Econometric Analysis Regarding the use of Labor Resources at the Level of Romania

Florina BRAN [1]
Laurentiu COROBAN [2]
Victor Marian DUMITRACHE[3]
Oana Camelia IACOB PARGARU[4]

Abstract

The labor market is a market with imperfect competition, which must present a certain flexibility that leads to greater competitiveness and systematically and favorably influences economic growth.

In the current conditions of the market economy, the social division of labor is deepening considerably, the workforce being structured by age, sex, socio-professional categories, qualification levels, geographical areas and employment opportunities. depending on the performance parameters, the main labor market characterized by high levels of stability and safety and the secondary labor market characterized by parameters specific to the periphery of economic activity can be delimited. Also, the labor market can be analyzed as the labor market characteristic of the macroeconomic level and the labor market characteristic of the microeconomic level.

Key words: *resources, Romania, market, labour force*

Jel classification: *J24;O15*

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1. Introduction

Economic activity objectively involves the labor factor intended to capitalize on natural and monetary resources in its interest. (Chéron, Hairault &Langot, 2013). Work is traded through the labor market. The balances or imbalances on the labor market can be approached starting from the characteristics of this market and continuing with the internal mechanism of its functioning (Iacob& Radu, 2021).

Studying the mechanisms and policies regulating labor supply and demand during the period of transition to the market economy in Romania requires, as a

[1] Florina Bran, Bucharest University of Economic Studies, florina.bran@eam.ase.ro
[2] Laurentiu Coroban, West University of Timisoara, Romania, laurentiu.coroban@e-uvt.ro
[3] Victor Marian Dumitrache, Bucharest University of Economic Studies, victor.dumitrache@ gmail.com
[4] Oana Camelia Iacob Pargaru, Polytechnic University of Bucharest, oana_camelia_iacob @upb.ro

starting point, the elucidation of some general, conceptual problems regarding the labor market (Dorsett& Luccino, 2018).

In the context of my work, the approach related to the position of the labor market in the market system is justified by the fact that the right to work, the free choice of profession, are fundamental human rights in a democratic society. From this perspective, securing a job is not only an economic act but also one of social and political balance. as a consequence, the occupation cannot be left only to the market mechanisms, but the responsibility of the company must also be involved (Stefan et al., 2018),

The key problem of economic life is the attempt to achieve at every moment the correspondence between the equilibrium level of goods and services and the level of full employment, levels that no natural mechanism can make coincide. But a gap cannot be tolerated because one does not joke with full occupation; no civilization would tolerate that some of its members find regular work and a normal income while another is condemned to misery because no opportunity is offered to earn a salary; this is not only a problem of economic balance, but also one of justice, of social and political balance (Lengyel, Borbala& Lilla, 2017)

Studying and evaluating processes on the labor market as dimensions, structures and trends are important for defining active employment and social protection policies under their most different aspects (Burlacu, Iacob Pargaru, Dobre& Buzoianu, 2024).

2. Literature review

Economic literature presents nuanced definitions of the labor market concept. According to some authors, the labor market is an economic space where transactions are concluded (confronted, negotiated) freely between the recipients of capital as comparators (demand) and the possessors of labor as sellers (offer), and the demand and supply of labor is adjusted through the mechanisms of the price of labor, of the real salary, of free competition between economic agents. Other authors consider the labor market, in a more concentrated formula, a complex mechanism, which ensures the regulation of labor demand and supply both through free decisions of economic subjects and through the medium of the real salary (Campos De Grauwe& Ji, Y., 2020).

Experience shows that, in essence, the labor market always involves the establishment of relationships between the bearers of the offer and the demand for work. They determine certain specificities related to the adjustment of supply and demand, to the formation of the labor price, to the existence of a system of social norms and values (Meyer& Shera, 2017).

In this sense, the labor market reflects the mutual links between the demographic realities that determine the labor supply and those of economic and social development that generate the labor demand. The labor market has an essential role in the interdependence that ensures the dynamism of the economy. But this relationship should not be absolute, because there is not always a close correlation

between the labor factor and economic growth. Some labor resources do not manifest themselves on the labor market as such, even if they are creators of economic goods (Neumark, 2019). The legal-social requirements, like those regarding employment and social protection, do not automatically solve either the problems of the labor market or those faced by the development of the economy. That's why the labor market implies permanent negotiation between the carriers of the labor supply and those of the labor demand in terms of quantity, quality and structure.

