Determinants of Internal Migration in Turkey: A Panel Data Analysis Approach[±]

M. Gizem Umut Doğan and Aslıhan Kabadayı[*]

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Abstract

Internal migration movements in Turkey have been a major concern for policy makers, city planners and academicians for decades. To anticipate and regulate these movements it is crucial to understand the factors behind these movements; namely the push and pull factors specific to regions. In this study it is aimed to discover the most effective determinants of the recent internal migration movements in Turkey. With this aim the internal migration patterns in 2008-2012 are examined by provinces in the context of push and pull factors of migration using a macro approach. A panel dataset is constructed by employing the available data covering time series of the economic, social and environmental aspects of provinces as well as the provincial migration movements. With this dataset it is attempted to find out the determinants of internal migration in Turkey by using panel data analysis methods. The economic factors such as job and high income opportunities; factors related to better living conditions such as education, health care and security are expected to play a significant role in pulling internal migration.

Keywords: internal migration; panel data; determinants; Turkey.

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[*] M. Gizem Umut Doğan and Aslıhan Kabadayı are based at Turkish Statistics Institute, Ankara, Turkey. Correspondence E-mail: aslihan.kabadayi@tuik.gov.tr.

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INTRODUCTION

Improvements in economic and social issues along with changes in demographic structure, affect individuals' spatial distribution as well as their income and living conditions (DPT, 2008). Understanding the movement of population is as crucial as knowing the qualitative and quantitative specifications of the population. Consequences of migration can be seen in many areas such as demographic, social, cultural, economic, political, health related and environmental areas. Predicting the consequences of migration both by characteristics and size would ease the process of planning for positive and negative outcomes. In planning and solving issues related to migration, it is essential to figure out the factors that affect migration. Without identifying the factors that affect migration decisions of individuals in different regions and without measuring the effects of economic policies on the volume and characteristics of migration, many issues arising from migration will remain unsolved (Üner, 1983).

In this study, it is aimed to analyze the significance of factors that are thought to be affecting the recent internal migration movements in Turkey. In order to determine the factors to be investigated, literature on reasons for migration has been searched emphasizing studies that intend to identify the factors affecting migration empirically. Secondly, the internal migration patterns in Turkey from past to the present are reviewed briefly concentrating on the direction of net migration movements in the last 6 periods as the dependent variable in the analysis. As the definition and periodicity of collected migration data has changed significantly with the introduction of the Address Based Population Registration System (ABPRS) compared to general population censuses of 2000 and before, it is considered to be more reasonable to use only the ABPRS migration data and therefore only 5 periods in the analysis. Thanks to the panel data estimation techniques it is possible to utilize this short time period effectively with high confidence parameter estimates, higher degree of freedom and less multicollinearity. In the Data and Method section the data to be used in the analysis will be introduced followed with the steps of panel estimation procedure used in this study. Results and Discussion section will give the model estimations with model selection criteria and the selected models will be interpreted in the context of migration theory.

Reasons for Migration

With a conventional definition, migration arises because of a "push" factor and a "pull" factor (Ravenstein, 1885). Life situations that give individuals reason to be dissatisfied with their present locale are the push factors, as attributes of distant places that make them appear appealing are the pull factors (Dorigo & Tobler, 1983). In line with the laws of migration, individuals migrate from regions with scarce economic opportunities to regions with rich opportunities (Çelik, 2005). Reviewing the literature on the reasons for migration, it draws attention to the key factors resulting in population movements between regions, which has mostly been identified as new job opportunities and higher income expectations. In addition, factors inducing differences in quality of life among regions such as public investments, education opportunities and level, environmental condition and security affect the direction and size of migration (Çelik, 2005). Push factors can be economic factors such as insufficiency and unequal distribution of agricultural land, increasing unemployment as a result of mechanization in agriculture as well as criminal events and natural disasters. Opportunity of finding jobs, higher income, educational utilities, health services, culture and entertainment facilities, better climate and substructure investments such as roads, harbours and airports are the pull factors that attract migration while keeping current residents (Çelik, 2005).

Golgher (2005) analysed factors that determine migration based on the human capital model with Brazil Demographic Census data of year 2000. In the study, migrants are grouped according to income per household. In the first stage of analysis, independent variables are determined by the gravity model and they are populations of receiving and sending regions and a logarithmic transformation of distance between regions. In the second stage of analysis, the urbanization rate, proportion of employed migrants in the population, unemployment rate, average income, employment by education and violent crime rates are used as explanatory variables, while in the third stage of analysis dummy variables regarding regional differences are used (Golgher, 2005).

