ln(Distance to Native Domicile) suggests that the propensity to make repeat migration indeed increased with the distance of previous migration, supporting the reasoning that the longer the previous migration distance, the less reliable the information used, the more likely the disappointment with

the outcome of previous migration, and thus the greater the re-migration propensity. Consistent with the multivariate finding, both observed and predicted departure rates were an increasing function of previous moving distance (Table 2). Second, contrary to the non-agricultural workers who are shown to be less likely to re-migrate from a prefecture with a high proportion of its total employment in the non-agricultural sector, the agricultural workers are shown to be highly prone to depart from such a prefecture. This result suggests that the agricultural workers who previously migrated to a prefecture with few agricultural job opportunities were most likely to be disappointed and hence to re-migrate.

The best departure model also suggests that the farmland in the native domicile might be a very important form of *location-specific capital* for agricultural workers. Contrary to the large negative coefficient (-0.9337) in the departure model of their native counterparts (Lin and Liaw, 1998), the coefficient of Agricultural Worker (0.740) turned out to be highly positive in the departure model of the non-natives. This sharp contrast suggests that farmland in the native domicile had a very strong power to retain the native agricultural workers and to pull back the non-native agricultural workers.

As suggested by the positive coefficients of Population Density (0.0231, $t=5.6$) and $\text{Ln}(\text{Housing Cost})$ (0.3297, $t=3.4$) in the best model, concerns with the *quality of life* and *cost of living* were also important to the departure decisions of the young non-natives: the non-natives were subject to the push effects of high population density and high housing cost. Note that housing cost was not a statistically significant factor in the departure model of the young adult natives (Lin and Liaw, 1998), most likely because many of the young natives were living in their parental homes and did not have to pay the rent.

Finally, the negative coefficient of $\text{Ln}(\text{Population Size})$ (-0.3325, $t=18.6$) indicates that more populous prefectures had a stronger retention power on the young adult non-natives. By contrast, the positive coefficient of Inclusive Variable (0.5783, $t=16.7$) shows that the aggregate attractiveness of the rest of Taiwan had a very strong power to draw out the young adult natives.

V. Findings from the Return/Onward Model

Estimation of the return/onward model is based on the 48,911 records representing 65,850 non-native migrants aged 25-29 in the labor force, of which 26,511 were observed to make return migration. The estimation results of the best return/onward model is summarized in Table 3, whereas the observed and predicted indices of return/onward choices are shown in Tables 2 and 4. The high Rho-square (0.1607) and the closeness between observed and predicted indices in Tables 2 and 4 show that the best return/onward model fits the data very well.

First of all, the estimation results indicate that the most important determinant was the *distance of previous migration* (measured by the distance to the prefecture of native domicile). As suggested by the estimated coefficients of $\ln(\text{Distance to Native Domicile})$ and Distance to Native Domicile (-0.696 and 1.470, respectively), the effect of distance to native domicile on the return/onward ratio was indeed *U-shaped*¹¹: the declining part suggested that at relatively short distances, the distance's depreciation effect on the location-specific capital in the native domicile outweighed its disappointment effect, whereas the rising part suggested that at relatively long distances, its disappointment effect on onward migration was partially neutralized by the effect of budget constraint. As a matter of fact, the non-linear effect of previous migration distance in the return/onward model is better revealed by the observed patterns of return and onward migration rates with respect to various levels of previous moving distance in Table 2: return migration rate was a U-shaped function of previous migration distance¹², whereas onward migration rate increased almost monotonically with previous migration distance.

In light of the very strong concave effect of previous migration distance on the return propensity, the variable of previous migration distance *won't* exhibit significant *linear effect* in the return/onward model. This may help explain why findings of

¹¹ Let X be a positive-valued explanatory variable, the effect of X represented by the functional form of $a \cdot \ln(X) + b \cdot X$ is (1) concave if $a < 0$ and $b > 0$; (2) convex if $a > 0$ and $b < 0$; (3) monotonic positive if both a and $b > 0$; and (4) monotonic negative if both a and $b < 0$.

¹² The main features of the U-shaped pattern of the return migration rate were (1) a very sharp decrease from 12.8% in the interval of 0-25 kilometers to 9.4% in the 25-50 interval and 6.2% in the 50-75 interval and (2) a sharp increase from 6.3% in the 100-200 interval to 7.9% in the 200-300 interval and 10.4% beyond 300 kms.

previous research on the linear effect of previous migration distance for return migration was inconclusive or insignificant. It is also important to note (1) that the sum of both return and onward migration rates, representing repeat migration rate, was an increasing function of previous migration distance, which is consistent with the multivariate finding in the best departure model that previous migration distance had a positive effect on the departure propensity of the young non-natives, and (2) that the strong positive effect of previous migration distance in the departure model was mainly shaped by its strong positive effect on the propensity of making onward migration. In short, the effects of distance to native domicile turned out to be consistent with the expectations derived in Section III from the disappointment hypothesis and the notions of capital depreciation and budget constraint.

The second most important factor affecting the choices of the young non-native migrants between return and onward options was *educational attainment*. As indicated by the estimated coefficients for the dummy variables of educational level (-0.243 for Senior High, -0.561 for the College, and -0.754 for University), education had a negative effect on the return/onward ratio. Consistent with the observed pattern of educational selectivity in Table 2, this effect was due to (1) the slightly negative selectivity in return migration (9.3% for those with primary education and 7.8% for those with university education) and (2) the very strong positive selectivity in onward migration (10.5% for those with primary education and 18.7% for those with university education), implying that the better educated, especially the university-educated, were much more likely to take the risk of making onward migration.

In addition to the strong effect of educational attainment, the effects of *occupational qualification and industrial category* also helped reveal a general pattern that repeat migrants with poorer and less adaptable human capital were more prone to return than to move onward. The positive coefficient of Low-skilled Labor (0.2349) indicates that the low-skilled laborers who migrated again tended to have a higher return/onward ratio. Similarly, the highly positive coefficient of Agricultural Worker (0.7906) shows that the re-migrated agricultural workers, being largely without useful skills in urban areas and presumably also subject to the strong attraction of location-specific capital (farmland) in the native domicile, were much more prone to return. Note

**Table 1. Estimation Results of the Departure Model for the Non-native Labor Force Aged 25-29
: Based on the 1990 Population Census, Taiwan.**