The market- shows Schneider& Hage (2007)- appears as a set of means of communication through which sellers and comparators inform each other about what they possess, about the needs they have and the prices they ask or propose in order to conclude transactions.

In another approach, the labor market can be seen as the set of operations that take place, at different levels of macro-social organization by different economic agents, in connection with ensuring the balance between supply and demand for labor (Fihel& Okolski, 2009). These operations are carried out by organizing, regulating and developing labor relations, professional relations in general, taking into account the estimation and evidence of the supply and demand of the labor force.

In this sense, the orientation, recruitment and employment of the labor force, including the system of institutions, organs and specialized bodies, the technical equipment and personnel related to these processes, as well as the duration of work, including the norming, are taken into account (Radu, 2022). That is why the emphasis is placed on diversifying and promoting forms of employment, especially part-time work, with the aim of reconversion and retraining of the workforce in order to ensure the rapid and efficient insertion of the workforce into an appropriate professional environment. All of these are aimed at increasing the quality of work life, humanizing work, protection and safety at work, as well as professional orientation and training.

The contemporary labor market, although keeping its attributes of the free labor market, has nevertheless, in relation to the one existing in the last century, turned a series of new markers. The labor market is the most imperfect and the most rigid among markets, due to the natural limits of labor mobility, the mechanisms for regulating demand and supply, but also the increasingly high degree of organization, regulation and control of processes on the labor market (Hili Lahmandi-Ayed& Lasram, 2016).

3. Research methodology

The parameters of the described model will be determined by a numerical calculation method as estimates, which is the main objective of the modeling. The quality of estimators is based on:

- minimizing the deviation between the empirical values (yt) and the values resulting from the application of the model (yt), $\sum_t (y_t - \bar{y}_t)^2$ so that is minimal
- estimates are undistorted, consistent, efficient;

- the cost of applying the estimation method is minimal.

The method that fulfills (under certain conditions regarding the observance of some fundamental assumptions) all these criteria is the least squares method.

The assumptions of the application of the least squares method in the case of statistical data regarding the variability of some phenomena considered interdependent are:

- data on variables (y) and (si) are obtained without observation or measurement errors. (especially systematic errors particularly affect the quality of the estimators);
- the explanatory variables (and) do not depend on each other, are not correlated with each other, exerting their influence only on the effect variable;
- the residual variable (u) is normally distributed
- the residual variable (u) follows a distribution independent of the order in which it appears in the string of terms (u) being also independent of the values of the explanatory variable. So, the dispersion of the disturbance (σ_u^2) does not differ significantly in relation to (and), which signals a relative stability of the link between the effect variable () and the factorial variable (x). This quality of the disturbance is called homoscedasticity;

As the intensity of the correlation increases, so does the covariance. in the case of a linear functional link, the maximum absolute value of the covariance is equal to the product $\sigma_{u_t}\sigma_{u_{t-d}}$ This indicator has the advantage that it is quite easy to calculate, but also has the disadvantage that it depends on the units in which the random variables are measured. So it is not comparable from one variable to another.

To verify the significance of the regression parameters, we start by replacing the real terms (y) with the values of the regression equation (theoretical values y), an operation called adjustment, using the relationship: $\sum y_i = \sum \hat{y}_i$. The stage of verifying the results obtained through statistical tests is necessary because the calculation of the parameters of the econometric model is based on a sample of data.

Often starting from an "n" sample (where n<30) we seek to arrive at "good" estimates for the general collective of hundreds of cases. It should be noted that if we change the sample size, we obtain different values for the estimators. Statistical tests determine:

- under what conditions the estimates can be generalized;
- if the estimated value of the parameter represents a significant value and is not the result of a conjuncture (sample too small; random variations);
- the limits between which the estimate can be modified without affecting the conclusions regarding its significance;

- probabilistic guarantees regarding the significance of the estimator (the interval in which the estimator can take values without it affecting the initial assessment.

