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ADVERSE INCENTIVE EFFECTS OF THE UNEMPLOYMENT BENEFIT LEVEL IN ROMANIA

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Abstract

This paper proposes an empirical analysis of the effects of unemployment benefit on unemployment in Romania. First, the existence of a long-run equilibrium relation between the two variables was checked using single-equation cointegration tests. The results showed that such a relation does not exist. Next, in order to evaluate the short-term effects of unemployment benefit on unemployment level, a VAR analysis was employed. Impulse response functions analysis showed that the number of persons registered as unemployed is expecting to rise as the value of monthly unemployment benefit is increasing. However, the variance decomposition analysis pointed out that only a small part (under 5%) of unemployment short-term dynamics could be explained by potential shocks in the unemployment benefit level.

Keywords: Unemployment, Unemployment Benefit
JEL classification: H53, J64, J65, C32

1. INTRODUCTION

Raising unemployment and its persistence are two of the main concerns both for academics and government authorities.

During the past decades, modern unemployment theory offered several possible explanations to both short-term and long-term unemployment dynamics (Blanchard, 2005). During the '70s, unemployment fluctuations were considered as a labour market response to different economic shocks, like productivity slowdowns (Bean and Dréze, 1991) and spikes in oil prices. In the '80s, the effects of capital accumulation (Bruno and Sachs, 1985) and the presence of insiders bargaining (Gregory, 1986, Blanchard and Summers, 1986) on labour market were taken into account. Since the '90s, the focus switched to the role played by labour market institutions (like unemployment benefit or minimum wage) in explaining unemployment (Bassanini and Duval, 2006, 2009).

The government authorities' ultimate rationale for unemployment benefits is to provide income insurance for risk adverse workers. However, the very existence of unemployment benefits could have adverse incentive effects in the labour market, affecting both individuals and firms and raising unemployment (for a survey, see Fredriksson and Holmlund, 2006).

At individual level, the level and the potential duration of the unemployment benefit affects individual search behaviour and quitting behaviour (Mortensen, 1977). A benefit with a high enough replacement value will reduce incentives for active search behaviour. Moreover, this could also be an incentive for those who have a job with a low salary to become unemployed.

At firm level, the presence of the unemployment benefit changes the value of the employed work and the wage setting decisions. Not to mention that a higher level of unemployment benefits improves the workers' bargaining power (van der Horst, 2003), raising the level of the entry wage, and thus, unemployment.

Empirical studies regarding the relation between unemployment benefit and unemployment widely support the theoretical predictions. In a multi-country setting, it has been shown that the level and duration of unemployment benefits lead to an increase in unemployment (Scarpeta, 1996, Nickel, 1998, Elmeskov et al., 1998, Nunziata, 2002). The same results hold for individual country studies. For instance, in the case of Austria, Lalive and Zweimüller (2004) proved that a drastic increase in the potential duration of unemployment benefit led to an actual increase of the duration of unemployment. In a panel study of Swedish regions, Fredriksson and Söderström (2008) showed that an increase in the replacement rate of 5 percentage points contributes to increasing unemployment by 25 percent. However, these results are not widely accepted. Recently, Howell and Azizoglu (2011) showed that during the last recession, increases in the potential duration of unemployment benefit in some US states did not lead to increases in unemployment level.

Given these theoretical predictions and empirical support, government authorities enacted consequent measures in order to correct the disequilibrium in the labour market during the economic crisis. Recent reforms of labour market institutions, especially by reductions in the level and duration of unemployment benefit, were triggered as a response to high unemployment across Europe (Saint-Paul, 2004, Nickell, Nunziata, and Ochel, 2005).

Though there is a vast, both theoretical and empirical, literature on labour market institutions effects on unemployment level, there are only several that are focused on developing countries. In this context, this paper proposes an empirical analysis of the effects of unemployment benefit on unemployment in Romania. First, the existence of a long-run equilibrium relation between the two variables is checked using single-equation cointegration tests. The results showed that such a relation does not exist. Next, in order to evaluate the short-term effects of unemployment benefit on unemployment level, a VAR analysis was employed. Impulse response functions analysis showed that the number of persons registered as unemployed is expected to rise as the value of monthly unemployment benefit increases. However, the variance decomposition analysis pointed out that only a small part (under 5%) of unemployment short-term dynamics could be explained by potential shocks in the unemployment benefit level.