Explanatory Variable	The Best Model		Relative Importance	
	Coef.	t	Decrease in Rho-square	Rank of Importance
Constant Term	-2.1558	-11.6		
I. Personal Attributes				
1. Effects of Marital Status and Sex(Refe.: Single)			0.0196	1
Married	0.2392	11.6		
Married*Female	0.7060	28.2		
Divorced/Separated	0.2375	2.4		
Divorced/Separated*Female	0.9647	8.0		
Widowed	0.4772	3.0		
2. Effects of Education(Refe.: At-most Junior High Schooling)			0.0102	2
Junior High	0.1254	3.9		
Senior High	0.1360	4.4		
College	0.4860	13.5		
At-least University	1.0333	27.3		
3. Effect of Breadwinner Status(Refe.: Non-breadwinner)			0.0013	9
Breadwinner	0.5201	12.6		
4. Effect of Industry (Refe.: Non-agricultural Worker)			0.0011	11
Agricultural Worker	0.7401	11.8		
5. Effect of Previous Migration Experience			0.0044	4
Log(Distance to Native Domicile)	0.2307	23.4		
II. Ecological Variables and Interaction Terms				
1. Effect of Size of Ecumene			0.0027	6
Log(Population Size)	-0.3325	-18.6		
2. Effect of Quality of Life			0.0003	14
Population Density	0.0231	5.6		
3. Effects of Employment Structure			0.0064	3
Log(Non-agri. Share of Total Employment)	-2.6229	-23.1		
Log(Non-agri. Share of Total Employment)*Agricultural Worker	4.6873	19.4		
4. Effect of Housing Cost			0.0001	15
Log(Housing Cost)	0.3297	3.4		
5. Effects of Employment Growth			0.0012	10
Employment Growth	-0.0342	-5.2		
Employment Growth*Breadwinner	-0.0849	-7.8		
Employment Growth*Female*Low-skilled Labor	-0.0166	-2.0		
6. Effect of Unemployment			0.0003	12
Rural Unemployment Rate*Breadwinner	0.1107	5.9		
7. Effect of Local Finance			0.0019	8
Local Government Expenditure Per Capita*Service Sector Worker	-0.4295	-15.5		
8. Effects of World City			0.0035	5
World City	0.6359	15.9		
World City*College	-0.4251	-9.3		
World City*At-least University	-0.7904	-17.1		
9. Effect of World City Suburban			0.0003	13
Science Park	-0.3968	-5.7		
10. Effect of the Attractiveness of the Rest of the System			0.0022	7
Inclusive Value	0.5783	16.7		
Rho-square	0.0660			
No. of Explanatory Variables(Excluding Constant Term)	27			

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Table 2. Observed and Predicted Rates of Return and Onward Migrations for the Non-native Labor Force Aged 25-29 by Sex and Marital Status, Education, Breadwinner Status, Industry, Occupation, Origin, and Distance to the Native Domicile : Based on the 1990 Census, Taiwan.

	At-risk Population		Repeat Mig. Rate		Return Mig. Rate		Onward Mig. Rate		Observed Return/Onward Mig. Rate (%)
	Volume (Persons)	Composition (%)	Observed (%)	Predicted	Observed (%)	Predicted	Observed (%)	Predicted	
Total	320,898	100.0	20.5	20.5	8.3	8.2	12.3	12.3	67.4
1. Male									
<i>Single</i>	99,398	52.9	16.6	16.5	6.9	6.7	9.7	9.8	71.0
<i>Married</i>	86,473	46.1	20.9	20.9	7.4	7.5	13.6	13.5	54.4
<i>Div/Sep</i>	1,729	0.9	20.2	20.2	9.3	8.9	11.0	11.3	84.2
<i>Widowed</i>	124	0.1	21.0	27.4	11.3	13.7	9.7	13.7	116.7
2. Female									
<i>Single</i>	56,025	42.1	14.8	15.0	5.8	6.5	9.0	8.5	64.4
<i>Married</i>	73,876	55.5	29.0	29.0	12.6	11.9	16.5	17.1	76.5
<i>Div/Sep</i>	2,814	2.1	36.3	36.3	17.8	17.6	18.5	18.7	96.5
<i>Widowed</i>	459	0.3	27.7	25.9	15.3	13.9	12.4	12.0	122.8
3. Education									
<i>Primary</i>	23,001	7.2	19.8	19.8	9.3	9.2	10.5	10.6	88.6
<i>Junior High</i>	75,780	23.6	19.7	19.7	9.2	9.0	10.5	10.7	87.2
<i>Senior High</i>	126,376	39.4	18.9	18.9	8.0	7.8	10.9	11.1	73.1
<i>College</i>	54,266	16.9	21.1	21.1	7.5	7.6	13.6	13.5	55.2
<i>University</i>	41,475	12.9	26.6	26.6	7.8	8.1	18.7	18.5	41.9
4. Breadwinner Status									
<i>Breadwinner</i>	117,361	36.6	21.3	21.3	6.5	6.3	14.8	15.0	43.7
<i>Non-breadwinner</i>	203,537	63.4	20.1	20.1	9.3	9.3	10.8	10.8	86.1
5. Industry									
<i>Primary</i>	9,531	3.0	26.8	26.8	20.1	19.9	6.6	6.9	303.8
<i>Secondary</i>	134,454	42.8	19.8	19.9	8.3	8.2	11.5	11.7	72.4
<i>Tertiary</i>	170,517	54.2	21.0	20.7	7.7	7.5	13.4	13.2	57.2
6. Occupation									
<i>Professional</i>	41,676	13.8	26.3	24.1	8.4	7.9	17.9	16.2	46.7
<i>Managerial</i>	2,401	0.8	20.4	21.3	5.9	7.2	14.6	14.0	40.3
<i>Low-skilled</i>	40,663	13.4	20.1	19.7	9.6	9.3	10.5	10.4	91.4
<i>Others</i>	218,024	72.0	19.7	20.0	8.2	8.1	11.5	11.9	71.3
7. Origin*									
<i>Most Urbanized Areas</i>	228,147	71.1	17.0	17.0	6.3	6.3	10.6	10.8	59.4
<i>Other Major Cities</i>	27,996	8.7	19.5	21.3	8.8	9.8	10.7	11.5	82.8
<i>Rural Prefectures</i>	64,755	20.2	33.4	32.4	14.8	14.2	18.6	18.2	79.7
8. Distance to Native Domicile(KM)									
<i>0- 25</i>	54,751	17.1	18.1	18.1	12.8	12.3	5.4	5.7	237.0
<i>25- 50</i>	54,464	17.0	20.8	20.6	9.4	9.8	11.4	10.9	82.1
<i>50- 75</i>	34,793	10.8	19.4	19.7	6.4	7.1	13.0	12.6	48.9
<i>75-100</i>	24,536	7.6	20.9	20.5	6.2	6.2	14.7	14.3	42.5
<i>100-200</i>	95,095	29.6	20.2	20.7	6.3	6.1	13.8	14.6	45.9
<i>200-300</i>	51,700	16.1	22.7	21.5	7.9	6.8	14.8	14.7	53.0
<i>300 +</i>	5,559	1.7	32.5	36.4	10.4	16.4	22.1	20.0	46.8

* The most urbanized areas include Taipei City, Taipei Hsien, and Taoyuan Hsien of northern Taiwan, Taichung City of Central Taiwan, and Kaohsiung City of southern Taiwan. Other major cities are Cities of Keelung, Hsinchu, Chiayi, and Tainan. The remaining prefectures are classified as rural prefectures.