The basic element is knowledge of the distribution that characterizes the behavior of the analyzed variable (effect variable, disturbance, estimators). in general, the normal distribution governs the values and the frequency of their occurrence. This law stands out both in the case of characterizing the disturbance and in the case of assessing the conditional distribution of the "y" values for the "x" level.

Thus, we distinguish the following stages in the statistical verification process:

- establishing the null hypothesis H0: ai = 0 (insignificance) and H_1: $a_i \neq 0$;
- establishing the distribution based on which we perform the testing
- calculation of the value of the standardized variable, $t_{cal} = \frac{\hat{a}_i}{S_{\hat{a}}}$; , in relation to the size of which we appreciate the quality of the estimate
- searching for the tabulated value of the standardized variable corresponding to the distribution established in the 2nd stage
- comparing the calculated value with the tabulated one.

In relation to the magnitude of these values, we accept the null hypothesis (H0) if the calculated level is lower than the tabulated one, respectively we reject (H0) if the calculated level is higher than the tabulated one.

To verify the extent to which the model, as specified, manages to lead to the reconstruction of the empirical values yt through the generated values y t, we use the ANOVA type analysis and the Fisher test.

ANOVA analysis scheme

Table 1

The kind of variation	**The sum of the squared deviations**	**The number of degrees of freedom**	**Estimates of the dispersions**	**F calculated**
Factorial variation	$\sum(\hat{y}-\bar{y})^2$	k-1	$\frac{MSR}{k-1}$	$F_{cal}=\frac{MSR}{MSE}$
The residual variation	$\sum(y-\hat{y}_x)^2$	n-k	$\frac{MSE}{n-k}$	-
Total variety	$\sum(y-\bar{y})^2$	n-1	-	-

The coefficient of multiple determination is added to these tests, which expresses the weight with which the factorial variables included in the model simultaneously influence the resulting variable. The closer the coefficient of determination is to 100%, it indicates strong links, a high degree of dependence between the factorial variables and the resulting variable of the model.

The weight with which the other factors not included in the model influence the result characteristic is obtained as the difference between unity and $R^2 = \frac{\sum_i (\hat{y}_i - \bar{y})^2}{\sum_i (y_i - \bar{y})^2}$, resulting in the multiple uncertainty coefficient. The calculation of the coefficient of determination is based on the decomposition of the total dispersion of the dependent variable into the dispersion of the empirical values against the theoretical values and the dispersion of the theoretical values against the average:

In addition to the coefficient of multiple determination, partial correlation coefficients can also be calculated that characterize the intensity between two characteristics under the assumption that the other characteristics included in the analysis remain constant (they do not influence the connection of the considered characteristics). The partial correlation coefficients are calculated based on the simple linear correlation coefficients. The partial correlation coefficient between the characteristics y and xk, under the conditions in which the influence of the characteristic xj on this link is eliminated.

In the case of the Durbin-Watson test, we have the null hypothesis (H0): the disturbance is not autocorrelated.

Considering that the way of defining the variable "d" is in close connection with the formula for defining the autocorrelation coefficient, we find that the definition of the variable "d" is between 0 and 4, the limit values of significance being calculated (d -lower, d-upper) under the assumption of normal distribution and published in tables for various significance thresholds. if d=4 we have perfect negative autocorrelation; for d=0 we have perfect positive autocorrelation and if d=2 autocorrelation is totally absent.

Decision scheme in the case of the Durbin-Watson test

Table 2

Intervals	0	dinf	dsup 2 4	4-dsup	4-dinf
	dalc<dinf H1 is accepted Positive autocorrelation	indecision	dsup<dcalc<dsup H0 is accepted The uf values are not correlated	indecision	dcalc>4-dinf H1 is accepted Negative autocorrelation

Statistical forecasting creates a fan of possible future situations, using hypotheses resulting from the in-depth analysis of the current concrete situation and

the trends that emerge from them. Forecasting the evolution of economic phenomena is the final objective in modeling.

The motivation of my approach is the final utility of econometric modeling for the generation of relevant trajectories regarding the evolution of the quality of life in a given socio-economic context; anticipating the short-term consequences on it and finding some management strategies for the economy, as well as some economic policy measures.