The rest of the paper is organized as follows: in the next section, a brief sketch of unemployment benefit design in Romania is given; section 3 presents the data and the methodology used, and the results obtained; section 4 concludes.

2. UNEMPLOYMENT BENEFIT DESIGN IN ROMANIA

In Romania, unemployment benefits are guaranteed and stipulated by the Unemployment Insurance System and Stimulation of Employment Act (Law no.76/2002), supplemented by several subsequent additions and changes.

The level of the benefit

Initially, the level of unemployment benefit was set at 50% of average earnings over the last 3 months for individuals with up to 5 years of contributions. For individuals with more than 5 years of contributions, the replacement rate was set to 55%. Given that the primary aim of the government authorities was to provide income insurance for those without a job, the minimum benefit was set at 23% of the national minimum wage for those with less than 5 years of contributions, and at 25% for those with more than 5 years of contributions.

Later, during the period of economic expansion, several adjustments were made to the unemployment benefit system. Starting with 2005, the level of the benefit was set to 75% of the national monthly minimum wage. Additionally, graduate first-time jobseekers received 50% of the national monthly minimum wage for up to 6 months. As a stimulus to improve search behaviour, an unemployed person who resumes full-time employment before the awarded benefit period ends was entitled to receive 30% of the benefit entitlement during the remaining period. Moreover, in order to improve the mobility of the workforce, a lump sum equal to twice the national monthly minimum wage was granted for unemployed persons who took jobs in locations more than 50 kilometers away from home. If the new job required relocation, the awarded lump sum was equal to seven times the national monthly minimum wage.

From 2009, a supplement was granted to those with at least 3 years of contributions. The maximum supplement was granted for 20 or more years of contributions.

Starting with 2011, the level of benefit was set at 75% of the national monthly minimum wage plus 3% to 10% of the average earnings of the insured person in the last 12 months (depending on the number of contributions). The rest of the legal provisions regarding the level of the unemployment benefit remained unchanged.

The duration of the benefit

According to the Unemployment Insurance System and Stimulation of Employment Act of 2002, the duration of the benefit was capped at 270 days.

Later on, the duration of the benefit was differentiated according to the length of contributions to the system: 3 months if the insured person had at least 5 years of contributions, 9 months for more than 5 years, and 12 months for more than 10 years. As a response to the economic recession, for a couple of years (2009-2010), the duration of the benefit was extended by 3 months.

Eligibility conditions

In order to qualify for the benefit, a person should have 12 months of contributions in the last 24 months before unemployment and be involuntarily unemployed, registered at the local labour office, and actively seeking work. Eligibility was granted also to first-time jobseekers older than age 18 with no independent income who have not found employment 60 days after the end of their school or university studies (30 days after the end of military service.

Financing of the system

The financing of the system is ensured by contributions from employees (0.5% of gross earnings), self-employed persons (1% of declared income), employers (1% of payroll) and government (any deficit).

However, all these contribution rates were lowered from their initial values. For employees, the initial value of 1% was halved, at 0.5%. The contribution rate was set for the self-employed persons by the 2002 Act at a level of 5% of the declared income. Later on, after a small increase to 6%, the rate was lowered first at 1.5%, and then at 1%. For employers, the initial rate of 5% of payroll was lowered to 3% and finally to 1%.

3. DATA, METHODOLOGY AND RESULTS

In order to test the effects of unemployment benefit on unemployment for the case of Romania, we used data from the Statistical Bulletin on Labour and Social Protection provided by the Ministry of Labour, Family and Social Protection.

To account for unemployment we used as variable of interest the number of persons registered as unemployed (UP). The other variable used was the monthly average unemployment benefit per person (UB). The nominal values were transformed in constant prices of January 2004 using CPI values from the Monthly Report of the National Bank of Romania. Descriptive statistics for both time series are given in Table no. 1.

