# Inter-regional migration in Romania *

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## Abstract

This paper examines the role of wage relativities and unemployment levels as major potential economic causes of internal migration between the separate regions of Romania in the period 1995 - 2005. The different inter-regional migration routes are treated as cross-section units in a panel data structure, with unobserved characteristics for each route modelled as fixed effects. SURE estimation indicates that inter-regional wage relativities have indeed had a significant influence on internal migration flows but relative unemployment levels have apparently played no part.

**JEL Classification**: F 22, O15, J61.

**Keywords**: Regional migration; Harris Todaro model; transition economies; Romania; SURE Model .

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## 1. Introduction

The present EU enlargement has increased interest in the pattern of labour mobility within transition economies and the consequent potential for output gains and welfare gains. Little is yet known about the causes and consequences of such inter-regional migration in transition economies [for an exception, see , Andrienko and Guriev, 2004; Ghatak, S. et al. 2008]. In this paper, we examine the major economic causes of inter-regional labour mobility within Romania since 1995.

In their seminal contributions to the economic literature, Todaro (1969) and Harris and Todaro [ H-T] (1970) identified real wage gaps and the probability of finding employment as the major factors behind immigration. In the light of such models, it is easy to understand why strong migration pressures exist from the East due to population growth and due to the growing economic gap, in terms of real wages and employment, between certain Central and Eastern European (CEE) countries on the one hand and the European Union on the other (Fassman and Munz, 1994; Ghatak et alia, 1996; Levine, 1999, Ghatak and Sassoon, 2001; Hatton and Williamson, 1998; Straubhaar and Zimmermann, 1992). Migration has become one of the most important factors affecting economic development in the 21st century (Hatton, 2001; Wheatley Price, 2001).

This paper focuses on the major economic causes of **internal** migration within Romania. Standard economic models have been applied for some CEE countries but to the best of our knowledge, for Romania, a modelling of inter-regional migration flows using panel-data methods has not been attempted before. In section 2, we survey the relevant literature. Section 3 describes the welfare implications of migration and the traditional theoretical basis for expecting real wages and unemployment levels to be significant causal factors. Some recent migration studies have extended this theoretical framework to include other possibly relevant factors such as housing, health care and human capital (see Ghatak,S. et.al. 2008). Data availability restricts this present investigation to the simpler traditional framework. Section 4 presents the empirical methodology and results. Section 5 draws some policy implications.

**2. Literature review and data sources**

The patterns of internal migration have been studied in some details for the Czech Republic, Slovakia, Russia, Poland, Hungary, Slovenia, Romania, Estonia, Latvia and Lithuania [see,e.g. Andrienko and Guriev,2004; Fridmuc (2002), Fridmuc and Huber (2002), Huber (2003), Kallai (2003), Hazans (2003)]. Fridmuc (2002) investigates the patterns of interregional migration at country level within the Czech and Slovak Republic. The findings are that migration as a mechanism for achieving regional adjustment in the labour market is limited. Support for the basic theoretical framework is mixed: unemployment rates and average real wages appear to have significant effects on net migration in Slovakia but not in the Czech Republic. Hazans (2003) finds that regional wage and unemployment differentials are significant in explaining internal migration flows in Estonia, Latvia and Lithuania. However these countries, despite their small size, continue to suffer from real and persistent regional disparities. Constantin, Parlog, and Goschin (2003) argue that, between 1990 and 2000, economic disparities increased also between the prosperous and poorer regions of Romania. Kallai and Traistaru (1998) investigate internal migration flows within Romania for the period 1990 – 1995, using data for 41 counties. They also conclude that regional disparities have persisted in Romania during this period and, further, that regional disparity of unemployment rates does not prompt corrective internal migration. One reason for counter-intuitive migration flows from richer to poorer regions, in the Romanian case from (say) Bucharest to poorer cities, is the importance of family networks. People who are out of work in Bucharest may move to a region with higher unemployment because that is where they can access family support.

In our paper, we employ panel estimation methods to analyse Romanian data on interregional migration between 1995 and 2005. The data we use are annual gross migration flows data for the eight geographic development regions in Romania. We have 616 observations points provided from the 11 years of annual records for 56 intra-regional migration regions. Our study fills a gap in the literature as, in Romania's case, panel estimation methods to analyse patterns of migration have not been applied before. Note that in terms of GDP, Bucharest ranks first and North–East region the eighth. Between them are in this order: Centre, West, South-East, North-West, South-West and South.