**Table 3. Estimation Results of the Return/Onward Model for the Non-native Labor Force Aged 25-29
: Based on the 1990 Population Census, Taiwan.**

Explanatory Variable	The Best Model		Relative Importance	
	Coef.	t	Decrease in Rho-square	Rank of Importance
Constant Term	0.5297	2.5		
I. Personal Attributes				
1. Effects of Marital Status and Sex(Refe.: Single)			0.0036	4
Married	0.9471	11.9		
Married*Female	-0.5338	-13.0		
Divorced/Separated	0.2580	3.4		
Widowed	0.6776	3.2		
2. Effects of Education(Refe.: At-most Junior High Schooling)			0.0079	2
Senior High	-0.2427	-9.0		
College	-0.5614	-16.0		
At-least University	-0.7535	-20.7		
3. Effect of Breadwinner Status(Refe.: Non-breadwinner)			0.0039	3
Breadwinner	-0.9792	-15.7		
4. Effect of Industry (Refe.: Non-agricultural Worker)			0.0005	17
Agricultural Worker	0.7906	5.5		
5. Effect of Occupation (Refe.: Non-low-skilled Labor)			0.0007	14
Low-skilled Labor	0.2349	6.9		
6. Effect of Previous Migration Experience			0.0169	1
Log(Distance to Native Domicile)	-0.6960	-29.1		
Distance to Native Domicile	1.4698	19.1		
II. Ecological Variables and Interaction Terms				
1. Effect of Size of Ecumene			0.0010	13
Log(Population Size)	0.3525	7.8		
2. Effect of Quality of Life			0.0019	7
Population Density	-0.1514	-11.1		
3. Effects of Employment Structure			0.0016	9
Log(Non-agri. Share of Total Employment)	0.6142	4.1		
Log(Non-agri. Share of Total Employment)*Agricultural Worker	-3.0743	-8.1		
Log(Non-agri. Share of Total Employment)*Service Sector Worker	0.3908	4.8		
4. Effects of Employment Growth			0.0027	6
Employment Growth	0.0772	3.7		
Employment Growth*Female	-0.0349	-2.0		
Employment Growth*Breadwinner	0.1769	10.0		
5. Effect of Housing Growth			0.0005	16
Housing Growth	0.2730	5.7		
6. Effect of Unemployment			0.0012	10
Rural Unemployment Rate*Breadwinner	-0.2395	-8.7		
7. Effect of Household Income			0.0010	11
Household Income Differential	0.0107	8.1		
8. Effects of Local Finance			0.0031	5
Local Government Expenditure Per Capita	1.0476	9.9		
Local Government Expenditure Per Capita*Service Sector Worker	0.3836	6.3		
9. Effects of World City			0.0007	15
World City	-0.5828	-4.6		
World City*College	0.6226	4.0		
World City*At-least University	0.8240	5.5		
10. Effect of World City Suburban			0.0002	18
World City Suburban	0.2589	3.2		
11. Effect of Science Park			0.0010	12
Science Park	0.8593	8.1		
12. Effect of the Attractiveness of the Rest of the System			0.0019	8
Inclusive Value	-0.3575	-11.1		
Rho-square	0.1607			
No. of Explanatory Variables(Excluding Constant Term)	31			

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Table 4. The Observed and Predicted Proportions of Return In-migrants in the Labor Force Aged 25-29 by Marital Status and Sex, Education, Breadwinner Status, Industry, Occupation, and Origin: Based on the 1990 Population Census, Taiwan.

Personal Characteristics	Return In-migrants		Proportion of Return In-migrants (%)											
	Volume (Persons)	Composition (%)	Northern Taiwan			Central Taiwan		Southern Taiwan		Other Major Cities	Other Rural Prefectures			
			Taipei City	Taipei Hsien	Hsinchu City	Taichung City	Taichung Hsien	Kaohsiung City	Kaohsiung Hsien					
Total	26,511	100.0	6.8	11.7	<i>(Observed)</i>			2.6	6.5	3.6	6.2	9.8	51.4	
1. Male														
Single	6,828	51.0	6.2	10.8	1.1	1.8	5.2	2.8	5.1	7.5	59.5			
Married	6,382	47.7	5.7	13.0	1.3	2.6	7.5	3.6	5.9	10.2	50.2			
Div/Sep	160	1.2	4.4	10.6	0.0	1.9	5.6	2.5	6.9	5.6	62.5			
Widowed	14	0.1	7.1	7.1	0.0	0.0	7.1	0.0	7.1	14.3	57.1			
2. Female														
Single	3,254	24.8	9.1	9.3	1.0	2.3	4.9	3.4	5.8	8.0	56.2			
Married	9,301	70.9	7.3	12.4	1.9	3.2	7.5	4.3	7.3	11.9	44.2			
Div/Sep	502	3.8	6.2	9.4	1.8	2.0	6.0	2.6	7.0	10.8	54.4			
Widowed	70	0.5	8.6	5.7	0.0	1.4	5.7	4.3	12.9	15.7	45.7			
3. Education														
Primary	2,144	8.1	3.5	13.2	0.7	1.7	5.8	2.1	6.6	7.7	58.7			
Junior High	6,960	26.3	4.0	11.1	1.1	1.9	6.1	2.7	6.3	8.3	58.4			
Senior High	10,075	38.0	7.5	12.6	1.4	2.9	7.2	4.3	6.7	10.6	46.9			
College	4,078	15.4	8.6	11.7	1.8	3.2	6.6	3.7	6.0	10.5	47.9			
University	3,254	12.3	10.4	8.9	2.1	2.8	5.9	4.0	4.7	11.4	49.8			
4. Breadwinner Status														
Breadwinner	7,604	28.7	9.4	16.6	1.7	3.1	7.4	5.1	6.2	11.9	38.5			
Non-breadwinner	18,907	71.3	5.8	9.7	1.3	2.3	6.2	2.9	6.3	9.0	56.6			
5. Industry														
Primary	1,920	7.3	0.7	2.6	0.4	0.4	5.7	1.0	7.0	5.4	76.8			
Secondary	11,163	42.7	5.1	13.8	1.8	2.0	7.1	3.2	6.6	10.3	50.0			
Tertiary	13,052	49.9	9.1	11.4	1.2	3.3	6.2	4.2	5.8	10.2	48.6			
6. Occupation														
Professional	3,485	13.7	7.9	9.5	2.2	2.4	6.4	4.0	5.9	11.0	50.8			
Managerial	141	0.6	14.2	16.3	0.7	3.5	7.1	2.1	4.3	8.5	43.3			
Low-skilled	3,909	15.4	2.5	11.3	0.9	1.4	6.2	2.6	5.9	8.9	60.3			
Others	17,883	70.4	7.2	12.0	1.4	2.7	6.6	3.7	6.5	9.7	50.2			
7. Origin*														
Most Urbanized Areas	14,432	54.4	8.8	13.6	1.0	0.9	6.7	1.5	7.1	8.4	51.9			
Other Major Cities	2,476	9.3	5.2	9.9	0.6	1.3	2.3	2.4	4.8	3.5	70.0			
Rural Prefectures	9,603	36.2	4.3	9.1	2.2	5.3	7.3	7.0	5.3	13.7	45.8			
Total	26,269	100.0	6.5	12.3	<i>(Predicted)</i>			3.0	5.7	3.3	5.6	8.6	54.0	
1. Male														
Single	6,648	50.0	6.9	12.1	0.9	3.1	5.8	3.1	5.3	8.1	54.7			
Married	6,473	48.7	5.3	12.5	0.9	3.2	5.8	3.2	5.5	8.7	54.8			
Div/Sep	154	1.2	6.8	10.9	1.1	2.8	5.2	3.6	5.3	9.1	55.2			
Widowed	17	0.1	4.8	3.5	0.8	2.0	7.7	0.0	4.3	10.4	66.4			
2. Female														
Single	3,622	27.9	8.3	13.0	1.0	3.0	6.1	3.5	5.2	8.9	50.8			
Married	8,795	67.8	6.3	11.9	1.2	2.9	5.5	3.3	6.2	8.5	54.2			
Div/Sep	496	3.8	6.2	14.1	1.3	2.8	5.2	3.4	6.2	10.5	50.4			
Widowed	64	0.5	8.2	7.9	0.6	1.8	4.4	3.0	7.2	9.6	57.3			
3. Education														
Primary	2,126	8.1	4.0	12.2	0.6	2.1	4.0	2.4	6.3	6.4	62.0			
Junior High	6,801	25.9	4.3	11.4	0.7	2.3	5.0	2.7	5.7	7.6	60.3			
Senior High	9,868	37.6	6.0	13.9	1.1	3.2	6.0	3.6	5.7	9.0	51.6			
College	4,128	15.7	8.7	11.9	1.4	3.8	6.6	3.6	5.4	9.3	49.4			
University	3,346	12.7	11.3	10.2	1.5	3.6	6.3	3.8	5.3	9.8	48.4			
4. Breadwinner Status														
Breadwinner	7,395	28.2	7.7	16.7	1.2	3.5	5.7	4.1	5.4	10.1	45.6			
Non-breadwinner	18,874	71.8	6.0	10.6	1.0	2.8	5.7	3.0	5.7	8.0	57.2			
5. Industry														
Primary	1,896	7.4	1.2	4.9	0.4	1.1	5.2	1.2	6.5	4.1	75.4			
Secondary	11,067	43.0	5.1	13.3	1.1	2.8	5.7	3.0	5.8	8.9	54.4			
Tertiary	12,787	49.7	8.6	12.5	1.1	3.5	5.7	3.9	5.3	9.0	50.3			
6. Occupation														
Professional	3,308	45.6	8.6	9.9	1.3	3.5	6.0	3.9	5.9	9.3	51.5			
Managerial	174	2.4	8.6	19.0	1.5	4.0	7.4	3.7	3.0	9.4	43.4			
Low-skilled	3,766	52.0	3.3	11.2	0.7	2.0	4.8	3.0	6.0	7.8	61.1			
Others	17,670	243.8	6.7	12.7	1.1	3.1	5.7	3.2	5.6	8.5	53.4			
7. Origin*														
Most Urbanized Areas	14,303	54.4	8.8	15.3	1.0	1.4	6.4	1.5	5.7	8.7	51.1			
Other Major Cities	2,745	10.4	4.6	14.7	0.5	1.4	2.7	2.5	5.6	4.4	63.7			
Rural Prefectures	9,221	35.1	3.5	6.9	1.2	6.0	5.5	6.2	5.6	9.7	55.4			