Table no. 1 Descriptive Statistics

	UB	UP[a]	UP[b]	LNUB	LNUP
Mean	261.70	513159.90	512981.40	5.55	13.12
Median	258.80	499336.00	509271.70	5.56	13.14
Maximum	354.16	765285.00	730836.40	5.87	13.50
Minimum	170.89	337084.00	348275.90	5.14	12.76
Std. Dev.	51.72	115771.60	112502.40	0.20	0.22
Skewness	0.27	0.33	0.30	0.04	-0.02
Kurtosis	1.85	2.21	2.07	1.79	1.97
Jarque-Bera	6.45	4.24	4.95	5.93	4.24
Probability	0.04	0.12	0.08	0.05	0.12
Sum	25123.25	49263350	49246217	532.60	1259.92
Sum Sq. Dev.	254118.70	1.27E+12	1.20E+12	3.71	4.61
Observations	96	96	96	96	96

[a] raw data. [b] seasonally adjusted data.

Given the fact that we used monthly data, and unemployment is linked with seasonal movements of economic activity, a seasonal adjustment procedure was employed. In order to extract the trend, Tramo/Seats procedure (Gómez and Maravall, 1996) was used. Tramo ("Time Series Regression with ARIMA Noise, Missing Observations, and Outliers") is a procedure which allows to estimate, to forecast, and to interpolate regression models with missing observations and ARIMA errors, accounting for several types of outliers. Seats ("Signal Extraction in ARIMA Time Series") is a procedure which allows an ARIMA-based decomposition of an observed time series into unobserved components.

Next, both variables were transformed using natural logarithms, so that the estimated coefficients represent elasticities.

Before we proceed to unit root tests, a visual inspection of the series is useful in order to identify whether constants or trends should be included in the tests of nonstationarity. Both the levels and first differences are plotted.

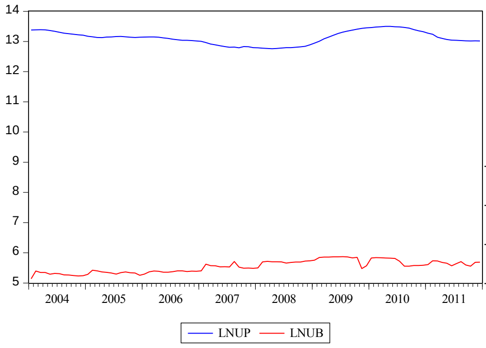

Figure no. 1 Series in levels

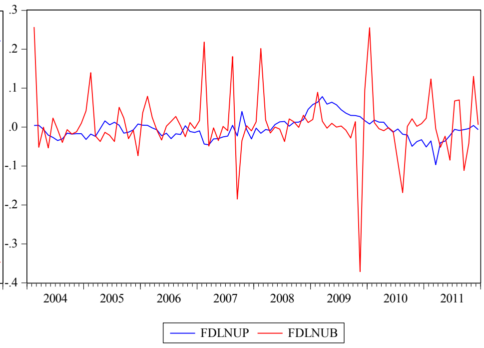

Figure no. 2 Series in first differences

The levels series appear not to be trending together, at least not for the whole period. This finding suggests that there is no need to include a trend in unit root tests regressions. Moreover, this comes naturally, given the nature of the data. The number of unemployed persons is always a finite positive number, lying between zero and the total population. The level of unemployment benefit is also a finite positive number, due to obvious budgetary constraints.

The differences show no obvious trend, and the mean of the series appears to be close to zero. However, to account for a possible non-zero mean, a constant will be included in the unit root tests regressions.

Next, we proceed to stationarity testing, using Augmented Dickey-Fuller (ADF) (1979), Phillips-Perron (PP) (1988), Elliott, Rothenberg, and Stock Point Optimal (ERS) (1996), and Ng and Perron (NP) (2001) unit root tests.

ADF and PP unit root tests are most commonly used, but both suffer from some problems when it comes to power and size of the test in certain situations. For instance, both tests have low power in the presence of a large autoregressive root (DeJong et al., 1992). Also, both tests are known to have severe size distortion in cases in which the series has a large negative moving average root (Schwert, 1989). Moreover, ADF test tends choose a lag length which is too small, when there is a large negative moving average root.

As an alternative to these tests, ERS unit root test improves power using an efficient de-trending procedure which uses quasi-differenced data.

