Globalization and Urban-Rural Migration in Taiwan

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I Introduction

Labor Migration has long been discussed by economist since Adam Smith (1776). Most of the studies, however, have focused on rural-to-urban migration in less developing countries (LDEs) (Johnson, 1948; Lewis, 1954; Ranis and Fei, 1961; Jorgenson, 1967; Todaro, 1969, 1980; Rosenzweig, 1978, 1988; Stark, 1982, 1991; Stark and Bloom, 1985; Schiff, 1996; Taylor and Martin 2001). None opened up the possibility of urban-to-rural migration in developing or developed countries in the recent years due to the trade liberation and the globalization of markets and production.

Like most of other countries, Taiwan economy has been shaped by the globalization of markets and production and rapid technological innovation over the last decade. Both the real wages and employments of less-skilled workers have been seriously and persistently worsened in nonagricultural sector since 1994. The employment rates of males aged 25-54 with nine or less years of schooling dropped from 96% in 1994 to 87% in 2005 (Figure 1). Their real wages declined almost 1% per year since 1994. At the meantime, the number of migration of labors into the agricultural sector has outweighed the number of migration of labors out of agricultural sector. The net inflows of labors into the agricultural sector have been witnessed in Taiwan since 1998, especially for man and workers with 12 years of schooling and below. In this study, we examine the association of urban-to-rural migration with the deterioration of labor market in urban sector due to the globalization of markets and production. Throughout this study, urban sector has been identified with nonagricultural sector and the rural sector with agricultural one.

Two measures of the relative impacts of globalization on urban and rural labor markets: changes in rural-urban real earning differential and changes in the rural-urban probabilities of being employed. We, thus, address the following questions. What would be the changes in both rural-urban real earning differential and the rural-urban differential in the probabilities of being employed over the last decade? Can real earning differentials or employment

differentials, or both significantly influence the urban-to-rural migration decisions? Which one plays a pivotal role in the analysis? What would be the roles of individual or family characteristics in determining the urban-to-rural migration decisions?

The data used for this analysis are obtained from a series of 12 consecutive Manpower Utilization Surveys (MUSs) in Taiwan area from 1994 to 2005. Our empirical model is built on Todaro's expected-income model of migration with the human capital theory of migration. The Todaro model treats rural-urban migration as primarily an economic phenomenon, while human capital theory offers the explanations for migrant heterogeneity. As proposed by Todaro, each potential migrant decides whether or not to move from source sector to target sector mainly based on the expected income maximization. Individuals are assumed to migrate from urban to rural if their rural-urban expected income differentials exceed their migration cost. Expected rural income is the product of the rural earning and the probability that a potential migrant will succeed in working in the rural sector. While, expected urban income is the product of urban earnings and the probability of keeping the urban job.

The next section sets up a migration model to take into account both rural-urban migration and urban-rural migration. Accordingly, an estimation model is derived in section III. Data are discussed in section IV. Section V contains the main empirical results.

II. A Simple Model for Migration

In order to explicitly explore the effects of both changes in rural-urban real earning differential and changes in the rural-urban probabilities of being employed on the number of net inflows, we set up a simple model of the labor migration to analyze the determination of the number of workers moving out of urban sector and the determination of the number of workers moving out of rural sector.

The migration behavior implicitly imply two procedures. During the first step, individual

worker make a decision on whether to change job or not. Given changing job, the individual worker, in the second step, settle on whether to move out of current sector or not. Since each individual worker choose to move out of current sector is a random variable followed Bernoulli distribution with parameter *P*, the probability of moving out of current sector. Let M_t^U and M_t^R denote the number of workers moving out of urban sector at period t and the number of workers moving out of rural sector at period t, respectively. Then, M_t^U, the summation of the individual deciding to move out of urban sector among those who want to change jobs, follows a Binomial distribution $N\left(C_t^U, P_t^U\right)$. Similarly, M_t^R, the summation of the individual deciding to move out of rural sector, follows a Binomial distribution $N\left(C_t^R, P_t^R\right)$. C_t^U and C_t^R are the number of workers whose choose to change jobs in urban and rural sector respectively. P_t^U and P_t^R are the probability of moving out of urban and rural sector. The expected number of moving out of current sector would then be the followings:

