Available online at www.sciencedirect.com

ScienceDirect

Procedia Economics and Finance 8 (2014) 362 – 369

Procedia Economics and Finance

www.elsevier.com/locate/procedia

1st International Conference 'Economic Scientific Research - Theoretical, Empirical and Practical Approaches', ESPERA 2013

Regional determinants of average wage in Romania

Zizi Goschin[a,b]*

[a]*Academy of Economic Studies, Piata Romană nr. 6, Bucharest, 010374, Romania*
[b]*Institute of National Economy, Calea 13 Septembrie nr.13, Bucharest, 050711, Romania*

Abstract

The economic crisis has conveyed a new set of challenges for the labour market, one of its most socially negative effects being the decline in real wages. In this context our paper attempts to explain the wage determinants in Romania from a territorial perspective. We examine the spatial correlation between real wage earnings and various regional characteristics in the framework of a panel data model. This technique allows controlling for region-specific differences in the factors of influence included in the wage model. We test the hypothesis that average regional wages are positively related to the economic performance of the regions. The empirical analysis has covered the 1995-2010 period and our empirical estimations confirmed the significant role of the development level, captured by GDP/capita, on regional wage determination in Romania on the long-run.

Keywords: wage; panel data model; region; Romania;

1. Introduction

Despite sizeable increase prior to the crisis, Romanian wages remain among the lowest in EU, being placed at 21% of EU-27 average in 2011. Average real wages by county constantly declined in the 1990s, bottoming in 2000 (Figure 1). Wages strongly increased since 2000 and reached a peak in 2008, following a period of constant and strong macroeconomic growth combined with labour force shortage due to large emigration. Inter-county wage

* Corresponding author. Tel.: +40 21 319 1900/383;
E-mail address: zizi.goschin@csie.ase.ro

doi:10.1016/S2212-5671(14)00102-6

disparities, however, went on an opposite path, deepening in the context of sizeable but uneven wage increases over 2000-2008.

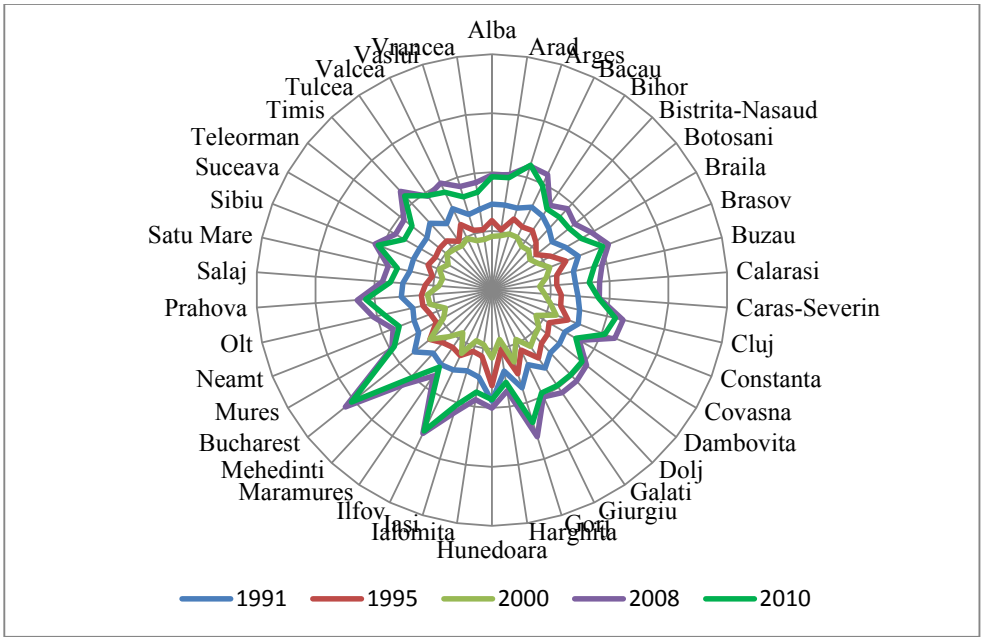

Fig. 1. Average real wage by county, selected years
Source: own processing based on data issued by NIS.

Space is a relevant factor in the wage setting mechanism: companies decide on best location considering both the quality and the cost of labour in different places, while employees move regionally in search of a better pay for their skills and experience. In this context, our paper aims at quantifying the role of different factors of influence on the real average wages in Romania at the county level in the framework of a panel data model that allows controlling for region-specific differences in the variables included in the model. Such information might be of interest for decision-makers since inequalities in earnings gain importance in the context of current increase in regional disparities and have significant social and economic impact, as well as a special relevance for poverty reduction efforts.