Ng-Perron unit root test uses a GLS estimator in order to demean or de-trend the series which improves power and a modified lag selection which reduces the above mentioned size distortions.

The results of these unit root tests are shown in Table no. 2.

Both our variable of interest proved to be non-stationary in levels, but became stationary after first-differencing.

Next, in order to check there is a log-run equilibrium relation between the two variables, two single equation residual-based cointegration tests were used.

Table no 2 Unit Root Tests

Unit Root Test		ADF[a]	PP[b]	ERS[b]	NP
Variable	Series in:	t-stat	Adj. t-stat	P-stat	MZa
LNNSISA	Levels	-2.39	-1.67	8.06	-3.73
	First Diff.	-2.07	-2.88*	1.80***	-13.71***
LNISMR	Levels	-1.41	-2.33	14.19	-2.14
	First Diff.	-10.75***	-14.04***	4.51**	-8.55**

(***), (**) and (*) denotes rejection of the unit root hypothesis at the 1%, 5% and 10% levels, respectively.
[a] Number of lags included in ADF regresion was selected using Modifies Akaike Information Criterion
[b] A kernel sum-of-covariances estimator with Bartlett weights was used. Bandwidth selection was made using Andrews method.

Both Engle-Granger and Phillips-Ouliaris cointegration tests were employed using only a constant in the specification and no deterministic trend. The results are shown in Table no. 3. However, including a deterministic trend in cointegration equations does not affect the results.

Table no. 3 Single-Equation Cointegration Tests

Cointegration test	Engle-Granger[a]		Phillips-Ouliaris[b]	
Dependent Variable	**tau-statistic**	**z-statistic**	**tau-statistic**	**z-statistic**
LNNSISA	-2.40	-14.31	-1.36	-3.16
LNISMR	-1.33	-2.52	-2.39	-8.37

(***), (**) and (*) denotes rejection of the no cointegration hypothesis at the 1%, 5% and 10% levels, respectively.
[a] Lags specification based on Modified Akaike criterion.
[b] Long-run variance estimate using Bartlett kernel and Newey-West fixed bandwidth.

Both tests results failed to reject the null hypothesis of no cointegration. This confirms that between the two variables there are no long-run equilibrium relations. Given that both variables are I(1) processes and are not cointegrated, in order to evaluate the short-run impact of the monthly average unemployment benefit per person on the number of persons registered as unemployed, the straightforward option is to use an unrestricted VAR model. However, both variables will be used in first differences, in order to prevent the problem of serial correlation in the residuals and to obtain more robust estimates.

Treating both variables as endogenous and assuming the same lag order for the two equations, the unrestricted VAR model will have the following structural form:

$$\Delta \ln UP_t = \alpha_1 + \sum_{j=1}^{k} \beta_{1j} \Delta \ln UP_{t-j} + \sum_{j=1}^{k} \gamma_{1j} \Delta \ln UB_{t-j} + u_{1t} \quad (1)$$

$$\Delta \ln UB_t = \alpha_2 + \sum_{j=1}^{k} \beta_{2j} \Delta \ln UP_{t-j} + \sum_{j=1}^{k} \gamma_{2j} \Delta \ln UB_{t-j} + u_{2t} \quad (2)$$

where α_1, α_2 are constants, β_1, β_2, γ_1, γ_2 are coefficients and u_1, u_2 are idiosyncratic error terms.

In order to determine the appropriate number of joint lags, the system of equation is solved with 12 lags (for space reasons the estimation results are not shown here), and then a lag length criteria is employed. The results are presented in Table no. 4.