Despite the many difficulties related to the identification of the behavioral relationships specific to the transition to the market economy or the conversion into economic effects of the aspects that define the quality of life, there is the conviction that econometric modeling represents one of the indispensable tools in approaching the field of the labor market. All these difficulties can be overcome by accepting the economic criterion as the only one possible to take into account in modeling the social field. The most relevant increase in employment is generated by investments in agriculture.

4. Results and discussion

The variables used in the given study are: GDP, CPI, total investments in the national economy (inv_tot), investments in the agricultural sector (inv_agr), the employed population at the national level (po_tot), the employed population in the agricultural sector (po_agr).

In order to obtain the comparability of the data used in the econometric analysis, it was necessary to perform the deflation operation using the consumer price index (CPI) of the following variables: inv_tot, GDP, inv_agr, VEN. The models were developed based on dynamic indices with a chain basis. Also, all data were logarithmized for linearization. The analysis includes data relating to the period 2017-2023. The data sources used for the statistical data were: National Institute of Statistics (TEMPO online database) and the Official Gazette of Romania, for the period already stated.

As can be seen from figure 1, all the indicators towards the end of the period vary around 100%, except for total investments in the national economy, which registered fairly visible decreases.

The consumer price index over the entire period can be said to have registered a continuous decrease - from 169.3% in 2017 to 116.08% in 2023. The employed population in the national economy as well as in the sectoral economy recorded smaller fluctuations, the data represents a more relevant precision.

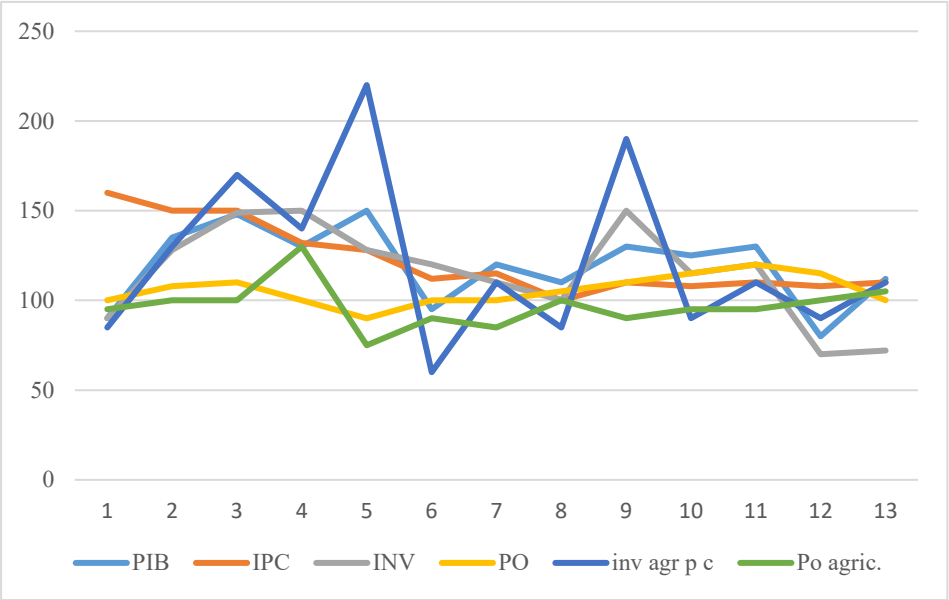

Figure 1. Evolution of the analyzed variables (2017-2023)

The statistical analysis of the distribution is rendered by the skewness and kurtosis coefficients. The data in table 3 show that there is asymmetry (left and right) in all variables except for the sectoral employed population which registered a more pronounced asymmetry (it has like one). Moreover, both indicators of population employment show that the series are leptokurtic, the others - platykurtic (the coefficients have values lower than three). The Jarque-Bera test measures the difference between the asymmetry coefficient and the kurtotics of the analyzed distribution.