The rest of the paper proceeds as follows. Section 2 shortly presents the relevant literature, while section 3 introduces the model, variables and data employed for the empirical analysis. Section 4 presents and discusses the main results and section 5 summarizes and sets out directions for future research.

2. Literature review

The literature highlights a large range of factors that determine regional wage inequalities: specific labour market aspects, human capital differentials, and general regional characteristics that may attract/reject firms and employees. From the employers' point of view, human capital differentials, that translate into labour productivity inequalities, represent a key determinant of territorial differences in wages. The close relationship between labour productivity and wage is a long-running theme in economics, addressed both in theoretical and empirical studies. Most empirical studies confirm their tendency to correlate (e.g. Fisher and Hostland, 2002; Feldstein, 2008), given that productivity growth may exceed average wage growth or not, depending on country and period of time (Sharpe et al., 2008).

Although wages do not strictly follow the GDP trend and might even behave counter-cyclically in open economies (Messina et al., 2009), there is also a stable positive impact of GDP growth on real wages. In the same register, empirical research showed that higher economic potential of regions determines higher average wages (Cieślik and Rokicki, 2013).

The regional variation in unemployment rate is another potential factor of influence. Since the seminal paper of Blanchflower and Oswald (1994), other researchers tested the unemployment-wage relationship and reported stable negative impact of unemployment on regional wages based on microdata (e.g. Albæk et al., 2000; Dyrstad and Johansen, 2000).

The economic crises entail severe labour market adjustments due to diminished activity and tend to reduce real wages, although an apparent growth in average wage might result from the under-qualified (under-paid) workers being dismissed firstly (O'Farrell, 2010). Moreover, such economic shocks tend to increase both sectoral and territorial wage disparities due to their uneven effects (Phillips, 1992; Monastiriotis, 2002). Labour force mobility also absorbs some of the economic shock by enhancing flexibility of the labour market and reducing job mismatches. Emigration diminishes the labour supply and enlarges wages in the sending regions, while immigration lowers the level of wages in the destination regions (Borjas, 1994; Elsner, 2013).

In Romania, a number of studies addressed the topic of wage disparities, focusing both on the sectoral and regional level. These studies pointed to the factors that caused the rise in wage differentials after 1989, such as abandon of centralized wage-setting procedure (Brainerd, 2010), better education (Skoufias, 2003; Andrén et al., 2005), higher regional variation in labour productivity (Goschin, 2007), unbalanced "wage push" effect of self-employment (Köllõ and Vincze M., 1999), inequalities in market access (Faina et al., 2010; López-Rodríguez, 2011), territorially uneven emigration, etc. Differences in regional effects of such factors can further enhance the spatial variation in wages.

3. Models, variables and data

Our analysis on the regional determinants of real wages is based on panel data modeling (Baltagi, 2005). This method combines cross-sectional and time series dimensions in one dataset. The data covers the interval 1995 to 2010 and 41 counties plus Bucharest municipality, resulting 672 observations. We are going to run first a simple pooled OLS (Ordinary Least Squares) regression on this dataset disregarding its combined structure: chronological and cross-sectional. In the pooled OLS regression model all the coefficients, including the intercept, are common for all counties:

$$y_{it} = \beta_0 + \Sigma_j \beta_j X_{jit} + e_{it},\ i=1,\ldots,42 \text{ and } t = 1995,\ldots,2010 \quad (1)$$

where:

y_{it} – the dependent variable -real average wage earnings- in county i and year t;
X_{jit} – the independent variable j in county i and year t;
β_0 – the common constant;
e_{it} - errors.

Since the county data are not separated, this method neglects the individuality of each county due to specific economic and social characteristics. The panel data model allows for fixing this problem through inclusion of fixed or random effects in the specification.

The fixed effects model is allowing individual time-invariant intercepts for the counties Assuming the existence of a region specific that remains unchanged over time, the unobserved characteristics can be modeled as fixed effects reflected in different values β_{0i}, for each region i, of the general constant β_0. Individual effects capture regional stable characteristics which impact on the wage setting mechanism, such as specificity of the local labour market, workforce county-specific policies, local entrepreneurship, etc. We control unobserved heterogeneity assuming that it is time-invariant (fixed) and possibly correlated with the regressors. The fixed effects (FE) regression model takes the following form:

$$y_{it} = \beta_{0i} + \Sigma_j \beta_j X_{jit} + e_{it},\ \text{for } i=1,\ldots,N \text{ and } t=1,\ldots,T \quad (2)$$

where β_{0i} is the individual unobserved effect, unchanged over time, for county i.