$$E\left(M_t^U\right) = C_t^U P_t^U$$

$$E\left(M_t^R\right) = C_t^R P_t^R$$

The number of net inflow into rural sector is the difference between the number of workers moved out of urban sector and the number of workers move out of rural sector $M_t^U - M_t^R$. The expectation of net inflow into rural sector would be

$$\begin{aligned} E\left(M_t^U - M_t^R\right) &= C_t^U P_t^U - C_t^R P_t^R \\ &= C_t^U \left(P_t^U - P_t^R\right) + P_t^R \left(C_t^U - C_t^R\right) \end{aligned}$$

The expectation of net inflow into rural sector at period t is influenced by the differences

between the probabilities of moving out of urban sector and rural sector $P_t^U - P_t^R$ and the differences between the number of workers deciding to switch jobs in urban and rural sector $C_t^U - C_t^R$ at period t. Therefore, the changes in rural-urban real earning differential and changes in the rural-urban probabilities of being employed may influence the net inflows into rural sector through either the probabilities of moving out of current sector or the size of changing jobs in each sector.

Similarly, the sizes of changing job C_t^U and C_t^R are random variables with Binomial distributions $N\left(N_t^U, T_t^U\right)$ and $N\left(N_t^R, T_t^R\right)$, where N_t^U and N_t^R are the numbers of working population in urban and rural sectors in the beginning of the period, respectively. Both N_t^U and N_t^R are assumed to be exogenous. T_t^U and T_t^R are the probabilities of changing job in urban and rural sectors, respectively. The expectation of the difference between the number of workers deciding to switch jobs in urban and rural sector $C_t^U - C_t^R$ at period t, is therefore determined by the differences between the probabilities of changing jobs in urban sector and in rural sector $T_t^U - T_t^R$ and the differences between the number of population workers in both urban and rural sector $N_t^U - N_t^R$ at period t. Since N_t^U and N_t^R are the numbers of working population in urban and rural sectors in the beginning of the period, they are exogenous. The changes in rural-urban real earning differential and changes in the rural-urban probabilities of being employed may influence the size of changing jobs in each sector $C_t^U - C_t^R$ through their influence in the probabilities of changing job in urban and rural sectors $T_t^U - T_t^R$.

The theoretical channel that the changes in rural-urban real earning differential and changes in the rural-urban probabilities of being employed may influence the net inflows into

rural sector is built on Todaro's expected-income model of migration with the human capital theory of migration. The Todaro model treats rural-urban migration as primarily an economic phenomenon, while human capital theory offers the explanations for migrant heterogeneity. As proposed by Todaro, each potential migrant decides whether or not to move from source sector to target sector mainly based on the expected income maximization. Individuals are assumed to migrate from urban to rural if their rural-urban expected income differentials exceed their migration cost. Expected rural income is the product of the rural earning and the probability that a potential migrant will succeed in working in the rural sector. While, expected urban income is the product of urban earnings and the probability of keeping the urban job.

III. Econometric Model

In order to examine the roles of rural-urban real income differential and the employment opportunity differential on net inflows in rural sector $M_t^U - M_t^R$, we need to examine the impacts of rural-urban real income differential and the employment opportunity differential on the probabilities of moving out of current sector $P_t^U - P_t^R$ and the size of changing jobs in each sector $C_t^U - C_t^R$. While, the changes in rural-urban real earning differential and changes in the rural-urban probabilities of being employed may influence the size of changing jobs in each sector $C_t^U - C_t^R$ through their influence in the probabilities of changing job in urban and rural sectors $T_t^U - T_t^R$. The estimation strategies are to estimate the the impacts of rural-urban real income differential and the employment opportunity differential on the probabilities of moving out of current sector P_t^U and P_t^R and the probabilities of changing job in urban and rural sectors T_t^U and T_t^R. Two estimation

procedures are followed

In the first procedure, the estimation of the probability of changing jobs with the total working population in each sector is carried out by Probit model. Data on migrant are censored because they are observed only for those who migrate. Once, the predicted values of the probability of changing job can be calculated. In the second procedure, we estimate the migration decision only with the population who decide to change job in the first procedure. Migration decision is a binary decision. We estimate the probability of move out of their current sector by using conditional probit estimation model to investigate the association between the worsen labor market in urban sector with urban-rural migration behaviors.