Table no. 4 VAR Lag Order Selection Criteria

Lag	LogL	LR[a]	FPE[b]	AIC[c]	SC[d]	HQ[e]
0	266.82	NA	5.80e-06	-6.38	-6.32	-6.36
1	314.14	91.21	2.04e-06	-7.42	-7.25	-7.35
2	326.10	22.49*	1.69e-06*	-7.62*	-7.33*	-7.50*
3	327.20	2.01	1.81e-06	-7.55	-7.14	-7.38
4	329.74	4.53	1.88e-06	-7.52	-6.99	-7.30
5	333.43	6.39	1.89e-06	-7.50	-6.86	-7.25
6	335.03	2.70	2.01e-06	-7.45	-6.69	-7.14
7	339.98	8.12	1.97e-06	-7.47	-6.60	-7.12
8	341.90	3.05	2.08e-06	-7.42	-6.43	-7.02
9	344.50	4.02	2.16e-06	-7.39	-6.28	-6.94
10	348.16	5.46	2.19e-06	-7.38	-6.15	-6.89
11	352.09	5.68	2.21e-06	-7.38	-6.03	-6.84
12	353.80	2.40	2.36e-06	-7.32	-5.86	-6.74

* indicates lag order selected by the criterion;
[a] LR: sequential modified LR test statistic (each test at 5% level);
[b] FPE: Final prediction error;
[c] AIC: Akaike information criterion;
[d] SC: Schwarz information criterion;
[e] HQ: Hannan-Quinn information criterion.

All statistical tests or informational criteria show that a joint lag length of 2 is appropriate. Next, we re-estimate the VAR model with a fixed lag length of 2. The results are showed in Table no. 5.

Table no. 5 Vector Autoregression Estimates

Independent Variables	**Dependent variable**	
	ΔLNUP	**ΔLNUB**
ΔLNUP(-1)	0.60 (0.09) [6.14]	-0.10 (0.48) [-0.20]
ΔLNUP(-2)	0.28 (0.10) [2.92]	0.07 (0.48) [0.14]
ΔLNUB(-1)	-0.04 (0.02) [-1.73]	-0.06 (0.10) [-0.54]
ΔLNUB(-2)	-0.05 (0.02) [2.50]	-0.24 (0.10) [-2.38]
C	-0.001 (0.002) [-0.43]	0.005 (0.008) [0.61]
Adj. R-square	0.73	0.06
F-statistic	60.82	0.02

Standard errors in ( ) and t-statistics in [ ]

Next, we tested the stability of the estimated VAR model, computing the inverse roots of the characteristic AR polynomial (see Table no. 6). All the roots lie inside the unit circle, their modulus being less than one, which means that the VAR model is stable.

Table no. 6 VAR Stability Test

Root	Modulus
0.91	0.91
-0.02 - 0.49i	0.49
-0.02 + 0.49i	0.49
-0.33	0.33

Next, the issues of serial correlation and heteroskedasticity were addressed. Given that we used monthly data, serial correlation was checked up to 12 lags with Portmanteau Autocorrelation Test. The null hypothesis of no serial correlation could not be rejected (see Table no. 7). This result is also confirmed by an LM test (see Table no. 8).

Table no. 7 Portmanteau Autocorrelation Test

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df*
1	0.14	NA**	0.14	NA**	NA**
2	3.40	NA**	3.47	NA**	NA**
3	6.73	0.15	6.91	0.14	4
4	11.95	0.15	12.36	0.13	8
5	15.10	0.24	15.70	0.20	12
6	17.15	0.38	17.89	0.33	16
7	23.97	0.24	25.27	0.19	20
8	25.08	0.40	26.48	0.33	24
9	27.88	0.47	29.57	0.38	28
10	29.88	0.57	31.82	0.48	32
11	35.82	0.48	38.56	0.35	36
12	42.00	0.38	45.65	0.25	40

*df is degrees of freedom for χ^2 distribution. **The test is valid only for lags larger than the VAR lag order.

Table no. 8 Serial Correlation LM Test

Lags	LM-Stat	Prob.
1	1.94	0.75
2	7.52	0.11
3	3.76	0.44
4	5.86	0.21
5	3.33	0.50
6	2.03	0.73
7	7.16	0.13
8	1.18	0.88
9	3.05	0.55
10	2.42	0.66
11	6.97	0.14
12	7.33	0.12

Probabilities from χ^2 with 4 degrees of freedom

Using a version of a White test for heteroskedasticity developed for systems of equations in Kelejian (1982) and Doornik (1995), the null hypothesis of no heteroskedasticity could not be rejected (see Table no. 9).

Table no. 9 White Heteroskedasticity Test

Hypothesis	χ^2
No Cross Terms	15.81
Includes Cross Terms	34.94

(***), (**) and (*) denotes rejection of the no heteroskedasticity hypothesis at the 1%, 5% and 10% levels, respectively.