### 3. A theoretical model of migration

In the Harris-Todaro (H-T) type of model of rural to urban migration, the future expected income after migration is given by

$$\int_0^\infty \left[PW_u + (1-P)W_b\right] e^{-rt} dt - C = \frac{1}{r}\left[PW_u + (1-P)W_b\right] - C \qquad (3.1)$$

where $C$ is the direct cost of migration, $r$ is the migrants' discount rate, $P$ is the probability of employment at the urban real wage, $W_u$, and $W_b$ is the real value of the urban unemployment benefit. The would-be migrants compare (3.1) with the future income from remaining in the rural sector, which the basic H-T framework assumes to be

$$\int_0^\infty W_r e^{-rt} dt = \frac{1}{r} W_r \qquad (3.2)$$

where $W_r$ is real wage in the rural sector.

If urban employment is a certain prospect (i.e. P=1) then migration takes place only if there are gains from moving, i.e., only if

$$\frac{1}{r} W_u - C > \frac{1}{r} W_r \Leftrightarrow W_u - W_r > rC \qquad (3.3)$$

Under conditions of uncertainty, the probability of obtaining employment is given by

$$P = \frac{\bar{L}_u}{\bar{N}_u} = \frac{\bar{L}_u}{\bar{L}_u + M\bar{N}_r} \tag{3.4}$$

where $\bar{L}$, $\bar{N}$, $M$ are defined as labour, population and migration respectively. The basic H-T framework thus assumes that migrants compete on equal terms with the incumbent urban employed population. When $M$ rises in this model, $P$ falls – reducing expected post-migration income, and migration continues only until the returns from (3.1) and (3.2) are equal. Hence, the equilibrium migration rate M is given by

$$P W_u + (1-P) W_b = W_r \tag{3.5}$$

with $P$ given by (3.4). Substituting (3.4) into (3.5) and solving for $M$ gives the equilibrium level of migration:

$$M = \left[ \frac{(W_u - rC) - W_r}{W_r - (W_b - rC)} \right] \frac{\bar{L}_u}{N_r} \tag{3.6}$$

If $W_r > (W_b - rC)$, i.e. there is no incentive to leave rural areas for urban unemployment, then we get the familiar results:

$$\partial M / \partial W_u > 0, \quad \partial M / \partial W_r < 0, \quad \partial M \big/ \partial \bar{L}_U > 0, \quad \partial M / \partial C < 0 \tag{3.7}$$

Equation (3.7) states that any marginal increase in urban wage, $W_u$, or decrease in the rural wage, $W_r$, will increase migration. Paradoxically, any policy to increase employment in the advanced urban sector will raise the migration rate and may increase urban unemployment. Hence, in H-T models, a policy of creating more employment opportunities in the advanced regions may only enlarge the migration from the backward region. Also, any decrease in the cost of migration will increase $M$ .

Figure 1 explains the gains and losses from migration, showing the pre- and post-migration labour market in host and donor regions.

[Figure 1 about here]

Due to the access to superior technology, better organisation and higher quality human capital, the marginal productivity of labour in the advanced ("Urban") region is higher than in the backward ("Rural") region as shown by the relative positions of the MPLU and MPLR curves. With employment initially at A, real wages are higher in the advanced region ($W_U$) in comparison with backward region ($W_R$). Figure 1 illustrates the case where migration is at a level AB (HA) which leads to an equality of wage rates across the two regions ($W_U = W_R = W$) The value of the additional output in the advanced region is KDBA whilst the output loss in the backward region is valued at FJAH, which is replicated as ECBA. Thus the net overall gain equals *KDCE*. Hamilton and Whalley (1984) estimate this area for the case of global perfect labour mobility. Clearly, the size of the gain will depend on the degree of labour mobility, nature and quality of labour, substitutability or complementarities between different types of labour and the degree of labour absorption in the labour market given by the real wage flexibility. *Inter alia,* the greater the wage flexibility in the host country, the greater would be the welfare gain (for formal proofs, see Ghatak et al. 1996; Levine, 1999).

## 4. Methodology

We test the extent to which inter-regional migration flows are correlated with *relative economic opportunities,* measured by differences in wages and unemployment rates. Our data is a panel of pooled cross-section / time-series with the units of the cross-section being the (8 x 7 = 56) different inter-regional migration routes between the 8 geographic regions of Romania.

As models applied to time series data are likely to have auto-correlated errors and those applied to cross section data are likely to encounter heteroskedasticity, we expect that both problems are present in our pooled data. Generalised Least Squares (GLS) is then theoretically superior to OLS, though infeasible without knowledge of the autocorrelation and heteroscedasticity parameters. Feasible GLS is a practical alternative, utilising consistent estimators of disturbance variances and covariances, and is asymptotically superior to OLS.