Cebula (2005) analysed the effects of economic and non-economic factors on internal migration in USA for the period between 1999-2002, using the proportion of migrants in the receiving region's population, expected per capita income in receiving region, the average number of sunny days in a year, violent crime rate, public park spaces, toxic waste areas and daily normal maximum temperatures in June. The author found that expected and current income has significant effect on the migration decision. Among non-economic factors, sunlight, warm weather and public park spaces affect migration positively as toxic waste areas and violent crime rates have a negative impact on migration (Cebula, 2005).

Çelik (2006) uses TurkStat's migration data of 2000 census in examining the determinants of internal migration with a model based on pull factors such as income per capita of province, unemployment rate, electricity consumption per capita as an indicator of industrialization, number of pupils per teacher and number of specialists per practitioners (Çelik, 2006).

Gökhan and Filiztekin (2008) analyses factors affecting internal migration in Turkey with models augmented from gravity models of migration by NUTS 2 regions. Firstly, they use a model where gross migration flow from region i to region j is the dependant variable and population, real GDP and distance between regions are independent variables. They augmented the model by adding variables defining all economic and social characteristics of provinces such as unemployment rate, proportion of young population, networking effect showing the number of migrants from i to j in preceding periods, inter-regional migration and dummy variables for İstanbul. All the explanatory variables are found to be statistically significant and with reasonable coefficient signs. It is found that the effect of income on migration has decreased from 1990 to 2000 and the negative effect of the unemployment rate of the receiving region has increased (Gökhan & Filiztekin, 2008).

Internal Migration in Turkey

In its settlement history of ten thousand years, Anatolia experienced various migrations and built its cultural variety through these processes (Tekeli, 2008). After the 1940s, financial subsidies from the west accelerated industrialization and thus paved the way to modernization. As labor force demand of industry and service sectors increased, people started to disengage from agriculture based jobs (Keyder, 1987). In the 1950s rapidly changing social and economic structures inevitably brought internal migration, which occurred most intensely within the 1950-1985 period (Kırdar & Saraçoğlu, 2008). The internal migration movement from rural to urban areas is explained as the charm of cities and on the other hand as the repellency of rural areas arising from economic weakening (Akşit, 1998). Since the beginnings of 1990s as a result of the instabilities in the East and Southeast Anatolian regions, internal migration continued despite changing structure in post-industrialised society (İçduygu, et al., 1998).

Examining the internal migration patterns in the recent 6 periods (2007/08 – 2012/13) on ABPRS data of the Turkish Statistical Institute (TurkStat) it can be seen that Tekirdag has the highest mean annual rate of net migration with 18.3‰. The second and third provinces with the highest mean annual rate of net migration from 2007/08 – 2012/13 are Yalova and Antalya with 15.83‰ and 12.68‰ respectively. During this period Yozgat, Mus and Kars have the lowest mean annual rates of net migration with -23.69‰, -23.17‰ and -22.37‰ respectively. In Figure 1, provinces are ranked by their mean annual rate of net migration and divided into 4 quintile groups. The values in brackets show the lowest and highest rate of each quintile per thousand followed with the number of provinces in the group. Observing the thematic map in Figure 1, it is obvious that East and Southeast Anatolian provinces still send more than they receive in migration and coastal west and southwest provinces are gaining more migrant population.

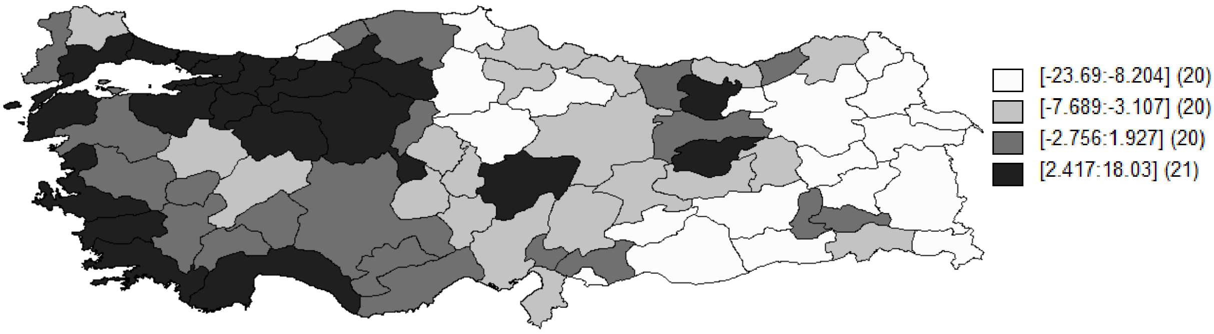

Figure 1. Mean annual rates of net migration, 2007/08 – 2012/13

Source: This thematic map is drawn with OpenGeoda 1.0.1 software using TurkStat ABPRS migration data and administrative map of Turkey retrieved from GADM database of Global Administrative Areas on http://www.gadm.org/.