Finally, the residuals normality is checked using the multivariate extension of the Jarque-Bera test from Doornik and Hansen (1994), based on the comparison of third and fourth moments of the residuals to those from the normal distribution. The null hypothesis that residuals are multivariate normal could not be rejected (see Table no. 10).

Table no. 10 VAR Residual Normality Tests

Component	Jarque-Bera
Equation [1]	11.11***
Equation [2]	66.81***
Joint	77.92***

(***), (**) and (*) denotes rejection of the residual normality hypothesis at the 1%, 5% and 10% levels, respectively.

Given that our VAR model is stable and that there are no problems with serial correlation and heteroskedasticity, even if residuals are not normally distributed, we could consider that our estimates are reliable and therefore, we could construct impulse response functions. This will allow us to highlight a key aspect of any economic model: propagation of shocks. Given that we have monthly data, we will trace the response function for a period of 12 months. In order to reduce the known sensitivity of the impulse response functions to VAR ordering, we used generalized impulses as developed in Pesaran and Shin (1998). The procedure uses an orthogonal set of innovations which are independent of VAR ordering. The response standard errors were computed using Monte Carlo. The graphical representations of the results are showed in Figures 3.

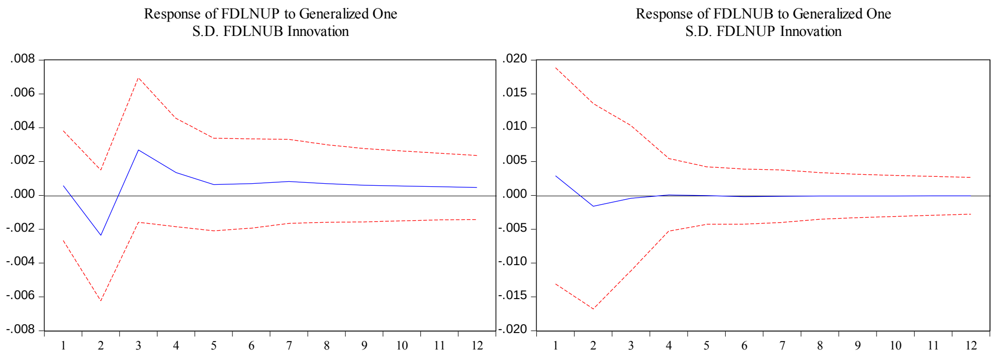

Figure no. 3 Impulse Response Functions

Since we worked with stationary time series, the shocks are not persistent. Therefore, there are no long-term effects of a shock in any of the two endogenous variables.

In the case of a positive shock in the number of persons registered as unemployed, the response of the monthly average unemployment benefit per person dies out after 3 months. The response is positive in the first month and negative in the second month. The accumulated response trends to zero. This result shows that the short-run dynamics of the unemployed population is not an important criterion for government authorities when it comes to change the value of monthly unemployment benefit.

A positive shock in monthly average unemployment benefit per person will trigger a different response in the number of persons registered as unemployed. After a negative response in the first two months, for the rest of the period, the response is positive and decreasing. The accumulated response trends to some positive value. This result shows that the number of persons registered as unemployed is expected to rise as the value of monthly unemployment benefit increases. This result points to the fact that the actual monthly unemployment benefit does have a value which ensures a high enough income for unemployed persons, so that they will not actively look for a job. Moreover, this could also be an incentive for those who have a job with a low salary to become unemployed.

Another way in which the effects of a shock on the system could be estimated is given by forecast errors variance decomposition. This procedure is based on the decomposition of the forecast errors at different horizons into contributions from different disturbances and it allows us to identify how much each variable contributes to the other variables in the autoregressions. The results of this procedure are given in Figure 4.