If $[y_i \quad X_i], u_i$ are vectors of data and disturbances for the $i^{th}$ migration route then, with common parameters, the entire data generating process can be modelled by stacking these vectors as:

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_M \end{bmatrix} = \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_M \end{bmatrix} \beta + \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_M \end{bmatrix}, \qquad \text{i.e. } y = X\beta + u \tag{4.1}$$

Permitting contemporaneous cross-equation correlation of disturbances, but no heteroskedasticity within equations and no serial correlation, the stacked disturbances will have a covariance matrix of the form:

$$\Omega = \begin{bmatrix} \sigma_{11} I_T & \sigma_{12} I_T & \cdots & \sigma_{1M} I_T \\ \sigma_{21} I_T & \sigma_{22} I_T & \cdots & \sigma_{2M} I_T \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{M1} I_T & \sigma_{M2} I_T & \cdots & \sigma_{MM} I_T \end{bmatrix} = \Sigma \otimes I_T \tag{4.2}$$

The $\sigma_{ij}$ may be consistently estimated on the basis of residuals obtained by applying OLS to 4.1, viz:

$$\hat{\sigma}_{ij} = T^{-1} \sum_{t=1}^{T} e_{it} e_{jt}, \quad \begin{bmatrix} e_1 \\ e_2 \\ \vdots \\ e_M \end{bmatrix} = y - X\hat{\beta}$$

If some $\sigma_{ij}$ are large, we expect, following Zellner (1962), to gain efficiency by applying GLS to equation (4.1) rather than OLS i.e.

$$\begin{aligned} \tilde{\tilde{\beta}} &= (X'\hat{\Omega}^{-1}X)^{-1}(X'\hat{\Omega}^{-1}y) \\ Asymptot.Var - Cov(\tilde{\tilde{\beta}}) &= (X'\hat{\Omega}^{-1}X)^{-1} \\ \hat{\Omega}^{-1} &= \hat{\Sigma}^{-1} \otimes I_T \end{aligned} \tag{4.3}$$

The coefficient covariance estimator is given by:

[illegible] (4.4)

where the first term is the degree of freedom adjustment depending on the total number of observations, $N^*$ is the total number of stacked observations and $K^*$ is the total number of the estimated parameters.

The cross-section SUR (Panel Corrected Standard Error PCSE) methodology [Beck and Katz (1995)] that we apply replaces the outer product of the cross-section residuals in equation (4.4) with an estimate of the cross section residual (contemporaneous) covariance matrix $\Omega_m$:

[illegible] (4.5)

This estimator is robust to unrestricted unconditional variance $\Omega_m$ but places additional restrictions on the conditional variance matrix. However, conditional and unconditional matrices remain the same. This ensures that the variance of $u_i$ remains constant with t and there is no serial correlation in the errors.

## 5. Empirical specification and results

For empirical modelling we use the following specification:

$$Y_{ijt} = \sum_k \beta_k X_{k,ijt} + \varepsilon_{ijt} \;\; with\; i, j = 1.....8, i \neq j \tag{5.1}$$

where $Y_{ij}$ is the natural logarithm of migration from region *i* to region *j* and $X_{k,ij}$ are explanatory variables as follows:

$X_{1,ij}$ is the natural logarithm of wages in the $i^{th}$ donor region

$X_{2,ij}$ is the natural logarithm of wages in the $j^{th}$ destination region

$X_{3,ij}$ is the natural logarithm of unemployment in the $i^{th}$ donor region

$X_{4,ij}$ is the natural logarithm of unemployment in the $j^{th}$ destination region

Some migration studies use symmetrical models, in which explanatory variables such as unemployment and wages enter as ratios or differences between donor and destination provinces (e.g. $\beta_1 = -\beta_2$). Since migrants may react differently to changes in labour markets in far provinces, compared to those in their home region, for which more information is available (Taylor and Martin 2001), our modelling uses the less restrictive asymmetrical specification.

Since the diagonality of $\Sigma$ is at the heart of using the SUR estimation method (Baltagi, 1999) we use the residual tests LM for testing if $\Sigma$ is diagonal. The LM statistic for the null hypothesis of no serial correlation is **385.55**, which has an effectively zero probability, which means that the null hypothesis of no serial correlation in the errors cannot be accepted. White's heteroskedasticity test indicates that the hypothesis of homoskedastic errors cannot be accepted (a value of 161.62 with a zero probability). With such error behaviour, the OLS estimators are unbiased but inefficient.