* See Table 2.

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Table 5. Estimation Results of the Destination Choice Model for the Non-native Onward Migrants in the Labor Force Aged 25-29: Based on the 1990 Population Census, Taiwan.

Explanatory Variable	The Best Model		Relative Importance	
	Coef.	t	Decrease in Rho-square	Rank of Importance
1. Effects of Distance to the Potential Destination				
Log(Distance to Potential Destination)	-0.5085	-46.0	0.0168	2
Log(Distance to Potential Destination)*At-least College	0.1913	16.7		
2. Effects of Contiguity to the Potential Destination				
Contiguity	0.3574	10.3	0.0025	8
Contiguity*Married	0.1754	5.6		
3. Effect of the Size of Ecumene				
Log(Population Size)	1.3478	63.2	0.0390	1
4. Effect of Quality of Life				
Population Density	-0.1014	-12.2	0.0012	11
5. Effects of Employment Structure				
Log(Non-agri. Share of Total Employment)	2.0519	15.6	0.0042	4
Log(Non-agri. Share of Total Employment)*Agricultural Worker	-4.7498	-14.5		
Log(Non-agri. Share of Total Employment)*Service Sector Worker	1.0591	6.9		
6. Effects of Employment Growth				
Employment Growth	0.3325	16.1	0.0026	7
Employment Growth*Female	-0.2614	-14.2		
Employment Growth*Professional/Managerial	0.1103	2.4		
Employment Growth*Non-world City*Low-skilled Labor	0.0819	5.6		
7. Effect of Unemployment				
Unemployment Rate*Low-skilled Labor	-0.1783	-4.3	0.0001	13
8. Effect of Housing Growth				
Housing Growth	0.4778	20.7	0.0032	6
9. Effects of Household Income Differential				
Household Income Differential*College	0.0090	2.2	0.0001	14
Household Income Differential*At-least University	0.0170	3.8		
10. Effect of Housing Cost				
Log(Housing Cost)*Married	-1.1630	-17.8	0.0024	9
11. Effects of Local Finance				
Local Government Expenditure Per Capita	0.7043	10.2	0.0039	5
Local Government Expenditure Per Capita*Service Sector Worker	0.5270	17.0		
12. Effects of World City				
World City	-0.6704	-13.1	0.0018	10
World City*College	0.5594	7.1		
World City*At-least University	0.9460	11.6		
13. Effects of World City Suburban				
World City Suburban*Primary Education	0.1519	2.2	0.0002	12
World City Suburban*Junior High	0.1935	4.7		
14. Effect of Science Park				
Science Park	0.2648	3.3	0.0048	3
Science Park*College	0.5739	4.6		
Science Park*At-least University	1.7985	18.3		
Rho-square	0.2426			
No. of Explanatory Variables(Excluding Constant Term)		28		

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Table 6. The Observed and Predicted Destination Choice Proportions of Onward In-migrants in the Labor Force Aged 25-29 by Marital Status and Sex, Education, Breadwinner Status, Industry, Occupation, and Origin : Based on the 1990 Population Census, Taiwan.