IV. Data and Urban-Rural migration in Taiwan

A. Description of the Data

The data used for this analysis are obtained from a series of 12 consecutive Manpower Utilization Surveys (MUSs) in Taiwan area from 1994 to 2005. The MUSs, conducted by the Directorate-General of Budget, Accounting and Statistics (DGBAS) Executive Yuan, R.O.C., are cross-sectional household surveys providing rich information regarding the locations, employments, and industries of current jobs, and those of the previous jobs if job turnover within the past 16 months for labors aged 15 and above in the whole economy. The data also contains information on the earnings of current jobs and the worker's age, education level, marital status, and the number of children in the families. Since the unskilled workers are the demographic group who suffered with the declines in their real earnings and employments from globalization of market and production, we restrict our sample on workers with 12 years of schooling and below.

In addition, we calculate the local unemployment rates by industries and by education, and then merge with the current jobs of both migrants and non-migrants. Local unemployment rates play important roles in determining the probabilities of being employed.

All the data for each industry group are calculated as the weighted average for that particular group. The weights are the MUS individual sample weights. The monthly earnings are deflated or inflated based on the 1991 consumer price index.

B. Urban-Rural migration in Taiwan

Figure 2 presents the trend of number of net inflow workers into rural sector since 1994 by education. Over all, the number of net inflow workers in rural sector became positive since 1998. Figure 2 shows that workers with 12 and less years of schooling contribute the most part of the positive net inflow in rural sector. Both Figure 3 and Figure 4 present the number of net inflow workers into rural sector since 1994 by gender and by ages respectively. They reveals that males and middle-aged workers contribute largely the positive net inflow in rural sector.

Table 1 depicts the basic characteristics of workers between rural and urban sectors and those of workers who move out from rural sector and from urban sector. It shows that the unemployment rates in rural sector are much lower than those in urban sector during 1994-2006. The workers in rural sector have longer working experience, lower schooling, larger percentage of being married, lower percentage of being employed in private sector and are older than workers in urban sector. In examining the workers in rural sector and those who move out of rural sector, we find that workers who move out of rural sector are younger, and have higher education and higher percentage of being employed in private sector. Similarly, in examining the workers in urban sector and those who move out of urban sector, we find that workers who move out have higher percentage of male and higher percentage of being self-employed. If comparing the workers who move out of rural sector with those who move out of urban sector, we find that the outflow worker are more likely to be male and workers with higher education.

V. Estimation Results

The migration selection process is endogenous. Migration selection is required to take into account. In order to examine the roles of rural-urban real income differential and the employment opportunity differential on net inflows in rural sector, two estimation procedures are performed. In the first procedure, the estimation of changing jobs with the total working population in each sector is carried out by Probit model. The estimation results are presented in Table 2. Data on migrant are censored because they are observed only for those who migrate. Once, the predicted values of the probability of changing job can be calculated. In the second procedure, we estimate the migration decision with only the population who decide to change job in the first procedure. Migration decision is a binary decision. We estimate the migration behaviors by using probit estimation model to investigate the association between the worsen labor market in urban sector with urban-rural migration behaviors. The results are depicted in Table 3.

