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## Migration and earnings in Romania

Maria Denisa Vasilescu<sup>a,b</sup>, Madalina Ecaterina Popescu<sup>a,b\*</sup>, Nicolae Cataniciu<sup>a</sup><sup>a</sup> National Scientific Research Institute for Labour and Social Protection, 6-8 Povernei Str., Bucharest, 010643, Romania<sup>b</sup> The Bucharest Academy of Economic Studies, 6 Romana Square, Bucharest, 010374, Roman

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### Abstract

This article investigates the determinants of Romanian average earnings by estimating several panel data econometric models at national and regional level. The earnings are regressed against a number of socio-economic variables that include the unemployment rate, the labour productivity, the number of immigrants, the number of emigrants and the number of graduates from tertiary education and from post-secondary education. The results obtained show that productivity, higher education and immigrants positively influence Romanian earnings and that the unemployment rate lowers the earnings. Also, different patterns are observed across the macro-regions, the comparative analysis of the results enabling us to identify the characteristics of each Romanian macro-region.

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### 1. Introduction

A person's salary is often associated with its standard of living. The European Union is focusing on policies meant to reduce poverty and is emphasizing the importance of raising the standard of living.

Romania is among the EU countries with very low wages and this issue has both social and economic consequences. The most debated aspect regarding Romania is the intense migration process which has its roots in the economic situation, among others, keeping in mind that a Romanian worker can earn in Western Europe up to 3 times more than in the country of origin. Romania is already experiencing shortages of skilled labour force, which is why employers are forced to turn to foreign workers. Knowledge of the impact of these migratory movements upon

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\* Corresponding Author: Popescu Madalina Ecaterina. Tel.: +4-072-282-7889  
E-mail address: [madalina.andreica@gmail.com](mailto:madalina.andreica@gmail.com)

labour market and earnings is important and useful to policy makers.

Many articles have focused on the impact of immigration on wages (Levine, 2010, Dustman and Glitz, 2006, Okkerse, 2005). Most studies of the economic impact of immigration are motivated by the desire to understand how immigrants affect different dimensions of the labour market in the host country. Borjas (2001) analyses the impact of immigrants on the US economy and finds out that immigration improves labour market efficiency. The explanation for this situation is that the immigrants tend to go where economic situation is more favourable. The evidence from a number of developing countries suggests that high emigration rates are not necessarily associated with rising wages or even declining unemployment (OECD, 2007). Still, the migration of low-skilled workers might result in rising wages or a relaxation of the local labour market in areas with high rates of emigration and an oversupply of labour. The outflow of skilled workers deprives developing countries of their human capital and results in brain drain with serious consequences on economic productivity (Dayton-Johnson et al., 2009)

For the case of Romania most of the studies are approaching the problem of massive emigration. Roman and Voicu (2010) analysed some socio-economic effects of labour migration on the sending country and concluded that the most important positive effects of emigration are the remittances and the “export” of unemployment. As for the negative aspects, the most severe ones are: loss of educated/qualified labour force (brain drain), shortage of labour force in certain domains, wage distortions and the segmentation of the labour force. Other studies concerning the Romanian migration are focusing mainly on the migratory behaviour (Roman et al., 2010; Baldwin-Edwards, 2005).

Even if the main purpose of this article is to investigate the impact of migration on average earnings in Romania, when analysing the determinants of earnings, factors like productivity, unemployment and education cannot be overlooked.

The most direct mechanism by which labour productivity affects living standards is through real wages, that is, wages adjusted for changes in the cost of living. Economic theory holds that at the aggregate level the growth of real wages are determined by labour productivity growth (Sharpe et al., 2008). The connection between labour productivity and wages within an industry (or occupation) implicitly assume the following: when output per worker increases, workers’ contributions to firm revenue growth causing the demand for workers to also increase. As wages are determined by supply and demand, an increase in demand will lead to an increase in wages (Bruce, 2002). The relation between wages and productivity has been analysed in different dimensions. Recent studies found evidence that wages have grown below productivity in the last 30 years: Fleck et al. (2011) and Meager and Speckesser (2011) describe a widening gap between growth rates of productivity and wages.