We apply the standard methodology to control for the autocorrelated and heterskedastic errors and allow route-specific intercepts ("fixed effects") to capture other unobserved characteristics. The values of fixed effects are given in table 1, for each route and they indicate that each route has unique features.

[Table 1 about here]

From Table 1a, we notice that only real wages in donor regions achieves statistical significance at the 5% level. One simple conclusion can be drawn from these results: during transition years , Romania faced a pattern of migration determined by *push* effects more so than *pull* effects as people were motivated more by a wish to escape from lowest-wage donor regions than an ambition to arrive at highest-wage destinations. The economic variables which might be theoretically anticipated to be prime drivers, i.e. relative wages and relative unemployment rates, do not perform according to this expectation in the case of inter-regional migration within Romania. The estimated fixed effects further highlight the contrast between theoretical expectations and empirical results. When North-East (the poorest region of the country) is the destination region, fixed effects are in many cases positive and high (see table 1b), indicating that migration flows towards this region were significant despite its apparent lack of economic opportunity.

In explaining our results, we wish to stress that the internal migration rate reached its highest level in 1990 in Romania (see for details, Constantin, Parlog and Goschin (2003)). This was the result of the cancellation of some restrictive legislation on residence in towns having more than 100 thousands inhabitants. First the rural-urban flow reached 70% of all migration which later **declined**; e.g., in 1994, it stood at 30.4%. A new pattern of migration developed. A relatively high level of urban unemployment [See Table 2] has induced the return of a large number of persons back to their rural origins.

Table 2: Unemployment rate In Urban and Rural Romania (sex and area)

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| Sex | | | | | | |
| M | 6,5 | 7,4 | 7,7 | 7,1 | 8,9 | 7,5 |
| F | 6,1 | 6,2 | 6,4 | 5,9 | 7,7 | 6,4 |
| Area | | | | | | |
| Urban | 9,2 | 10,3 | 11,2 | 10,4 | 11,2 | 9,5 |
| Rural | 3,5 | 3,5 | 3,1 | 2,8 | 5,4 | 4,3 |
| | | | | | | |

Source: *Anuarul statistic al României*, 2004, INS (Statistical Yearbook of Romania).

## 5. Conclusions

This paper examines the causes of Romanian inter-regional migration. Using the SURE methodology for analyzing panel data with cross-sectional fixed effects, we test the role of real wages and unemployment as the major explanatory variables of migration. We find that unemployment effects are absent and that wage effects are primarily the influence of low wages in donor regions. To rationalize these counter-intuitive results we suggest that the migration decision is not simply one of which geographical region to live in but also a decision about which type of sub-regional economy (urban or rural) to participate in. In the Romanian case, the de-collectivization of agriculture has provided rural economic opportunities and emerging high rates of urban unemployment have reduced urban economic opportunities. In consequence there has been some significant return migration from urban to rural areas which may have incidentally involved inter-regional relocation.

Inter-regional factor mobility is acknowledged to be an important route to promote economic growth and efficiency gains. EU enlargement with Romania and Bulgaria forces both countries to improve their regional policies and to stimulate their economic development. One of the central issues of economic development is an efficient inter-regional migration that contributes to the reduction of regional income disparities by reallocation of labor from low productivity to high productivity regions. It can be realized by improving the employment opportunities, real wages and economic and social conditions of different regions. At the moment, it seems that the efficiency and welfare [as measured by output] gains from inter-regional labor mobility in Romania have been limited. There are other aspects of inter-regional disparities - factors such as housing quality and availability, health amenities and human capital, which could be important areas of future research into the determinants of migration patterns in transition economies (see Ghatak, Mulhern, Watson, 2008). Unfortunately, the lack of relevant information has prevented us from investigating these in the case of Romania.