Relation (2) includes only cross-section –county- fixed effects (one-way fixed effects model), but the model can be expanded to include period –annual- fixed effects (two-way fixed effects model):

$$y_{it} = \beta_{0i} + \gamma_t + \Sigma_j \beta_j X_{jit} + e_{it}, \text{ for } i=1,\ldots,N \text{ and } t=1,\ldots,T \quad (3)$$

where γ_t captures the time influence, such as changes in economic policy, the impact of cyclical phenomena (economic crises, recession, boom), etc., while β_{0i} represents the space influence (time-invariant county specific). This means that the two-way fixed effects model is taking into account the likely heterogeneity both among counties, and the years included in the period of interest.

In the case of random effects (RE) model the counties are assumed to have a common average β_0 from which individual county constants β_{0i} randomly deviate:

$$\beta_{0i} = \beta_0 + \varepsilon_i, \quad (4)$$

where ε_i is the error.

It follows that the random effects model considers the errors to have a composite form:

$$u_{it} = \varepsilon_i + e_{it}, \quad (5)$$

where ε_i is the error specific for county i and e_{it} is the usual error. Introducing relations (4) and (5) into the equation of FE model we get the general form of the random effects model:

$$y_{it} = \beta_0 + \Sigma_j \beta_j X_{jit} + u_{it}, \text{ for } i=1,\ldots,N \text{ and } t=1,\ldots,T \quad (6)$$

where the errors u_{it} are as in relation (5).

The use of random effects model is justified if the sample units come from a large overall collectivity.

Finally, we have to test which model is better. To check whether fixed effects are better than pooled OLS we run a Redundant fixed effects test (null hypothesis: pooled regression against the alternative: fixed effects), while the Hausman test discriminates between RE and FE. The null hypothesis of Hausman test states that random effects are more appropriate, against the alternative of fixed effects. If we fail to reject the null hypothesis it is considered that the estimators of the two models produce similar results.

The dependant variable in the regression models is real average salary earnings, by county and by year. The explanatory variables, common in all three models, are described in Table 1.

Table 1. The variables

Variable name	Description
wage	Real average salary earnings (constant 1995 lei)
GDP	Annual real GDP per capita (constant 1995 lei)
prod	Annual real labour productivity (constant 1995 lei)
ur	Unemployment rate (%)
edu	Higher education graduates (persons)
wk	Share of workers in total number of employees (%)
private	Share of employees in privately owned firms (%)

Our selection of independent variables is based on theoretical considerations in the literature, as well as on data availability for Romanian counties over the period of interest. The choice of interval of analysis was limited by available regional statistics. The data cover the interval 1995 to 2010 and 41 counties plus Bucharest municipality. Data were drawn from Institute of National Statistics, TEMPO online database (INS, 2013).

4. Results and discussion

The results from the pooled data OLS model of real wages, reported in Table 1, confirm the expected positive impact of GDP/ capita, as a key indicator of regional economic performance, of labour productivity, a source for wage increases, and of tertiary education, as enabler for higher productivity. As documented in the literature, the share of low-skilled workers seems to have a negative impact on regional wages. On the opposite, the share of employees in privately owned firms bears an unexpected positive sign, suggesting higher wages in the private sector. The unemployment rate is statistically insignificant.

Table 2. Estimation results from model 1: pooled data OLS

Variable/ Statistic	Coefficient	Probability
GDP	0.959303	0.0082
PROD	0.404502	0.0000
EDU	0.005988	0.0000
PRIV	121.6476	0.0117
UR	-1.683534	0.3789
WK	-603.0014	0.0000
C	590.1976	0.0000
No. observations	672	
Adjusted R-squared	0.579988	
F-statistic (prob)	155.4287 (0.0000)	

Source: own computations

The low value of the Durbin Watson statistic indicates potential autocorrelation of errors in the pooled data OLS model. We are going to run further the fixed effects model which allows testing the individual spatial and temporal effects.