During the last decade, numerous empirical studies have examined the connection between labour market conditions, the unemployment rate in particular, and real wages across regions and industries within a country (Gregg and Machin, 2012). Blanchflower and Oswald (1995) used individual data to explore the relationship between wages and the unemployment rate in the local labour market, a relationship they labelled “the wage curve”, and concluded that wages are lower in labour markets with higher unemployment. Following Blanchflower and Oswald’s approach many studies have verified that the unemployment elasticity of real wages is remarkably similar across countries and estimated at approximately -0.1 (Sanz de Galdeano and Turunen, 2005). In general the wage curve has negative unemployment elasticity based on the fact that high unemployment frightens workers and weakens their bargaining power. The workers place greater weight on employment and less on wage objectives when unemployment is high and the chances of finding employment are consequently low.

Education plays a central role in preparing individuals to enter the labour force, as well as equipping them with the skills to engage in lifelong learning experiences (Fasih, 2008). Education level is one of the major factors determining lifetime earnings because it impacts the available career options, job levels and salary, and even employment vs. unemployment. Hundreds of studies in many different countries and time periods have confirmed that better-educated individuals earn higher wages, experience less unemployment and work in more prestigious occupations. For example, Graham and Paul came to the conclusion that staying in school really does pay off and that the connection between schooling and employability and wages exists and is statistically significant. The more educated one is, the better his chances of getting hired, and the more likely he is to earn more. And all of that, of course, leads to a better overall living standard.

## 2. Data and methodology

In evaluating the determinants of average net earnings in Romania we used the following explanatory variables: the unemployment rate (*ur*), the labour productivity (*prod*), the number of immigrants (*imig*), the number of emigrants (*emig*), the number of graduates from tertiary education (*iscsed56*) and from post-secondary education (*iscsed4*). The labour productivity is expressed in this analysis as the ratio between the gross domestic product and the civil employed population. We used the Consumer Price Index to obtain real values for the earnings and the GDP deflator for the labour productivity. All the variables were used in the econometric analysis as natural logarithm, except for the unemployment rate. The analysis refers to the period 2000-2010. It should be noted that we excluded from the analysis one county, Tulcea, for missing data reasons. The source of our data was the Romanian National Institute of Statistics.

The panel data econometric analysis was conducted using the STATA software. One of the first things that need to be checked when working with panel data is whether we should actually use the panel data model in favour of a pooled OLS regression. A simple pool ability test can indicate if the individual effects are significant or not, the later suggesting that the OLS estimator is biased and inconsistent.

There are two main panel data models: the fixed-effects model (FE) and the random-effects model (RE). In the FE model, the individual-specific effect is a random variable that allowed to be correlated with the explanatory variables. In the RE model, the individual-specific effects are treated as stochastic. (Schmidheiny, 2013). To decide between fixed or random effects we can run a Hausman test where the null hypothesis is that the preferred model is RE vs. the alternative the FE (Green, 2008). It basically tests whether the unique errors are correlated with the regressors; the null hypothesis is they are not.

In order to test if the underlying regression model's assumptions are not violated, we can check for the presence of heteroskedasticity or the serial correlation of the errors. Ignoring the heteroskedasticity of the disturbances or the correlation in the estimation can lead to a severe bias of the results. Any statistical inference that does not take these issues into consideration is invalid. The best solution to overcome these problems is a robust estimation using Driscoll and Kraay standard errors, which is a non-parametric technique assuming the error structure to be heteroskedastic, autocorrelated up to some lag and possibly correlated between the groups (Hoechle, 2007).

## 3. Results of the analysis

The following general net earnings equation was considered in the analysis:

$$l\_earnings_{it} = a_1 + a_2 * ur_{it} + a_2 * l\_imig_{it} + a_3 * l\_emig_{it} + a_4 * l\_iscsed4_{it} + a_5 * l\_iscsed56_{it} + a_6 * l\_prod_{it}$$

When running the Hausman test in order to decide if we are either dealing with RE model or FE model, the obtained probability suggested that the hypothesis of fixed-effects model is more appropriate. After estimating the model using the within estimator, we performed both the modified Wald test for heteroskedasticity and the serial correlation test. Since the tests indicated both the presence of autocorrelated and heteroskedastic error terms, we had to estimate a robust fixed-effects regression with Driscoll and Kraay standard errors, in order to ensure the validity of the statistical results.