Onward In-migrants			Destination Choice Proportion of Onward In-migrants (%)								
Personal Characteristics	Volume (Persons)	Composition (%)	Northern Taiwan			Central Taiwan		Southern Taiwan		Other Major Cities	Other Rural Prefectures
			Taipei City	Taipei Hsien	Hsinchu City	Taichung City	Taichung Hsien	Kaohsiung City	Kaohsiung Hsien		
<i>(Observed)</i>											
Total	39,339	100.0	19.6	31.5	2.5	6.3	5.6	6.8	5.7	12.8	9.1
1. Male											
Single	9,623	44.7	23.4	32.1	3.1	5.8	5.0	5.9	5.6	11.1	8.0
Married	11,727	54.4	13.6	33.2	1.9	6.7	7.0	7.1	6.7	14.3	9.5
Div/Sep	190	0.9	16.8	31.6	2.1	6.8	9.5	11.1	3.7	11.1	7.4
Widowed	12	0.1	16.7	16.7	0.0	0.0	16.7	8.3	8.3	8.3	25.0
2. Female											
Single	5,052	28.4	33.2	28.9	2.5	6.1	3.5	5.7	4.4	9.3	6.5
Married	12,158	68.4	17.1	30.8	2.7	6.4	5.6	7.5	5.4	14.2	10.4
Div/Sep	520	2.9	13.8	26.0	1.3	7.3	6.7	10.2	4.2	17.3	13.1
Widowed	57	0.3	8.8	22.8	5.3	5.3	1.8	8.8	7.0	14.0	26.3
3. Education											
Primary	2,421	6.2	10.1	32.5	1.6	5.1	8.3	6.5	6.5	15.0	14.4
Junior High	7,979	20.3	11.6	34.9	1.1	6.0	7.3	7.0	7.4	14.3	10.3
Senior High	13,785	35.0	17.5	31.8	1.2	6.7	6.1	7.7	6.8	13.1	9.0
College	7,390	18.8	23.5	30.6	2.3	7.0	4.8	6.5	5.1	12.2	8.0
University	7,764	19.7	30.8	27.9	6.7	5.5	3.1	5.6	2.2	10.8	7.4
4. Breadwinner Status											
Breadwinner	17,385	44.2	17.7	31.9	2.1	6.8	6.1	7.3	6.1	13.3	8.7
Non-breadwinner	21,954	55.8	21.1	31.2	2.8	5.9	5.3	6.5	5.3	12.5	9.4
5. Industry											
Primary	632	1.6	7.0	13.0	0.5	6.0	8.2	9.8	7.6	12.3	35.6
Secondary	15,423	39.7	14.0	34.5	3.1	5.2	6.9	6.1	6.8	14.9	8.5
Tertiary	22,836	58.7	23.7	30.1	2.2	7.0	4.8	7.2	4.9	11.4	8.7
6. Occupation											
Professional	7,467	20.1	23.4	27.5	6.4	5.7	3.9	6.6	4.0	13.0	9.6
Managerial	350	0.9	24.0	31.7	2.0	7.7	5.7	7.1	6.3	9.7	5.7
Low-skilled	4,276	11.5	8.6	37.7	1.1	4.5	7.8	6.0	8.7	15.4	10.2
Others	25,088	67.5	20.1	31.6	1.6	6.6	5.9	7.0	5.8	12.5	9.0
7. Origin*											
Most Urbanized Areas	24,297	61.8	19.5	35.1	2.7	4.4	6.2	4.0	7.6	12.6	7.9
Other Major Cities	2,992	7.6	26.3	23.6	2.4	4.2	2.8	7.8	2.5	10.2	20.2
Rural Prefectures	12,050	30.6	18.1	26.2	2.2	10.6	5.1	12.3	2.6	14.1	8.7
<i>(Predicted)</i>											
Total	39,581	100.0	20.7	30.4	2.5	6.6	4.6	6.8	4.3	12.7	11.5
1. Male											
Single	9,712	45.0	22.8	32.0	2.6	7.8	4.5	6.5	3.7	11.6	8.5
Married	11,636	54.0	17.5	28.9	2.3	7.3	5.4	7.1	5.1	14.6	11.8
Div/Sep	196	0.9	20.2	32.9	1.4	8.0	5.1	7.3	3.8	12.1	9.3
Widowed	17	0.1	22.3	30.9	2.1	7.8	4.9	7.8	3.7	11.4	9.2
2. Female											
Single	4,775	26.5	26.9	32.3	2.8	5.5	3.4	6.4	3.2	10.0	9.4
Married	12,664	70.3	19.6	29.8	2.5	5.3	4.4	6.8	4.4	12.9	14.2
Div/Sep	526	2.9	21.0	34.1	1.4	6.1	4.4	7.4	3.6	10.9	11.1
Widowed	55	0.3	20.6	32.3	1.4	6.7	4.3	8.7	3.4	10.9	11.8
3. Education											
Primary	2,439	6.2	17.3	28.8	1.2	6.6	5.2	7.0	4.9	14.9	14.1
Junior High	8,138	20.6	16.8	31.5	1.2	6.8	5.1	6.9	4.9	14.3	12.5
Senior High	13,992	35.3	16.1	32.7	1.3	6.7	4.9	7.3	5.0	13.6	12.5
College	7,340	18.5	23.9	28.9	2.3	6.8	4.4	6.9	3.8	12.0	10.9
University	7,672	19.4	31.1	27.1	6.5	5.8	3.5	5.6	2.7	9.4	8.1
4. Breadwinner Status											
Breadwinner	17,594	44.5	19.4	30.3	2.3	7.1	4.9	6.9	4.5	13.3	11.2
Non-breadwinner	21,987	55.5	21.7	30.5	2.6	6.2	4.3	6.7	4.1	12.2	11.7
5. Industry											
Primary	656	1.7	6.9	20.8	1.1	4.7	7.5	3.9	9.2	11.4	34.6
Secondary	15,702	40.3	15.4	32.1	2.1	6.4	5.5	5.9	5.0	14.8	12.7
Tertiary	22,587	58.0	24.9	29.4	2.7	6.8	3.9	7.5	3.7	11.3	9.9
6. Occupation											
Professional	6,744	59.6	28.0	26.9	4.4	6.3	4.0	6.5	3.5	10.5	10.0
Managerial	338	3.0	17.2	35.3	3.2	6.0	4.8	5.6	4.0	13.4	10.5
Low-skilled	4,227	37.4	13.4	32.0	1.3	6.4	6.3	6.6	5.2	15.9	13.0
Others	26,032	230.2	20.2	30.7	2.1	6.7	4.5	7.0	4.4	12.7	11.7
7. Origin*											
Most Urbanized Areas	24,573	62.1	22.7	36.2	2.5	4.3	4.4	3.3	4.1	13.1	9.2
Other Major Cities	3,232	8.2	24.0	25.2	2.0	6.8	4.3	9.6	4.2	9.6	14.3
Rural Prefectures	11,776	29.8	15.5	19.8	2.5	11.2	5.1	13.2	4.7	12.7	15.3

* See Table 2.

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that the observed return/onward ratio was 91.4% for low-skilled laborers and 303.8% for agricultural workers, compared with 67.4% for all young adult repeat migrants in the labor force.

Findings on *the joint effects of marital status and sex* were also noteworthy. First, when repeat migration was triggered by marriage, the young non-natives were more prone to return than to move onward. However, this return tendency was reduced substantially for females, because under Taiwan's patriarchal ideology a bride is expected to move to her groom's place of residence in general. Second, when repeat migration was induced by unsuccessful marriage experience or by the incidence of spousal death, the young non-natives were more prone to return rather than to move onward.