Table 3. Estimation results from model 2: fixed effects

	Cross section fixed effects		Period fixed effects	
Variable/ Statistic	Coefficient	Probability	Coefficient	Probability
GDP	0.405318	0.0034	0.245627	0.0000
PROD	0.592270	0.0000	0.126151	0.0000
EDU	0.002794	0.0429	0.001760	0.0000
PRIV	-153.0931	0.0012	-431.6949	0.0000
UR	-7.158259	0.0000	1.434819	0.0989
WK	-709.9243	0.0000	82.63546	0.0183
C	542.8185	0.0000	598.6414	0.0000
No. observations	672		672	
Adjusted R-squared	0.779560		0.940426	
F-statistic (prob)	51.48747 (0.0000)		505.3915 (0.0000)	

Redundant fixed effects test:		
cross-sect. F (prob)	652.535644 (0.0000)	
period F (prob)		1504.347686 (0.0000)

Source: own computations

Results from cross-section fixed effects model (Table 3) point to the positive effect of the counties' economic performance (captured by GDP per capita), labour productivity and education (captured by higher education graduates) on the counties' average wages. As expected, a high level of unemployment rate and a large share of workers in total number of employees both tend to lower the average wage of the counties. In contrast to the first model, the share of employees in privately owned firms now has a negative sign, meaning that it tends to diminish the level of average wage. This new result seems more appropriate, based on lower wages in the private sector.

Results from the period fixed effects model also support the expected positive impact of GDP per capita, labour productivity and education, as well as the negative effect of the share of employees in privately owned firms on the variation of annual levels of average wage, but the estimations for share of low-skilled workers, although still significant, bear an unexpected positive sign. There might be a simple statistical explanation to this: the share of workers in total employees declined while average wage increased. The unemployment rate has a low statistical significance in this model.

It is necessary to test if the initial model (pooled OLS) is less good than the model with fixed effects (FE). The results obtained in EViews for Redundant fixed effects test support rejection of the null hypothesis that the individual effects (both cross-section and period) are zero. This result corresponds to the expectations of a high level of heterogeneity among Romanian counties, and between the different sub-periods of the 1995-2010 interval, as indicated by preliminary statistical analysis.

Results from both cross-section and period random effects model (Table 4) are similar as regards the signs of the estimated coefficients, indicating positive effects of GDP per capita, labour productivity and education, and negative effects of unemployment rate, share of employees in privately owned firms, and share of workers in total number of employees. There are however important differences in the statistic significance of these estimations, as unemployment rate in the cross-section RE model and share of employees in privately owned firms in the period RE model are both insignificant, while share of workers in total number of employees has a sizeable lower level of significance in the cross-section compared to period RE model. These dissimilarities are derived from the different perspective, spatial against temporal, in the two models.

Table 4. Estimation results from model 3: random effects

	Cross section random effects		Period random effects[1)]	
Variable/ Statistic	Coefficient	Probability	Coefficient	Probability
GDP	0.431232	0.0000	0.382578	0.0000
PROD	0.027095	0.2390	0.108240	0.0000
EDU	0.002170	0.0000	0.002621	0.0000
PRIV	-206.5097	0.0000	-45.42172	0.1138
UR	-0.760849	0.3201	-2.021913	0.0100
WK	-53.09071	0.0874	-150.9640	0.0000
C	623.5610	0.0000	564.1740	0.0000
No. observations	672		672	
Adjusted R-squared	0.971127		0.818307	
F-statistic (prob)	1075.704 (0.0000)		65.29878 (0.0000)	
Hausman test :				
Cross-section Chi-Sq. Statistic (prob)	34.806344 (0.0000)			

Period Chi-Sq. Statistic (prob)	325.287496 (0.0000)

[1)]estimation method: Generalised Least Squares (GLS)
Source: own computations

Finally, we should choose between the fixed effects and random effects model. Low probability of the Hausman test (Table 4) indicates that we should reject the null hypothesis that random effects are more appropriate, and chose fixed effects instead. This supports the hypothesis of omitted individual effects that influence the regional wage setting mechanism. Such factors that determine the regional specificity can be both quantitative (e.g. the sectoral structure of activities in the region that influence the average wage) and qualitative (the bargaining power of unions, quality of workforce, specific regional policies that influence economic performance, etc.). Opportunity to highlight these factors is a key advantage of panel data techniques (Baltagi, 2005).

5. Conclusion

In this paper we have explored the main causes of territorial wage disparities in Romania based on a panel data model. Our empirical research provided clear evidence for the fixed effects specification. This suggests that Romanian counties are heterogeneous and the wage setting procedure is influenced by local characteristics that generate significant variation in average wages. Results provided by the models are largely in accordance with the literature on wage determinants. They indicate the positive effect of economic performance, labour productivity and education on the counties' average wages, while unemployment rate, share of low-skilled workers and share of employees in privately owned firms have a negative impact.