Method

In this study provincial data for the period 2008-2012 was used. The abbreviations, explanations and sources of variables used in the models are as follows: **NMR** is the rate of net migration data from TurkStat's ABPRS results defining internal migration as changes in usual residence addresses of the population within one year in the specific areas (region, province, district, etc.) inside the country. **LFPR, UNEMP** and **EMP** are labor force participation, unemployment and employment rate provincial estimates respectively from TurkStat's Household Labour Force Survey results. **AUTO** is the number of automobiles per 1,000 heads from TurkStat's Road Motor Vehicles statistics and it is thought to represent the level of in provinces. **TRADEVOL**, **EXPPERCAP** and **IMPPERCAP** are per capita trade volume, exports and imports from TurkStat's foreign trade statistics according to the tax numbers of the firms located in a province. **AGRVALPERCAP** is the per capita agricultural value from TurkStat. **ESTFIRMPERLIQ** and **ESTFIRMNAMEPERLIQ** are the number of established firms and trade names per liquidated firms and trade names calculated from The Union of Chambers and Commodity Exchanges of the Turkey database. **PATENTPERHUND** is the number of patent and utility model applications per 100,000 calculated from Turkish Patent Institute's data and population, which is thought to represent the innovative capacity of a province allowing for job and income opportunities. **PUBLICINVPERCAP** is per capita public investment from the Ministry of Development database. **EDULEVEL** is the education level index of provinces calculated from ABPRS 15+ age, education level data. **UNIV** is number of universities in each province from the Council of Higher Education database. **CINEMAPERHUND** and **THEATREPERHUND** are number of cinema and theatre seats per 100,000 from TurkStat's culture statistics database. **TOTHEALPERPERHUND** and **TOTDOCPERHUND** are total number of health personnel and doctors per 100,000 respectively and **HOSBEDPERHUND** is number of hospital beds per 100,000 from TurkStat's health statistics database. **POPDENS** and **CITYPOP** are population density and proportion of city population in total population from ABPRS results.

CRIMERATE is the proportion of each province in Turkey's total convicts received into prison, where the crime was committed from TurkStat's database. **INDELECTPERCAP** is industrial electricity consumption per capita from TurkStat's energy statistics database. **DEPOSITSPERCAP** is per capita deposits in banks from The Banks' Association of Turkey's database.

In analyzing the effect of variables on rate of net migration firstly the data is restructured as annual panel data with 81 cross sections and 5 years, in total 405 observations, for each variable in E-views 6 and Matlab.

To be able to select the most significant variable amongst similar variables such as employment variables LFPR, UNEMP and EMP; foreign trade size variables TRADEVOL, EXPPERCAP and IMPPERCAP; buoyant trade environment variables ESTFIRMPERLIQ and ESTFIRMNAMEPERLIQ; and health personnel variables TOTHEALPERPERHUND and TOTDOCPERHUND, 36 models were constructed containing only one variable from the aforementioned 4 categories with all the remaining variables (Equation 1). All of these 36 regressions have been run in Matlab with pooled, fixed effects and random effects panel data estimation methods using "Panel Data Toolbox" (Alvarez Ayuso, Barbero, & Zofío, 2013). Mean p-values of the coefficient estimations have been calculated for the selective variables and selection has been made considering the lowest mean p-value. For each estimation procedure, the same variables have been selected and Equation 1 has been transformed into Equation 2.