Indicator statistics

Table 3

	PIB	IPC	INV_TOT	INV_AGR	PO_TOT	PO_AGR	VEN
Mean	119.4278	120.5200	116.6378	117.9300	100.3368	99.42463	120.5317
Std.Dev	20.17597	19.32148	26.52447	48.82941	5.751425	13.47185	14.68946
Skewness	-0.328363	0.831429	-0.313528	0.921398	-0.102553	1.259917	0.226195
Kurtosis	2.059491	2.227375	2.094468	2.726595	6.013692	5.897479	1.861434
Jarque-Bera	0.712750	1.821074	0.657149	1.879898	4.942386	7.986827	0.687953
Probability	0.700220	0.402309	0.719963	0.390647	0.084485	0.018435	0.708942

Source: author, after Campos, De Grauwe,& Ji, Y., (2020)

The econometric analysis of the evolution over time of economic phenomena and processes represents a distinct side of the research of economic

variables with the help of quantitative methods. An econometric model based on the influence of time on the evolution of an economic variable presents several fundamental characteristics: variability, homogeneity, the interdependence of the terms, the length of the series, the optimal form of series analysis.

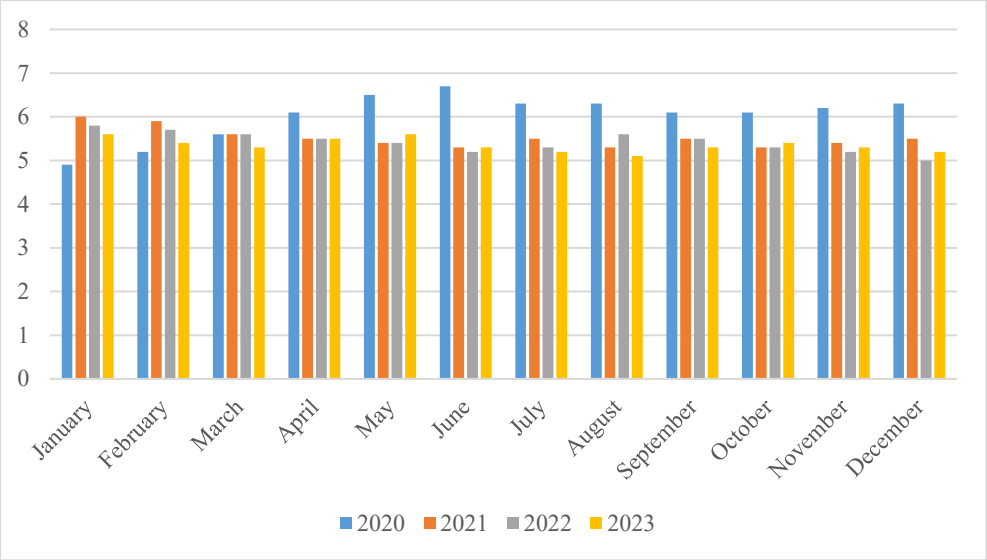

Figure 2. Evolution of the registered unemployment rate, 2022-2023
Source: INS/ANOF

The downward trend of the unemployment level, compared to 2010, can be observed, as well as the preservation of the differences between female (4.9%) and male (5.5%) unemployment, a difference that remains almost constant throughout these years . The structure of the number of registered unemployed by age groups has maintained its evolution over the last three years with periodic amplitudes, the crisis period not influencing this structure. Most of the unemployed, namely 235,636 people, come from the countryside.

The counties with the highest share of the unemployed without compensation in the total number of unemployed are: Teleorman (78.20%), Buzău (75.72%), Dolj (74.73%), Galati (74.24%), Brăila (72.68%) and Covasna (72.35%).

Increases in the unemployment rate are recorded in 30 counties and in the Municipality of Bucharest, the largest increases being recorded in the counties: Covasna, with 0.64%, Alba with 0.54%, Galati with 0.45%, Ialomiţa, with 0 .35%, Bistrita Nasaud, with 0.37% and Calarasi with 0.28%.

Conclusion

In the current difficult and slow transition period, Romania is a clear example of what can be called the vicious circle of labor resources. The reforms

undertaken in various sectors (economy, education, health, employment, the political system, administration) cannot be completed without adequate labor resources.