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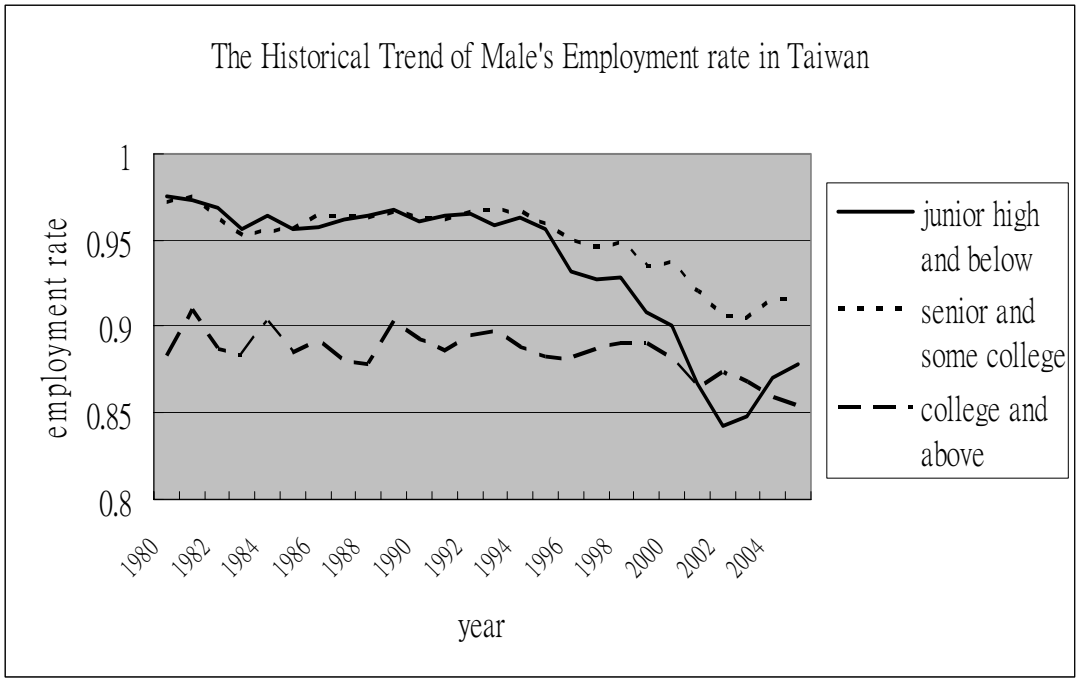