The influence of patriarchal value system was also revealed by *the sharp contrast between breadwinners and non-breadwinners* in their return/onward choices. As indicated by the large negative coefficient of Breadwinner (-0.979), breadwinners were less prone to choose return option. In other words, with a greater responsibility to improve familial economic well-being, breadwinners were more prone to take the risk of making onward migration. This multivariate finding is consistent with the observed differences in both return migration rate (6.5% for breadwinners versus 9.3% for non-breadwinners) and onward migration rate (14.8% for breadwinners versus 10.8% for non-breadwinners) in Table 2.

Although those repeat migrants with poorer human capital were more prone to return than to move onward, return migrants were still responsive to the differences in *economic opportunities in the native domiciles*. In other words, the native domiciles with better economic opportunities were more capable of getting back their departed natives. The coefficients of Employment Growth (0.0772), Employment Growth*Female (-0.0349), and Employment Growth*Breadwinner (0.1764) indicate (1) that a native domicile with a higher employment growth rate tended to be more capable of attracting back repeat migrants, and (2) that this attraction was weaker for females but stronger for breadwinners. The negative coefficient of Rural Unemployment Rate*Breadwinner (-0.2395) shows that the re-migrated breadwinners were less likely to return to the native domiciles with higher unemployment rates. As indicated by the positive coefficient of

Household Income Differential (0.0107), repeat migrants were also more likely to return to the native domiciles with higher income levels. The positive coefficients of Local Government Expenditure Per Capita (1.0476) and its interaction with Service Sector Worker (0.3836) show that a native domicile with relatively high local government expenditure per capita that presumably created more jobs in the service sector tended to have a stronger ability to attract repeat migrants, especially those who were service workers. Furthermore, the coefficients of Ln(Non-agricultural Share of Total Employment) (0.6142) and its interactions with Service Sector Worker (0.3908) and Agricultural Worker (-3.0743) suggest that a native domicile with a higher proportion of employment in non-agricultural sectors was more able to attract repeat migrants, especially the service sector workers, but it tended to repel the repeat migrants who were agricultural workers. This finding suggests that the similarity between a prefecture's industrial structure and the repeat migrants' job-specific skills enhanced its ability to attract return migrants.

The best return/onward model also shows that return migrants also responded in a rational way to *the economic restructuring and globalization* in the late 1980s. The coefficients of World City (-0.5828) and its interactions with College (0.6226) and University (0.8240) indicate that among Taipei City's departed natives who decided to re-migrate, the less educated were discouraged from returning, whereas the better educated, especially those with university education, were encouraged to return. The positive coefficient of World City Suburban (0.2589) suggests that the re-migrating natives of Taipei Hsien were more prone to return. The large positive coefficient of Science Park (0.8593) indicates that the re-migrating natives of Hsinchu City were highly prone to be attracted back by the new opportunities generated by the expansion of high-tech industries.

The best return/onward model also suggests that the repeat migrants' propensities to choose the return option were also affected by the quality of life, housing opportunities, and population size in the native domicile. The coefficients of Population Density (-0.1514) and Housing Growth (0.2730) show that these propensities were weakened by a high population density and strengthened by a high housing growth. The positive effect of Ln (Population Size) (0.3525) shows that the return propensities were enhanced by

the population size of native domicile. Also, note that the negative coefficient of Inclusive Variable (-0.3575), which is properly bounded between 0 and -1, indicates that the perceived utility of making onward migration had the expected negative effect on the propensities to choose the return option.

Additional insights are revealed by the distribution of return migrants into different destinations (Table 4). In general, return migrations were mainly *urban-to-rural* in orientation, with 52% of returnees ended up in rural prefectures. Note that the most urbanized areas were the major origins of the largest return flows, mainly because they had a relatively high non-native share of population. Also, it is worthy of stressing that triggers of *urban-to-rural return migrations* were highly related to the disappointment and location-specific capital left in the native domiciles, whereas *rural-to-urban* and *urban-to-urban* return migrations were largely induced by labor market forces. Since those with better education tend to be more capable of taking the opportunities in the labor market, it is not surprising that the shares of return migrants by Taipei City as a destination increased strongly with education (from 3.5% at the primary level to 10.4% at the university level), whereas the corresponding shares by rural destinations tended to decrease with education (from 58.7% and 58.4% at the primary and junior high levels to 47.9% and 49.8% at the college and university levels). Note that return migrants received by Taipei City were also strongly over-represented by breadwinners and professionals/managers.

VI. Findings from the Onward Destination Choice Model

Estimation of the onward destination choice model is based on the 31,817 observations representing 39,339 onward migrants in the labor force aged 25-29 (in 1990). The estimation results of the best model are shown in Table 5, with the observed and predicted destination choice proportions of onward migrants by a set of explanatory variables being summarized in Table 6. Since the Rho-square of the best model is as high as 0.2426 and the predicted figures in Table 6 provide a good fit¹³ of the observed ones, the best onward destination choice model thus fits the data well.

¹³ Because the best onward destination choice model does not contain much information on the effects of marital status and sex, the predicted figures by marital status and sex thus do not fit the observed ones very well.

The best model shows that onward migrants were *very responsive to the labor market factors* of destinations. The highly positive coefficient of Employment Growth (0.3325, compared with 0.0772 in the return/onward model) indicates that onward migrants were very strongly attracted to prefectures with higher employment growth rates. The positive coefficients of its interactions with Professional/Managerial (0.1103) and Non-world City*Low-skilled Labor (0.0819) suggest that this attraction was even stronger for professionals and managers, and for low-skilled laborers who went to prefectures other than Taipei City. However, the highly negative coefficient of its interaction with Female (-0.2814) shows that female onward migrants, whose repeat migrations were mainly due to marriage, were much less subject to its positive effect.

Somewhat more important than total employment growth were *the level and expansion of employment in non-agricultural*, especially the service sector. The highly positive coefficient of Ln (Non-agricultural Share of Total Employment) (2.0519, compared with 0.6142 in the return/onward model) indicates that onward migrants were also strongly attracted to the prefectures with a high proportion of the employment in non-agricultural sectors. The coefficients of its interactions with Service Sector Worker (1.0591) and Agricultural Worker (-4.7498) show that this attraction was particularly strong for service workers, but became reversed for agricultural workers. The positive coefficients of Local Government Expenditure Per Capita (0.7043) and its interaction with Service Sector Worker (0.5270) suggest that prefectures which had a relatively high local government expenditure per capita and presumably created more jobs in the service sector tended to have a stronger ability to attract onward migrants, especially those who were service workers.

Mainly due to its explanatory power *overlapping* with those of several other explanatory factors such as Non-agricultural Share of Total Employment and Local Government Expenditure Per Capita¹⁴, the income level of destination turned out to have limited attractive power in the multivariate context. The positive coefficients of the interactions of Household Income Differential with College (0.0090) and University

¹⁴ The explanatory powers of World City, Science Park, Population Size, and Housing Growth also overlapped substantially with that of Household Income Differential. For example, when World City is removed from the best model, the coefficients of Household Income Differential*College and Household Income Differential*University are increased substantially from 0.0090 and 0.0170 to 0.0280 and 0.0556, respectively. The associated t-values are also increased drastically from 2.2 and 3.8 to 11.1 and 21.3, respectively.