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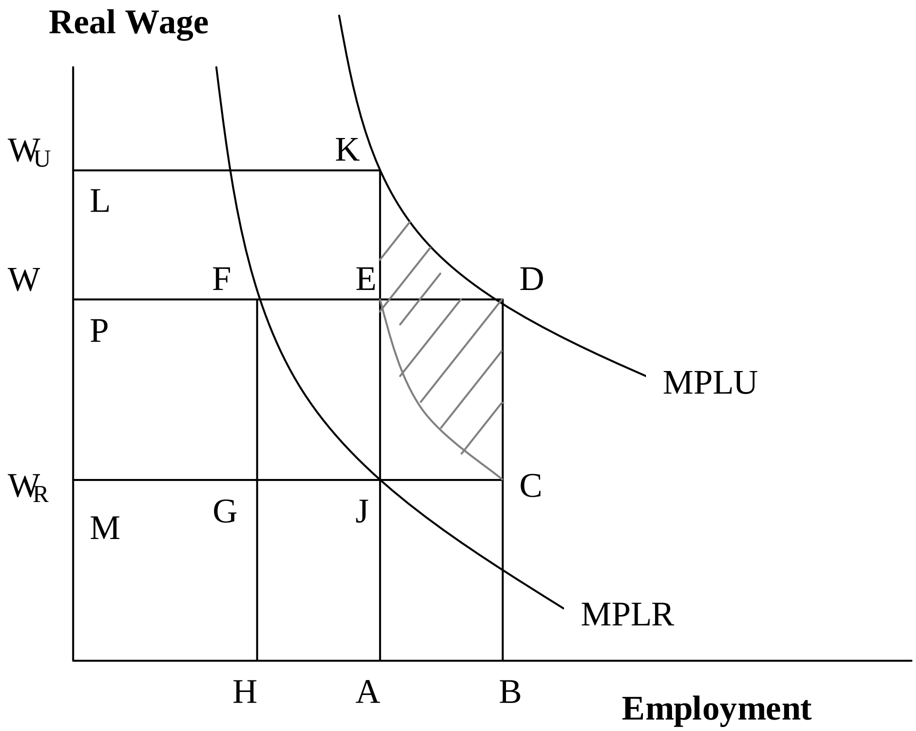


**Figure 1: Employment and Real Wage before and after migration**

**Table 1a: Estimated model, Cross section SUR (PCSE) with fixed effects**

Dependent Variable: LOGMIGRATION
Method: Panel Least Squares
Sample (adjusted): 1995 2005
Cross-sections included: 56
Total panel (balanced) observations: 616
Cross-section SUR (PCSE) standard errors & covariance (d.f.corrected)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 8.35 | 0.336 | 24.84 | 0.00 |
| UNEMPLOYMENTDESTINATION | 0.016 | 0.011 | 1.44 | 0.14 |
| UNEMPLOYMENTDONOR | -0.011 | 0.011 | -0.95 | 0.33 |
| LOGWAGEDONOR | -0.615 | 0.318 | -1.93 | 0.05 |
| LOGWAGEDEST | 0.504 | 0.325 | 1.55 | 0.12 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.958 | Mean dependent var | 6.80 |
| Adjusted R-squared | 0.953 | S.D. dependent var | 0.86 |

**Table 1b: fixed effects for migration routes**

| | | | |
|---|---|---|---|
| Bucharest – Centre | -0.309611 | South-Bucharest | 1.890298 |
| Bucharest – North East | 0.615237 | South-Centre | -0.278091 |
| Bucharest – North West | -0.748257 | South-North East | -0.106460 |
| Bucharest – South | 1.801774 | South- North West | -1.342855 |
| Bucharest – South East | 0.595396 | South- South East | 0.733632 |
| Bucharest – South West | 0.140613 | South-South West | 0.178584 |
| Bucharest – West | -0.852703 | South-West | -0.866516 |
| Centre – Bucharest | -0.641081 | South East- Bucharest | 0.994293 |
| Centre – North East | 0.708784 | South East-Centre | 0.113079 |
| Centre – North West | 0.490342 | South East-North East | 1.147288 |
| Centre – South | -0.507965 | South East-North West | -1.136271 |
| Centre – South East | 0.017372 | South East-South | 0.831072 |
| Centre-South West | -0.444767 | South East-South West | -0.573201 |
| Centre- West | 0.443882 | South East-West | -0.470520 |
| NE-Bucharest | 0.874704 | South West-Bucharest | 0.491410 |
| North East- Centre | 0.850462 | South West- Centre | -0.147202 |
| NE – NW | -0.393856 | South West- North East | -0.717760 |
| North East-South | 0.381828 | South West-North West | -1.302986 |
| NE – SE | 1.315635 | South West- South | 0.287609 |
| North East-South West | -0.446018 | South West-South East | -0.532927 |
| North East-West | 1.049281 | South West-West | 0.653190 |
| North West- Bucharest | -1.029549 | West-Bucharest | -1.032937 |
| North West- Centre | 0.431711 | West-Centre | 0.115545 |
| North West- North East | -0.747933 | West-North East | 0.746726 |
| North West-South | -1.359686 | West-North West | 0.510561 |
| North West-South East | -1.380194 | West-South | -0.877210 |
| North West- South West | -1.408078 | West-South East | -0.517127 |
| North West-West | 1.172607 | West- South West | 0.588843 |