$$NMR = f\left(\begin{array}{c} \begin{bmatrix} LFPR \\ UNEMP \\ EMP \end{bmatrix}, \begin{bmatrix} TRADEVOL \\ EXPPERCAP \\ IMPPERCAP \end{bmatrix}, \begin{bmatrix} ESTFIRMPERLIQ \\ ESTFIRMNAMEPERLIQ \end{bmatrix}, \begin{bmatrix} TOTHEALPERPERHUND \\ TOTDOCPERHUND \end{bmatrix}, AGRVALPERCAP, \\ AUTO, PATENTPERHUND, EDULEVEL, UNIV, THEATREPERHUND, CINEMAPERHUND, PUBLICINVPERCAP, \\ HOSBEDPERHUND, POPDENS, CITYPOP, CRIMERATE, INDELECTPERCAP, DEPOSITSPERCAP \end{array}\right) \quad (1)$$

$$NMR = f\left(\begin{array}{c} EMP, EXPPERCAP, ESTFIRMPERLIQ, TOTHEALPERPERHUND, AGRVALPERCAP, AUTO, \\ PATENTPERHUND, EDULEVEL, UNIV, THEATREPERHUND, CINEMAPERHUND, PUBLICINVPERCAP, \\ HOSBEDPERHUND, POPDENS, CITYPOP, CRIMERATE, INDELECTPERCAP, DEPOSITSPERCAP \end{array}\right) \quad (2)$$

Following the identification of all variables to be included in the initial model, Equation 2 has been run in E-Views with each panel estimation method. In order to determine the variables having significant and theoretically reasonable signed coefficients, firstly the Hendry method has been employed (Yurdakul, 1999). All variable coefficients have been evaluated according to their their statistical significance (p-values). The model has been run successively eliminating the variable with the highest p-valued coefficient from the model in each run, until all the remaining variables have significant p values. This procedure has been implicated for all three panel data estimation methods.

After constructing three models by identifying the explanatory variables with statistically significant coefficients, each model has been run with the other two estimation procedures in order to find out what estimation procedure was most suited to the data. Thus, a total of 9 estimations have been carried out with 3 different models and 3 different estimation procedures. For selection between pooled OLS and fixed effects panel estimation, the F test has been employed, while for selection between fixed effects and random effects the Hausman test panel estimation test has been employed. The null hypothesis of F test is that constants are equal for each province as the null hypothesis of a Hausman test implies that the individual effects are uncorrelated with the other regressors in the model and in this case a random effect model produces biased estimators (Verbeek, 2004; Greene, 2003). Selecting the most suitable estimation procedure for each model, models are evaluated considering the theoretical relevance of the coefficient signs and statistical significance.

Results and discussion

Equation 2 has been run with pooled OLS, fixed effects and random effects panel estimation and reduced by the Hendry method resulting in Equation 3, 4 and 5 respectively.

$$NMR = f\begin{pmatrix} ESTFIRMPERLIQ, DEPOSITSPERCAP, UNIV, INDELECTPERCAP, TOTHEALPERPERHUND, \\ HOSBEDPERHUND, AUTO, PATENTPERHUND, CITYPOP, POPDENS, EXPPERCAP \end{pmatrix} \quad (3)$$

$$NMR = f(\ PUBLICINVPERCAP, ESTFIRMPERLIQ, AGRVALPERCAP) \quad (4)$$

$$NMR = f(\ ESTFIRMPERLIQ, AUTO, CITYPOP, INDELECTPERCAP) \quad (5)$$

Table 1, 2 and 3 show coefficient estimation results of equations 3, 4 and 5 respectively with each estimation procedure. The values with grey backgrounds are statistically insignificant p-values at 85% confidence level. Using data in Table 1, F(80,313) test statistic is computed as 2.45 with a probability of 0.00; thus the null hypothesis is rejected and the fixed effects estimation has to be favoured. Testing random effects procedure against fixed effects, Hausman test statistic is calculated as $\chi^2(11)$= 20.32 with a probability of 0.0411. Therefore the null hypothesis is rejected at 95% confidence level so a fixed effect model is preferred. Considering the significance of coefficients estimated through the fixed effects estimation, it is seen that none of the coefficients are statistically significant.

Using data in Table 2, F(80,321) test statistic is computed as 5.69 with a probability of 0.00; thus the null hypothesis is rejected and the fixed effects estimation has to be favoured. Testing random effects procedure against fixed effects, Hausman test statistic is calculated as $\chi^2(3)$= 19.67 with a probability of 0.00. Therefore null hypothesis is rejected and again the fixed effect model is preferred.

Using data in Table 3, F(80,320) test statistic is computed as 2.85 with a probability of 0.00; thus the null hypothesis is rejected and the fixed effects estimation has to be favoured. Testing random effects procedure against fixed effects, the Hausman test statistic is calculated as $\chi^2(4)$= 2.85 with a probability of 0.1606. Therefore, the null hypothesis is accepted at 95% confidence level and in this case random effect model is preferred. Considering the significance of coefficients estimated through the random effects estimation, it is seen that all of the coefficients are statistically significant.