Although labor resources are part of the life of each individual, their use as well as the effects of this use are directly related to the life of a community or even society as a whole. The social integration of labor resources leads us to consider an essential form of capital, human capital, with all the defining characteristics associated with a public good: it benefits directly or indirectly even those who do not participate in its creation and maintenance. It is in everyone's interest that these resources are not only conserved but also developed in accordance with our aspirations for well-being, stability and social cohesion, especially since Romania is rich in labor resources.

The objectives of the labor resource development strategy must be based on the global contribution of this hour to social change.

In order to mobilize and develop the necessary human potential in the perspective of ending the transition, the following aspects must be taken into account:

- the use of centers of excellence and efficient sectors as support for the transformation of the entire society;
- the development of institutional capacities, especially those with potential for innovation, direct influence and the multiplication of social changes;
- the formation of adaptation skills in an uncertain and problematic context, in the perspective of increasing competitiveness, employment and sustainable development capacities;

In order for the labor resource development strategy to be effective, it must start from the identification of priority problems and the definition of some directions of action.

The economic and political changes of the transition had important consequences on labor resources. The citizens had to assume new responsibilities, new social, economic and political roles, to capitalize on their knowledge, experience and skills in a completely different context. This context results from the convergent action of private initiative, competition and social insecurity, but also from the inherent difficulties of any regime change.

In the new economic and social circumstances, the existing human capital experienced a strong erosion, but also processes of alternative valorization through adaptation and creation, a fact that largely ensured the satisfaction of the needs of an uncertain market. This contradictory situation, which combines decline and apathy with the emergence of new skills, institutions and centers of excellence, must be capitalized in the strategy for the development of labor resources.

References

1. Burlacu S., Iacob Pargaru O.C., Dobre F., Buzoianu O., (2024). The evolution and Trends in the Dynamics of Services in Romania, International Conference on Sustainable Development 12th, ICSD 2024, Rome, Italy

2. Campos, N.F., De Grauwe, P., Ji, Y., (2020). Economic Growth and Structural Reforms in Europe; Cambridge University Press: Cambridge, UK, ISBN 978x1108782517.
3. Chéron, A., Hairault, J.O., Langot, F., (2013). Life-Cycle Equilibrium Unemployment. Journal of Labor Economics, 31 (4), pp. 843-882
4. Dorsett, R., Luccino, P., (2018). Young people's labour market transitions: The role of early experiences. Labour Economics, Vol 54, pp. 29-46
5. Fihel, A., Okolski, M., (2009). Dimensions and Effects of Labour Migration to EU Countries: The Case of Poland. In EU Labour Migration since Enlargement Trends. Impacts and Policies; Galgóczi, B., Leschke, J., Watt, A., Eds.; Ashgate: Aldershot, Hampshire, UK, pp. 185-210
6. Hili, A., Lahmandi-Ayed, R., Lasram, H., (2016). Differentiation, labor market and globalization. The Journal of International Trade & Economic Development, 25 (6), pp. 809-833
7. Iacob, S.V., Radu, I., (2021). Studiu privind for de muncă- ocuparea și subocuparea în România în anul 2020, Romanian Statistical Review, Supplement, 5, pp. 67-74
8. Lengyel, G., Borbala, G., Lilla, T., (2017). Expected long-term labour market resilience and the European Union's perceived role results of an online policy Delphi. Society and Economy 39, no. 2, 165-82
9. Meyer, D., Shera, A., (2017). The impact of remittances on economic growth: An econometric model. Economia, 18, pp. 147-155.
10. Neumark, D., (2019). The Econometrics and Economics of the Employment Effects of Minimum Wages: Getting from Known Unknowns to Known Knowns. Ger. Econ. Rev., 20, pp. 293-329
11. Radu, I., (2022). The socio-economic situation of youth in Europe under the eff ects of the Covid-19 pandemic, Romanian Statistical Review, Supplement, 7, pp. 23-38
12. Schneider V., Hage F., (2007). Europeanization and the retreat of the state. Journal of European Public Policy, 15 (1), pp. 1-19
13. Stefan M., Oancea Negescu M., Diaconu A., Buzoianu O., Mitrita M, (2018), Free Movement of Labour in the European Space and Impact on the Labour Market in Romania, publicat in The 32nd Ibima International Conference Held in Sevilla, Spain, 15-16 November, ISBN: 978-0-9998551-1-9