Future research should include additional explanatory variables in the models, such as net migration, innovation, and foreign direct investments. Sophisticated methods, such as spatial regressions might also help to shed more light on the regional wage determinants.

References

Albæk, K., Asplund, R., Barth, E., Blomskog, S., Gudmundsson, B.R., Karlsson, V., Madsen, E.S., 2000. The Wage- Relationship in the Nordic Countries, Econometric Society World Congress 2000 Contributed papers 1893.

Andrén, D., Earle, J. S., Săpătoru, D., 2005. The Wage Effects of Schooling under Socialism and in Transition: Evidence from Romania, 1950 – 2000. Journal of Comparative Economics 33, pp. 300 - 323.

Baltagi, B.H., 2005. Econometric Analysis of Panel Data, Third edition, John Wiley & Sons Ltd.

Blanchflower, D.G., Oswald, A.J., 1995. An Introduction to the Wage Curve. Journal of Economic Perspectives, 9 (3), 153-167.Borjas, G.J., 1994. The Economics of Immigration. Journal of Economic Literature, Vol. 32(4), pp. 1667-1717.

Brainerd, E., 2010. Human Development in Eastern Europe and the CIS Since 1990. Human Development Reports Research Paper, http://hdr.undp.org/en/reports/global/hdr2010/papers/HDRP_2010_16.pdf

Cieślik A., Rokicki, B., 2013. Regional wage determinants in Poland: the empirical verification of the NEG approach, Bank i Kredyt 44 (2), 159–174.

Dyrstad, J. M., Johansen, K., 2000. Regional Wage Responses to Unemployment and Profitability: Empirical Evidence From Norwegian Manufacturing Industries. Oxford Bulletin of Economics and Statistics, 62, 101–117.

Elsner, B., 2013. Emigration and wages: The EU enlargement experiment, Journal of International Economics, Volume 91, Issue 1, pp. 154-163.

Faina. A., Rodriguez, J., Gabriela, B.C., Candamioan, L.V., 2010. Income disparities in Romanian regions: The role of market access. Working Paper, No. 5-0.

Feldstein, M. S., 2008. Did Wages Reflect Growth in Productivity?. NBER Working Paper No. W13953, available at: http://ssrn.com/abstract=1121743

Fisher, T., Hostland, D., 2002. The Long View: Labour Productivity, Labour Income and Living Standards in Canada. The Review of Economic Performance and Social Progress, pp. 57-67.

Goschin, Z., 2007. Spatial and Sectoral Analysis of Productivity-Wage Dissimilarities in Romania. Romanian Journal of Regional Science, Vol. 1, 1, pp. 33-44.

INS, 2013. Institute of National Statistics, TEMPO online database, available at: www.insse.ro.

Köllõ J., Vincze M., 1999. Self-employment, Unemployment and Wages: Regional Evidence from Hungary and Romania. Budapest Working Papers on the Labour Market, BWP 1999/7.

López-Rodríguez, J., Faiña, A., Cosmin-Gabriel, B., 2011, Economic Remoteness and Wage Disparities in Romania. Tijdschrift voor economische en sociale geografie, 102: 594–606.

Messina, J., Strozzi, C., Turunen, J., 2009. Real wages over the business cycle. OECD evidence from the time and frequency domains, Wage Dynamics Network, Working Paper Series no 1003, available at: http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1003.pdf.

Monastiriotis, V., 2002. Inter- and intra-regional wage inequalities in the UK: sources and evolution. LSE research papers in environmental and spatial analysis, 70, Department of Geography and Environment, London School of Economics and Political Science, London, UK.

O'Farrell, R., 2010. Wages in the crisis. Working paper 2010.03, ETUI , European Trade Union Institute. Brussels.

Phillips, K. R., 1992. Regional wage divergence and national wage inequality. Economic and Financial Policy Review, Federal Reserve Bank of Dallas, issue Q IV, pp. 31-44.

Sharpe, A., Arsenault, J.F., Harrison, P., 2008. The relationship between labour productivity and real wage growth in Canada and OECD countries. Centre for the Study of Living Standards, Research Report No. 2008-8, available at: http://www.csls.ca/reports/csls2008-8.pdf.

Skoufias, E., 2003. The structure of wages during the economic transition in Romania. Economic Systems, Vol. 27, issue 4, pp. 345-366.