The general net earnings equation at **national level** is presented below:

$$l\_earnings_{it} = -3,69 - 0,0036 * ur_{it} + 0,0286 * l\_imig_{it} - 0,0141 * l\_iscsed4_{it} + 0,0382 * l\_iscsed56_{it} + 0,966 * l\_prod_{it}$$

(-27,61)\* (-2,02)\*\* (3,05)\* (-1,83)\*\*\* (3,59)\* (139,4)\*

where between brackets are t-Statistics values and \* significant at 1%; \*\* significant at 5%; \*\*\* significant at 10%.

The results of the econometric analysis upon the Romanian labour market at national level during 2000 - 2010 indicate that the real net earnings are mostly affected by the variations of labour productivity, meaning that a 1% increase in labour productivity leads to a 0.966% increase on real net earnings, keeping all the other variables constant. The influence of the labour productivity dynamics appears to be economically normal because a growth in productivity stimulates the production in goods, leading eventually to higher labour demand (especially highly qualified workers), which further on generates higher wages.

Secondly, the results indicate a negative impact of unemployment rate upon the real net earnings, as expected according to the neoclassical theory. More precisely, a 1% increase on unemployment rate leads to a 0.36% decrease in earnings, *ceteris paribus*.

Another influent factor on earnings variation is the total number of immigrants, for which the econometric results suggests that when the number of immigrants increase at national level with 1%, the real net earnings are expected to grow accordingly with almost 0.03%, keeping all other variables constant.

When considering the effect of the number of persons with tertiary education we notice a positive influence upon real net earnings at national level of approximately 0.038% increase in earnings at a 1% increase of the number of persons with tertiary education, keeping all the other variables constant. On the other hand, the number of persons with post-secondary education has an opposite but least significant impact on real net earnings. This indicates that at national level the higher the number of persons with tertiary education is, the higher the real net earnings are to be expected, while at the contrary, the lower the number of persons with post-secondary education becomes, the higher the wages are expected to be.

We further on present the panel data results **at macro-regional level**. The econometric analysis was built on a similar structure to the model estimated at the national level and the results of the four panel data models are summarised in table 1.

We can see that the labour productivity has the greatest influence on the real net earnings in Romania for all macro regions. Secondly, the negative unemployment rate effects upon real net earnings is noticeable, with exception for the case of the first macro region where the unemployment rate effect upon earnings is statistically insignificant. Regarding how education influence the level of earnings, the econometric results indicated that there is a positive correlation between real net earnings and the number of persons with tertiary education, while a post-secondary education level has an opposite impact on earnings. When considering the migration effect upon earnings in each macro region, one can notice a positive influence of both the number of immigrants and emigrants upon earnings with one exception.

For **the first macro region** case, we notice the negative effect of the number of emigrants as compared to the positive impact of immigrants and emigrants upon the real net earnings for all the other macro regions. A possible explanation is the fact that emigration numbers are so high that demand and output fall. Also, if the emigrants are high skilled workers than the average wage will be lowered.

The labour productivity influence is however normal and the most significant one and, thus, an increase in the current output leads to a stimulation of earnings. Moreover, the variable representing the number of persons with tertiary education turned out to be statistically significant indicating that a 1% increase in the number of persons with tertiary education will lead to a 0,046% growth in earnings, keeping all other variables constant.

When considering **the second macro region** equation, we first notice that the labour productivity has the greatest influence on the real net earnings in this region, as compared to the other macro regions. As expected, the unemployment rate affects net earnings in a negative way, although the coefficient is not very significant. Moreover immigrants also have a positive impact on real net earnings, which shows that many of those who have legally settled in this area are employable people and, moreover, they are looking for a well-paid job.

In the equation corresponding to **the third macro region** we notice that the greatest influence upon earnings corresponds to the labour productivity, which is also sustained by the fact that Bucharest is included in this macro region.