(0.0170) indicate that the onward migrants with college and especially university education were subject to the attraction of destination income level. Unemployment rate, which had little interprefectural variation, also turned out to have a limited effect. The negative coefficient of Unemployment Rate*Low-skilled Labor (-0.1783, $t=-4.3$) shows that low-skilled onward migrants tended to avoid going to the prefectures with a relatively high unemployment rate¹⁵.

In a highly selective way, onward migrants were very responsive to *the effects of economic restructuring and globalization*. The positive coefficients of Science Park (0.2648) and its interactions with College (0.5739) and University (1.7985) indicate that Hsinchu City, with a highly successful large-scale Science Park, was attractive to onward migrants, especially those with college and university education. The coefficients of World City (-0.6704) and its interactions with College (0.5594) and University (0.9460) suggest that Taipei City discouraged the settlement of less educated onward migrants (especially those with less than college education) but encouraged the entry of university-educated onward migrants. The positive coefficients of the interactions of World City Suburban with Primary Education (0.1519) and Junior High (0.1935) suggest that Taipei Hsien was attractive to the less educated onward migrants, including those who got a job in Taipei City but could not afford the city's high housing cost.

Onward migrants were also sensitive to the quality of life in their choices of destinations. The highly significant coefficients of Population Density (-0.1014, $t=-12.2$), Housing Growth (0.4778, $t=20.7$), and Ln (Housing Cost)*Married (-1.1630, $t=17.8$) suggest that the young adult onward migrants tended to avoid destinations with high population density and to select destinations with increasing housing opportunities, and that they were less prone to settle in the prefectures with high housing cost, if they became married.

As expected, the destination choice behaviors of onward migrants were subject to the strong effects of distance and contiguity. The coefficients of Ln (Distance to

¹⁵ The relative weak explanatory power in the multivariate context is partly due to the overlap of its explanatory power with that of Population Size, because these two explanatory factors are negatively correlated. When Population Size is deleted from the best model, the coefficient of Unemployment Rate*Low Skilled Labor is changed from -0.1783 to -0.4450, and the associated t-value is changed from -4.3 to -11.5.

Potential Destination) (-0.5085) and its interaction with At-least College (0.1913) indicate that the distance to potential destination had a negative effect, which was weaker for the better educated. The coefficients of Contiguity (0.3574) and its interaction with Married (0.1754) show that onward migrants, especially those who got married, were more prone to move to a neighboring than a non-neighboring prefecture. Compared with the corresponding research on the primary labor migration (Lin and Liaw, 1998), onward migrants were less subject to the distance-decay effect and more prone to select a neighboring prefecture. These contrasts reflect (1) that onward migrants, who had experienced at least one migration before, tended to have a **broader information field** than primary migrants, and (2) that a high proportion of onward migrations were probably triggered by **housing relocations** (which spilled over to a neighboring prefecture), following a job-oriented long distance migration.

Destination population size also had a very strong positive effect. In fact, the very strong attraction of destination population size to onward migrants was due to (1) that population size was positively associated with employment growth rate and income level, and negatively related to unemployment level, and (2) that Taipei Hsien, the most populous prefecture of Taiwan, absorbed the most number of onward migrants.

The distribution of onward migrants into different destinations, as shown in Table 6, reveals some further insights. In sharp contrast to the strong urban-to-rural orientation of return migrants, the flows of onward migrants were characterized (1) largely by the **inter-urban** and (2) partly by the **rural-to-urban** moves. Note that only 9.1% of onward migrants but as many as 51.4% of return migrants ended up in rural prefectures¹⁶. Another important feature of the destination choice pattern of onward migrants was that most of onward migrants chose only **a few highly urbanized destinations**, particularly the Taipei Metropolitan Area. As many as 78.1% of onward migrants and only 38.8% of return migrants ended up in the three major metropolitan areas (Taipei, Kaohsiung, and Taichung). Note that the Taipei area absorbed as many as 51.1% (19.6% for Taipei city and 31.3% for Taipei Hsien) of onward migrants and only 18.5% (6.8% for Taipei city and 11.7% for Taipei Hsien) of return migrants.

¹⁶ Although rural areas have a net gain of return migration, the net gain is not a very important factor to their population growth. In effect rural areas are still a loser of labor migration. The main reason is that they are associated with voluminous net loss in population from primary and onward migrations.

Moreover, the educational selectivity in the distributions of onward migrants into different types of destinations was also consistent with the multivariate findings in the sense that the responses of onward migrants to the economic restructuring and globalization in the late 1980s were highly selective by educational attainments. Taipei City's share of onward in-migrants increased from less than 20% at lower levels of education to 23.5% at the college level and 30.8% at the university level. Similarly, Hsinchu City's share of onward in-migrants increased from less than 2% at lower levels of education to 2.3% at the college level and 6.7% at the university level.

VII. Conclusion

By applying a three-level nested logit model to a multidimensional tabulation of the full records of the 1990 Taiwanese census, we have identified behaviors and major determinants of the 1985-90 migration of young non-native labor force in Taiwan. We have also gained supports for both disappointment and responsiveness hypotheses as well as the effects of Taiwan's patriarchal value system.

A strong support for the disappointment hypothesis was shown by the positive effect of previous migration distance (i.e. distance to native domicile) in the departure model. Its U-shaped effect in the return/onward model not only supported the disappointment hypothesis, but also revealed its effects on the depreciation of location-specific capital and on the ability to finance a repeat migration. Other supports for this hypothesis were that the return/onward ratio was a negative function of educational attainment, and that agricultural workers were particularly prone to re-migrate from prefectures with a high proportion of total employment in non-agricultural sectors.

Although the non-natives disappointed with the outcome of previous migration were more prone to make return migration, returnees were still subject to the effects of labor market forces in a rational way and were also responsive to the economic restructuring and globalization of the late 1980s. In general, prefectures of native domicile with better economic opportunities were more capable of getting back their departed natives, although more than 50% of return migrants ended up in rural prefectures. Among the re-migrating natives of Taipei City (the command center of Taiwan's economic system), the better educated were encouraged to return, whereas the

less educated were discouraged to do so. The re-migrating natives of Hsinchu City (Taiwan's Silicon Valley) were highly prone to be attracted back by the expansion of high-tech industries and other industries. It is worthy of noting that despite being very attractive, the total number of returnees and onward in-migrants of Hsinchu City is not numerous at all.

The destination choice behaviors of onward migrants showed very strong supports for the responsiveness hypothesis. Compared with return migrants, onward migrants were much more responsive to labor market forces, especially to employment growth. In response to the economic globalization, the best educated onward migrants were strongly attracted by Taipei City, whereas those with less education were more prone to head for its suburban prefecture, Taipei Hsien. Responding to the economic restructuring, the non-natives were also attracted to Hsinchu City in a highly selective way: very strong at the college level and extremely strong at the university level.