Table 1. Model estimations of equation 3 with pooled OLS, FE and RE panel regression

	Pooled		FE		RE	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
C	-26.0153	0.0000	-18.3872	0.5602	-24.9057	0.0000
ESTFIRMPERLIQ	0.2084	0.0211	0.1309	0.2442	0.2034	0.0277
DEPOSITSPERCAP	0.0010	0.0128	-0.0010	0.3721	0.0007	0.1951
UNIV	-1.6351	0.0001	1.0321	0.4504	-1.1801	0.0242
INDELECTPERCAP	0.0013	0.0034	0.0014	0.4132	0.0014	0.0144
TOTHEALPERPERHUND	0.0125	0.0551	0.0297	0.0531	0.0106	0.1756
HOSBEDPERHUND	-0.0149	0.0804	-0.0266	0.2880	-0.0138	0.1923
AUTO	0.0510	0.0234	-0.0743	0.4611	0.0580	0.0474
PATENTPERHUND	0.4821	0.0031	0.0922	0.7397	0.3387	0.0741
CITYPOP	0.1304	0.0056	0.1912	0.7246	0.1345	0.0317
POPDENS	0.0179	0.0006	-0.0309	0.7285	0.0137	0.0362
EXPPERCAP	-0.0012	0.0950	0.0000	0.9787	-0.0009	0.3196
Sum squared resid		32218.6800		19822.9800		25479.9000
R-squared		0.3525		0.6016		0.2072

Table 2. Model estimations of equation 4 with pooled OLS, FE and RE panel regression

	Pooled		FE		RE	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
C	0.7503	0.5904	-8.5493	0.0000	-4.0138	0.0223
ESTFIRMPERLIQ	-0.3404	0.0003	0.1697	0.0961	-0.0322	0.7207
PUBLICINVPERCAP	-0.0002	0.8602	0.0039	0.1242	0.0014	0.4317
AGRVALPERCAP	-0.0007	0.0284	0.0009	0.1184	0.0000	0.9121
Sum squared resid		47864.7400		19804.0300		25767.8100
R-squared		0.0380		0.6020		0.0023

Table 3. Model estimations of equation 5 with pooled OLS, FE and RE panel regression

-	Pooled		FE		RE	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
C	-22.4927	0.0000	-24.0430	0.4148	-22.2553	0.0000
ESTFIRMPERLIQ	0.1525	0.0825	0.1221	0.2678	0.1620	0.0714
INDELECTPERCAP	0.0019	0.0000	0.0015	0.3598	0.0019	0.0009
AUTO	0.1034	0.0000	-0.0267	0.7066	0.0937	0.0000
CITYPOP	0.1191	0.0021	0.3164	0.5403	0.1275	0.0223
Sum squared resid	32162.2500		20030.2300		25319.3900	
R-squared	0.3536		0.5974		0.1677	

The model selection process favoured the fixed effects panel estimation in the first and second cases above. However fixed effects estimations are only interpretable in the second case where the model identification was initially made with FE. Signs of all FE coefficient estimations are compatible with expected signs. It is seen from the estimations that an increases in public investments, agricultural value per capita and number of established firms compared to the liquidated firms would affect migration positively. The positive effects are reasonable as public investments improve the living conditions; enhance education and cultural possibilities as well as creating employment and higher income opportunities. Increase in total agricultural value per capita can be the result of higher productivity and hence bring higher income for the people engaged in agricultural activities and the overall prosperity of the region. Likewise, the number of established firms per liquidated firms was included in the analysis as a pull factor and an indicator of opportunities regarding opportunities for business start-ups.

The model selection process favoured the random effects panel estimation in the third case above and all of the coefficients estimated by RE are statistically significant with expected positive signs. An increase in the number of established firms per liquidated firms signals an economic environment with increasing opportunities to start a business and thus is a pull factor in migration. Industrial electricity consumption per capita stands for the industrialization or industrial production levels of regions. Possibilities of earning higher income are higher in more industrialized regions. Therefore an increase in the industrial electricity consumption will pull migration. The number of automobiles per capita was included in the analysis as a proxy for GDP representing opportunities of higher income and better living conditions. The positive sign of city population's coefficient is expected because a higher percentage of city population represents urbanization, and urban areas are more attractive since opportunities of finding jobs, higher income and better education are improved. In conclusion our models showed that employment and higher income opportunities are still the key factors that make people migrate within Turkey.

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