In terms of migration, we see that both emigrants as well as immigrants have a positive impact on real average net earnings. A characteristic of this macro region is that, in general, it has a positive migration balance and relative high number of immigrants compared to the other macro regions. The fact that Bucharest, the capital city, is a part of this macro-region could explain the immigrants' interest towards this area being well known the fact that immigrants tend to go where the economic situation is more favourable (a higher living standard, more and better-paid jobs, more opportunities for career and personal development). The positive impact of the number of emigrants could be explained by the fact that people who leave this macro region are mostly low-skilled workers and the fact that their low earnings are no longer part of the Romanian economy has a logical consequence of raising the real average earnings.

Finally, the results corresponding to **the fourth macro region** indicate that there is a positive impact of labour productivity and tertiary education on earnings, as well as a negative effect of unemployment rate. Besides, immigrants contribute to the real net earnings growth with the highest level as compared to any other macro region. The influence of the post-secondary education level is very low, which indicates a certain reduction on earnings of

about 0.04% at a 1% increase in the number of persons with post-secondary education.

Table 1. Econometric results for the four panel data models

Variables	MACRO REGION 1	MACRO REGION 2	MACRO REGION 3	MACRO REGION 4
<i>Ur</i>		-0,0082 (0,004)***	-0,011 (0,004)**	-0,0059 (0,002)**
<i>l_emig</i>	-0,0347 (0,02)***		0,0634 (0,019)*	
<i>l_imig</i>		0,0322 (0,01)*	0,0453 (0,02)**	0,0489 (0,01)*
<i>l_isced56</i>	0,0457 (0,01)*		0,058 (0,03)***	0,0828 (0,013)*
<i>l_isced4</i>				-0,0383 (0,01)*
<i>l_prod</i>	0,9828 (0,01)*	0,9841 (0,01)*	0,939 (0,005)*	0,925 (0,008)*
<i>cons</i>	-3,758 (0,18)*	-3,6062 (0,16)*	-3,9614 (0,23)*	-3,573 (0,11)*

where between brackets are the Driscoll and Kraay standard errors values and \* significant at 1%; \*\* significant at 5%; \*\*\* significant at 10%.

#### 4. Conclusions

In this study we investigated the impact of several socio-economic indicators that are important in determining Romanian earnings. Annual data for the period 2000-2010 for the 42 Romanian counties were used by considering the following variables: the real net earnings as dependent variable and the unemployment rate, the labour productivity, the number of immigrants, the number of emigrants and the number of graduates from tertiary education and from post-secondary education, as explanatory variables.

Several panel data econometric models of earnings were estimated both at national level as well as for each of the four Romanian macro regions. The econometric results were consistent to the economic theory and are of great interest for the scientific community as well as for the policy makers. First of all, we found evidence of a strong relationship between labour productivity and average earnings in the sense that the labour productivity growth induces a similar increase to the average wage. Also, the Romanian earnings are positively influenced by higher education and immigrants and the unemployment rate lowers the earnings.

At macro region level, the results indicated the fact that the labour productivity has the greatest positive influence on the real net earnings in Romania for all macro regions, while the unemployment rate diminishes the real net earnings. Regarding the impact of education on earnings, the econometric results indicated that there is a positive correlation between real average net earnings and tertiary education graduates and that a higher number of post-secondary education graduates decreases average earnings.

Some other particularities were also noticed at macro region level. For instance, for the case of the first macro region the unemployment rate effect upon earnings turned out to be statistically insignificant, while the post-secondary education effect was only statistically significant for the fourth macro region, but with a very low impact on earnings.

As for migration, although most of the studies are focusing on emigration we see that the impact on average earnings is not very strong and is significant only for 2 macro regions, unlike the influence of immigrants which is present both at national and at macro-regional level. Even if Romania is a developing country and its economic pattern is marked by emigration, the results show that it's worth taking into consideration the immigrants as they have a statistically significant impact on labour market. The immigrants coming to Romania have distinct profiles. A large number are coming from Moldova, due to similar language and culture. In recent years, the shortages of labour force due to massive emigration were substituted with foreign workers, most of them from Turkey or China for construction and services industries. With business visa are the immigrants from Germany, Italy and other developed countries. Therefore, the results of our econometric analysis indicate that the immigrants participating on

the Romanian labour market are mostly high-skilled or good professionals that increase the average wage. Although immigration has many facets and our analysis captured only a small part of its influence on the labour market we are confident that our study will trigger the interest of researchers on this topic.

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