Figure1. The Historical Trend of Male's Employment rate in Taiwan

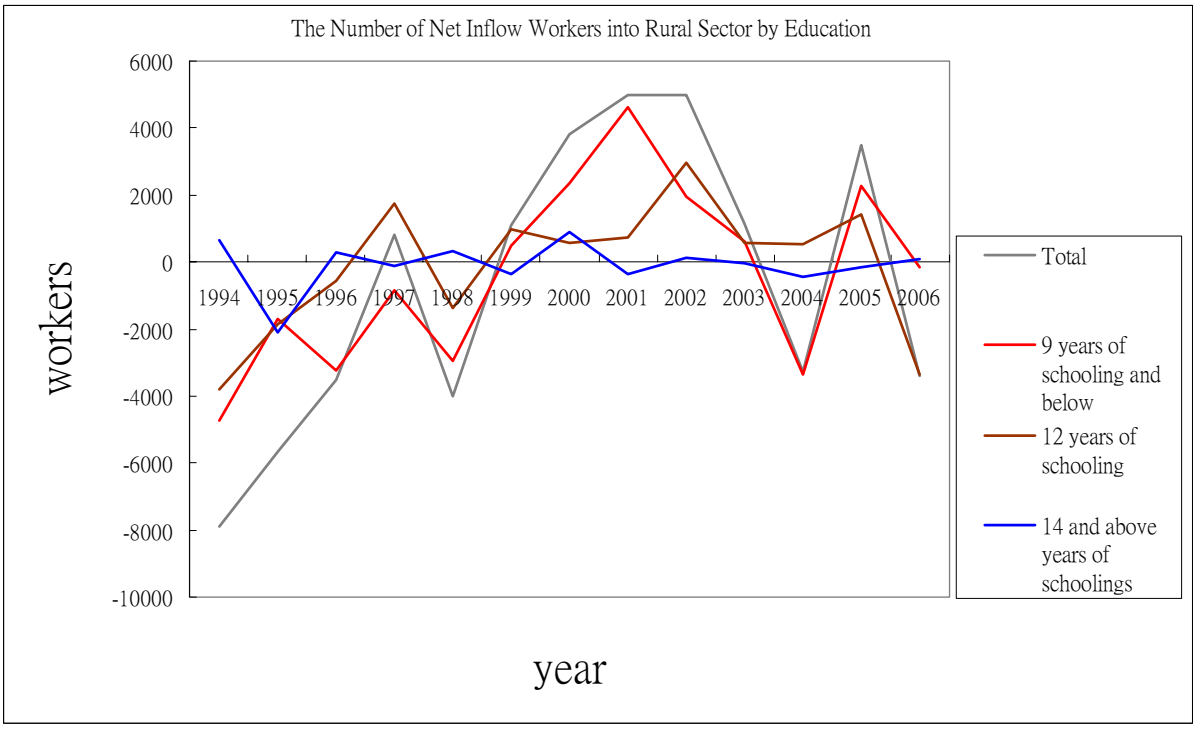

Figure 2. The Number of Net Inflow Workers into Rural Sector by Education

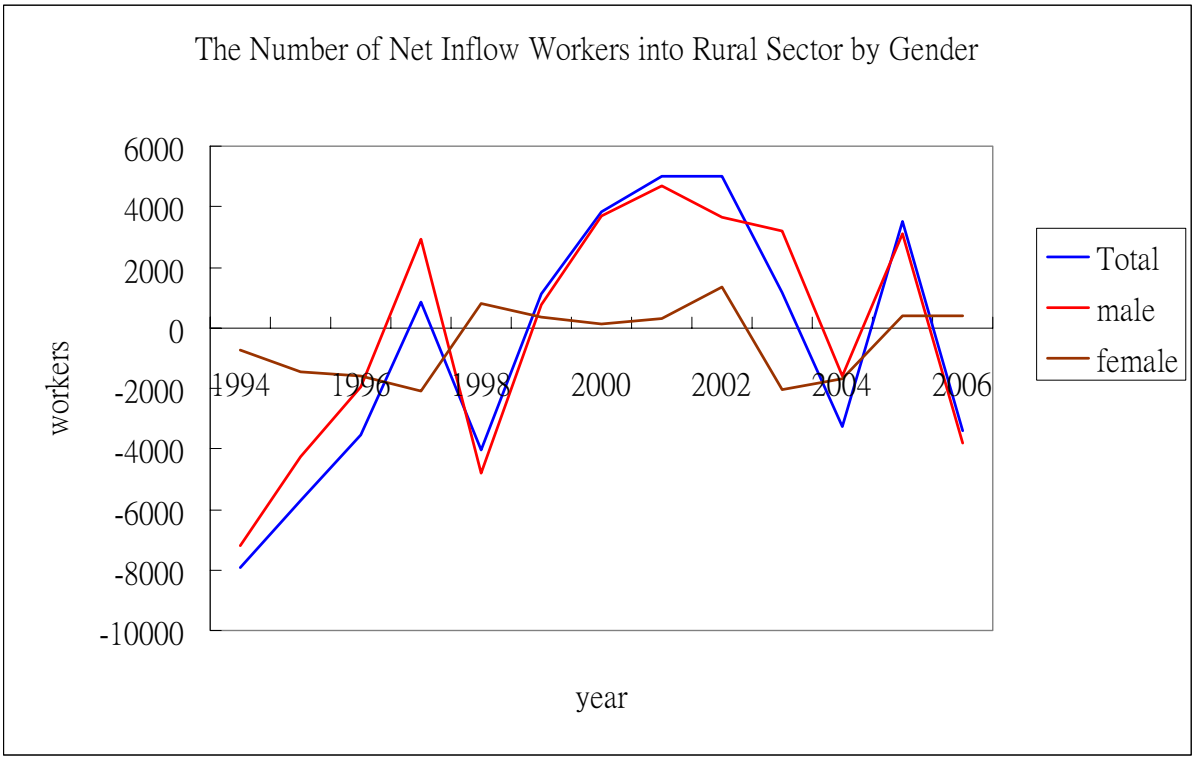

Figure 3. The Number of Net Inflow Workers into Rural Sector by Gender

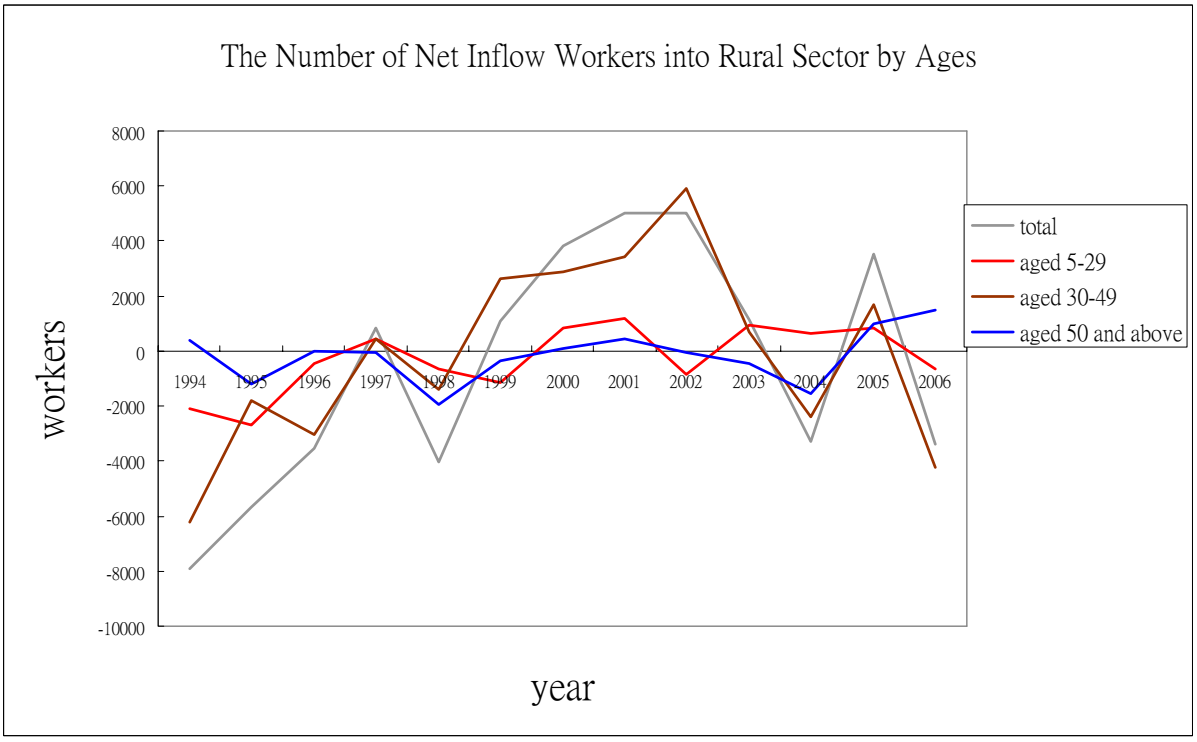

Figure 3. The Number of Net Inflow Workers into Rural Sector by Age

Table 1 Mean Statistics

	Rural Sector		Urban Sector	
	Total	Move out	Total	Move out
Unemployment rate	0.017	0.017	0.040	0.047
Working Experience(weeks)	221	8	88	7.7
Male	0.688	0.778	0.601	0.820
School	6.901	8.799	9.714	9.00
Age	47.928	37.657	37.901	37.754
Married	0.823	0.611	0.666	0.646
Divorce, Widow	0.074	0.094	0.061	0.065
Middle	0.372	0.266	0.263	0.3176
South	0.424	0.434	0.320	0.396
East	0.095	0.159	0.044	0.148
Primary working hours	41.053	44.507	45.134	41.152
Employed by private	0.404	0.780	0.734	0.572
Employed by government			0.061	0.014
Number of workers in working place			3.184	1.874
Living in City			0.132	0.023
Number of cases	38567	627	275003	573

Table 2 The Coefficient Estimates of Changing jobs Behavior (=1)