Repeat migration of the non-natives could also be affected by Taiwan's patriarchal value system. Being assigned with the major responsibility of improving family economic well-being within this value system, breadwinners were (1) more prone to migrate onward, (2) less prone to return, and (3) more responsive to the pushes and pulls of market forces than were non-breadwinners. Due to the structure of patrilineal family, change in marital status had a stronger effect on the re-migration propensities of females than on those of males.

The overall conclusion of this paper is that migrations of the young adult non-natives were highly responsive to the labor market forces. Even the return migrants, who were more prone to be disappointed with the outcome of previous migration and were less adaptive to the changing economic circumstances, were shown to respond to these forces in a rational way. Therefore, the corresponding policy implications are twofold. First, as a natural outcome of market adjustment, the responsiveness of repeat migrations to the market forces has the effect of promoting market efficiency, suggesting that there is no need to intervene such a process. Second, to reduce unnecessary repeat moves triggered by disappointment, the policy measure should be designed to facilitate those less capable of processing market information, mostly the less educated.

Appendix. Definition of Explanatory Variables

Breadwinner Status This variable assumes the value of 1 otherwise 0, if an individual reported that she/he was obliged to assume the responsibility of her/his family livelihood at the time of census. It is expected that breadwinners are more responsive to market forces than non-breadwinners.

Dummy Variable of the Agriculture Sector This variable assumes the value of 1 otherwise 0, if the type of economic activities an individual was engaging in at the time of census belonged to the "Primary Category of Agriculture, Forestry, and Fishing and Animal Husbandry" of the 1991 Standard Classification of Industry published by the Directorate-general of Budget, Accounting, and Statistics (DGBAS), Taiwan. Due to economic restructuring, agricultural workers are expected to be less responsive to market forces. Moreover, since they tend to be less educated, it is expected that they tend to be more subject to the effect of disappointment if their previous migration is not satisfactory.

Dummy Variable of the Industrial Sector This variable assumes the value of 1 otherwise 0, if the type of economic activities an individual was engaging in at the time of census belonged to the following "Primary Categories" of the 1991 Standard Classification of Industry of DGBAS: (1) Mining and Quarrying, (2) Manufacturing, (3) Electricity, Gas and Water, (4) Construction.

Dummy Variable of the Service Sector This variable assumes the value of 1 otherwise 0, if the type of economic activities an individual was engaging in at the time of census belonged to neither Agricultural Sector nor Industrial Sector mentioned above. Since those in the service sector tend to have better education, it is hypothesized that they are very responsive to market forces and are less likely to get "disappointed" if the decision of previous migration outcome is incorrect.

Dummy Variable of Low-skilled Laborers This variable assumes the value of 1 otherwise 0, if the occupational position of an individual in a specific entity of entrepreneur at the time of census belonged to either (1) the "Primary Category of Elementary Occupations" or (2) some other more detailed subcategories showing less-skilled requirement (identified by the

author) of the 1992 Standard Classification of Occupation by DGBAS. The use of this variable is to control for the effect of occupational hierarchy on the propensity of making a repeat move.

Population Size This variable is the average size of population at prefectural level during the period of 1985-90, derived from the 1985-90 Yearbooks of Manpower Survey in Taiwan by DGBAS. The unit is 1,000,000 persons. The use of this variable is to control for the effect of economic scale for a specific market. Since it is positively related to economic scale, we expect that repeat migrants (either returnees or their onward counterparts) are very subject to the responsive effect of population size.

Population Density This variable is the average population density at prefectural level during the period of 1985-90, derived from the 1993 Taiwan-Fukien Demographic Fact Book (Ministry of Interior, Taiwan, ROC). The unit is 1,000 persons/km squared. Since it is negatively related to environmental quality, we expect that it has a pushing effect in the departure model and a discouraging effect in the destination model. Note that this variable is used simply to control for the effect of environmental quality. It is irrelevant to disappointment hypothesis and responsiveness hypothesis.

Non-agricultural Share of Total Employment This variable is the average of the ratios of the non-agricultural labor force to the total labor force at prefectural level during the period of 1985-90, derived from the 1985-90 Yearbooks of Manpower Survey by DGBAS. The unit is percentage. The use of this variable is to control for the effect of regional economic structure. In other words, it is intended to reflect how potential and observed repeat migrants respond to regional economic structure.

Household Income This variable is the average household income at prefectural level during the period of 1985-90, derived from the 1985-90 Reports on Individual Income Survey by DGBAS. The unit is 10,000 NT dollars. It is used to control for the effect of responsiveness.

Employment Growth Rate This variable is the average of the annual rates of the civilian employment growth (the civilian employment growth divided by the year-end total employment) at prefectural level during the period of 1985-90, derived from the 1985-90 Yearbooks of Manpower Survey by DGBAS. The unit is percentage per year. It is used to

control for the effect of responsiveness.

Unemployment Rate This variable is the average of the annual unemployment rates at prefectural level during the period of 1985-90, derived from the 1985-90 Yearbooks of Manpower Survey by DGBAS. The unit is percentage. It is used to control for the effect of responsiveness.

Local Finance This variable is the average amount of the local government's expenditure per capita at prefectural level during the period of 1985-90, derived from the 1985-90 Urban and Regional Development Statistics by Council for Economic Planning and Development (CEPD). The unit is 10,000 NT dollars. It is used to control for the effect of responsiveness.

Housing Growth Rate This variable is the average annual growth rate of the floor area of new building construction at prefectural level divided by average prefectural population size during the period of 1985-90, derived from the 1985-90 Urban and Regional Development Statistics by CEPD. The unit is square meter/1,000 persons. Since part of the incidences of repeat migration is irrelevant to disappointment hypothesis and responsiveness hypothesis, the incorporation of this variable into the models is to control for the effect of housing resettlement.

Housing Cost This variable is the average housing expenditure share of total family expenditure at prefecture level during the period of 1985-90, derived from the 1985-90 Urban and Regional Development Statistics by CEPD. The unit is percentage. The use of this variable is also to control for the effect of housing resettlement.

Distance Used exclusively in the destination choice model, this variable represents the Euclidian distance between both population centers of the origin and the potential destination. The unit is 100 km. It represents (1) the distance of previous migration in the departure and return/onward models and (2) the distance of origin to a specific destination in the destination choice model. Since information quality of previous migration decision tends to deteriorate with longer previous migration distance, it is hypothesized that the longer the previous distance is, the worse the quality of previous migration information is, and thus a previous migrant is more likely to get "disappointed"; in other words, previous migration distance is expected to have a positive effect on the likelihood of making a repeat move. In the destination choice model, it is used to control for the effect of migration costs. Thus, its effect

is expected to be negative. Note that the effect of distance turns out to be very complex. For detailed discussion, see Lin et al. (1999).

Contiguity Used exclusively in the destination choice model, this variable is a dummy variable assuming the value of 1 otherwise 0, if the origin and the potential destination share the common borders. The purpose of using this variable is same as that of using distance. Its effect is expected to be opposite to that associated with distance. Note that the use of this variable is also intended to control for the case of short distance residential mobility.

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