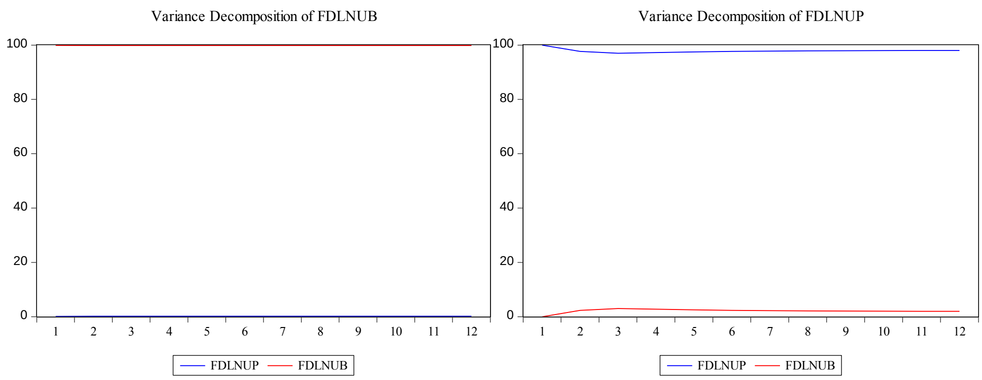

Figure no. 4 Variance Decomposition

Variance decomposition of unemployment benefits variable shows that its disturbances are virtually not affected by shocks in the errors of unemployed persons variable. This result confirms the inference based on impulse response functions. However, the variance decomposition of unemployed persons variable indicates that a small amount of its variance is given by changes in the errors of unemployment benefits variable. This proves that government authorities' decisions regarding the real changes in the level of average monthly unemployment benefit could determine changes in the number of unemployed persons. This result is in line with theoretical predictions that higher unemployment benefits could have some adverse incentive effects on labour supply.

However, slightly different results were obtained when taking into account genre and education of unemployed persons. These results are given in Table no. 11.

Table no. 11 Variance of UP due to UB (%) - accounting for Genre and Education

Period (Month)	Baseline Model Total UP	Male UP	Female UP	UP with Primary Education	UP with Secondary Education	UP with Tertiary Education
1	0.00	0.00	0.00	0.00	0.00	0.00
2	2.31	0.95	0.83	1.15	2.03	2.11
3	3.02	1.62	1.32	3.96	1.64	2.58
4	2.79	1.65	1.56	4.22	1.46	2.78
5	2.51	1.52	1.46	4.26	1.39	2.87
6	2.33	1.45	1.40	4.37	1.34	2.92

The results pointed out that the adverse incentive effect of unemployment benefit level is just a little higher for male unemployed persons than for female unemployed persons. Taking into account the education level of the unemployed persons, the adverse incentive effect is significantly higher for persons with only primary education.

4. CONCLUSIONS

In the recent literature, the persistence of high unemployment levels was often explained as a consequence of rigid and inadequate labour market institutions. One of them, the unemployment benefit, was found to induce significant adverse incentive effects, affecting unemployment and its duration. Using a VAR analysis framework, these theoretical predictions were found to be supported by Romanian labour market data for the period 2004-2011.

However, no long-run equilibrium relation between unemployment benefit and the level of unemployment was found. This finding points to the fact that, in Romanian labour market, changes in the level of unemployment benefit could only temporarily affect unemployment, leaving the long-run path unaffected. In this context, if the government authorities would like to tackle the persistence of unemployment, changes in the level of unemployment benefit are not an adequate measure. However, such measure could have an impact on short-run unemployment dynamics.

The impulse response functions analysis pointed out that the number of persons registered as unemployed is expected to rise as the value of monthly unemployment benefit increases. This result points to the fact that the actual monthly unemployment benefit does have a value which ensures a high enough income for some unemployed persons, so that they will not actively look for a job. Moreover, this could also be an incentive for some of those who have a job with a low salary to become unemployed.

However, the variance decomposition analysis pointed out that only a small part (under 5%) of unemployment short-term dynamics could be explained by potential shocks in the unemployment benefit level. The adverse incentive effect of unemployment benefit level proved to be slightly higher for males than for females, and also for those with only primary education than for those with secondary or tertiary education. These results pointed out that government authorities' decisions regarding the real changes in the level of average monthly unemployment benefit could determine only minor changes in the number of unemployed persons.

Given the fact that not only the level of unemployment benefit, but also its potential duration, could produce adverse incentive effects and, thus, raising unemployment, further research is needed in order to quantify the direction and the magnitude of these effects.

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