	Rural sector		Urban Sector	
Variables	Coefficient	t value	Coefficient	T value
Unemployed rates	5.386	(-0.662)	-2.939	(-2.958)
Earning			0.001	(-4.118)
Working experience	-0.110	(-30.962)	-0.232	(-25.281)
			0.128	(1.729)
Middle	0.093	(-0.971)	0.138	(2.069)
South	0.214	(2.36)	-0.028	(-0.472)
East	0.085	(-0.807)	-0.022	(-0.184)
Male	0.431	(6.161)	0.400	(7.565)
Age	1.321	(8.313)	0.863	(6.27)
Age square	-0.142	(-7.341)	-0.095	(-5.276)
Married	0.162	(2.068)	-0.268	(-3.605)
Divorce or Widow	0.204	(91.699)	-0.310	(-2.805)
Years of schooling	0.013	(0.959)	0.051	(4.181)
Employed by private	0.289	(4.2)	-0.078	(-0.81)
Primary working hours	-0.003	(-1.762)	-0.101	(-58.776)
Number of Workers			0.124	(6.217)
Employed by government			-0.532	(-2.428)
1995	0.261	(2.156)	0.068	(0.514)
1996	-0.013	(-0.103)	0.087	(0.671)
1997	0.018	(0.15)	-0.451	(-3.199)
1998	0.144	(1.154)	-0.420	(-2.874)
1999	0.055	(0.391)	-0.404	(-2.987)
2000	0.029	(0.215)	-0.382	(-2.675)
2001	-0.187	(-1.37)	-0.380	(-2.895)
2002	-0.227	(-1.286)	-0.298	(-2.236)
2003	-0.259	(-1.571)	-0.211	(-1.554)
2004	0.069	(0.501)	-0.428	(-3.136)
2005	-0.066	(-0.451)	-0.403	(-2.882)
2006	-0.295	(-1.977)	-0.505	(-3.655)

Table 3 The Coefficient Estimates of Moving Out Behavior (=1)

	Rural Sector		Urban Sector	
Variable	Coefficient	t value	Coefficient	t value
Unemployed rate in current sector	214.761	(11.067)	-132.209	(-26.333)
Unemployed rate in previous sector	-48.166	(-1.25)	6.660	(4.868)
Current real earning	0.084	(1.183)	-0.080	(-5.825)
Previous real earning	-0.0002	(-0.513)	0.0002	(1.808)
Working experience	0.063	(2.96)	0.002	(0.331)
Living in city			-0.662	(-4.386)
Middle	-0.357	(-0.934)	0.561	(6.383)
South	-0.505	(-1.399)	0.663	(7.933)
East	-0.940	(-2.313)	0.948	(8.001)
Male	-0.014	(-0.064)	0.604	(8.21)
Agw	-1.245	(-2.059)	0.191	(0.973)
Age square	0.122	(1.766)	-0.020	(-0.798)
Married	-0.467	(-1.658)	0.052	(0.626)
Divorce or widow	0.018	(0.047)	-0.055	(-0.385)
Years of schooling	0.040	(0.752)	-0.078	(-5.369)
Employed by private	-0.121	(-0.547)	-0.298	(-3.567)
Primary working hours	0.003	(0.332)	-0.029	(-10.47)
Number of workers			-0.422	(-8.762)
Employed by government			1.635	(4.058)
1995	-0.988	(-3.302)	0.052	(0.464)
1996	-1.134	(-3.105)	0.390	(3.225)
1997	-1.870	(-5.144)	0.490	(3.799)
1998	-0.950	(-2.36)	0.492	(3.948)
1999	-0.920	(-1.653)	0.277	(1.788)
2000	-0.692	(-1.534)	-0.179	(-1.395)
2001	-2.277	(-3.406)	1.293	(7.345)
2002	-3.827	(-6.272)	2.130	(12.255)
2003	-3.419	(-3.944)	2.562	(12.623)
2004	-3.025	(-5.378)	1.279	(6.913)
2005	-2.717	(-4.558)	1.368	(8.442)
2006	-2.072	(-2.944)	0.984	(5.27)