

The Romanian labour supply and demand: Analysis on sex and age sub-groups

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Abstract—This study models the labour demand and supply in Romania, during the period 2000-2009. We considered 6 age and sex sub-groups for the employment and labour force and constructed 6 system equation models in order to quantify the impact of minimum wage. We have also proposed two scenarios for the evolution of the minimum wage and forecast the evolution of the 15 - 19 and 20 - 24 years sub-groups employment and labour force for both females and males.

Keywords—age and sex sub-groups, employment, labour supply, real minimum wage, system equation model.

I. INTRODUCTION

THE aim of this paper consists in modelling the labour demand and supply for 6 age and sex sub-groups within simultaneous equations models in order to quantify the impact of minimum wage upon the labour market in Romania, during the period 2000-2009. Based on our estimations we were able to predict the evolution of the 15 - 19 and 20 - 24 years age sub-groups employment and labour force, by considering two plausible scenarios built on two hypothetical minimum wage policies.

The paper is organized as follows: Section II offers a short literature review on the main minimum wage impact studies, Section III describes the data, Section IV presents the econometric framework used for this study, whereas Section V presents the 6 system equation models of the age and sex sub-groups and the young employment and labour supply predictions based on different scenarios. The last section concludes.

II. LITERATURE REVIEW

The empirical research on the economic impact of the minimum wage upon labour market mainly discusses the effect of minimum wage upon employment, focusing on specific fields that are mostly affected by wage variation such as young employees, young adults and unqualified workers or underpaid employees. Various conclusions were drawn from the large amount of empirical research on this field.

One of the first results was presented in USA by the economist Brown [22], who concluded based on a survey analysis between the years 1973 and 1983 that a 10% increase

of minimum wage generates a reduction of 1% to 3% in young employment.

His work was soon followed in 1992 by the economists Newmark and Wascher, who extended the research on the minimum wage impact upon employment, by using annual national data for the period 1973-1989. They proposed a new and more efficient econometric model, based on which they were able to quantify the minimum wage effects on different population sub-groups, reaching similar conclusions to Brown's study. They stated that a 10% increase of minimum wage generates both a decrease of 1-2% for young employment and of 1.5 - 2% for adult employment [18]-[21].

Their study was then followed by many other economists. For example, in 1995, Deere estimated a set of equations based on sex, age and race, using monthly observations on the USA population, noticing an employment decrease of 4.8%, 6.6% and respectively 7.5% for men, women and black teenagers after the increase of the minimum wage in 1990.

Starting with Card, Krueger and Deere's models, R. Burkhauser, K. Couch and D. Wittenburg, estimated in 2000 the effects of minimum wage increase in the United States, based on monthly surveys on population between 1979 and 1997, founding an indirect relation between the minimum wage increase and youth employment [8]. Besides, they empirically demonstrated that when including annually binary variables there is a major loss in the minimum wage variation.

Moreover, Schaafsma and Walsh formulated some general equilibrium models based on linear-logarithmic simultaneous equations, using Canadian regional data and reached that the minimum wage has a significant negative effect on employment and labour force for most age groups, as well as a significant positive impact on all unemployment age-group rates [23].

A similar study was made by J. Shuk-Lin Kan and S. Sharir, who estimated both the demand and the supply equations for competitive labour markets within a simultaneous equations model [13]. Their results indicated a negative effect of the minimum wage on labour force participation, especially for males in the supply equation, but a surprisingly insignificant effect on the employment of the first two youngest groups in the demand equation.

A different approach was formulated in Lemos's [14]-[16] study in Brazil, in which the novelty consisted in modelling the impact of the minimum wage variation simultaneously upon the following three main elements of the labour market: prices,

employment and wages. The results indicated that a 10% increase of minimum wage during 1982 - 2000 generates only 0.2% decrease of employment, but a 0.8% prices increase after a 5 month adjustment period.

Among the international studies some also quantified the impact of minimum wage upon European developing countries, such as Romania. Their results were consistent to the theory, but focused less on sex and age sub-groups, but mostly at a national level [2]-[7], [17]. That is why we consider this paper to be an extension of the European developing countries research upon labour market.

III. DATA DESCRIPTION

The analysis focuses on six age and sex labour sub-groups as follows: males and females in the fifteen to nineteen years, twenty to twenty-four years and twenty-five plus years. For each labour sub-group we used two endogenous variables: the number of people willing to work (the labour force) and the number of people actually working (employment).

Thus, we made use of the following main variables: the national nominal minimum wage, the employed population, the active population, the total population, the gross domestic product, the consumer price index and the producer price index. The gross domestic product, which is used as the proxy for output in the employment equations, is the real domestic product (we used the GDP deflator).

Quarterly data were used starting with Q1 2000 and ending with Q4 2009. The reason for choosing this period was based on data availability, since there were no available data for the quarterly gross domestic product before 2000.

The main data sources were the Romanian National Institute of Statistics, the Ministry of Labour, Family and Social Protection and the National Bank of Romania.

In order to gain an insight into the discriminatory attitudes on the labour market in Romania, we made use of a survey about the economic and social cohesion [9]. We tried to see how the perceptions of men and women differ when considering the importance and the priority of finding a job.

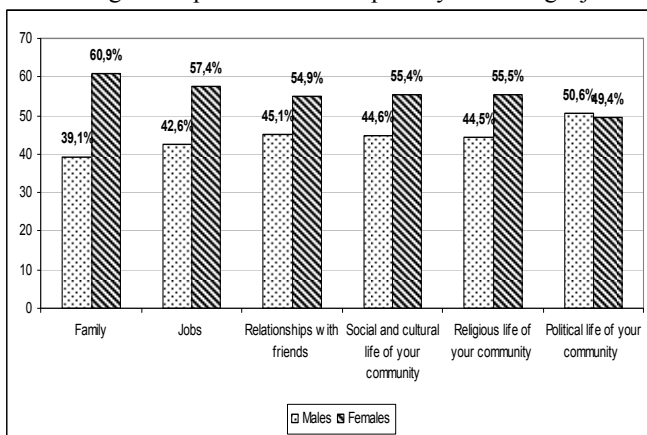


Fig. 1 The importance of males and females interests

From Fig. 1 we can notice that women have more interests in family than men, (with a 60.9%), while work ranks second

(57.4%), whereas men find jobs more important than family (42.6% vs. 39.1%).

The following two questions show men and women perceptions regarding giving up work or concerning the priorities men and women should have in getting a job.

Question 1 - Should a woman be prepared to give up work to care for family?

Question 2 - When there is a shortage of jobs in the labour market, should men have priority in getting a job?

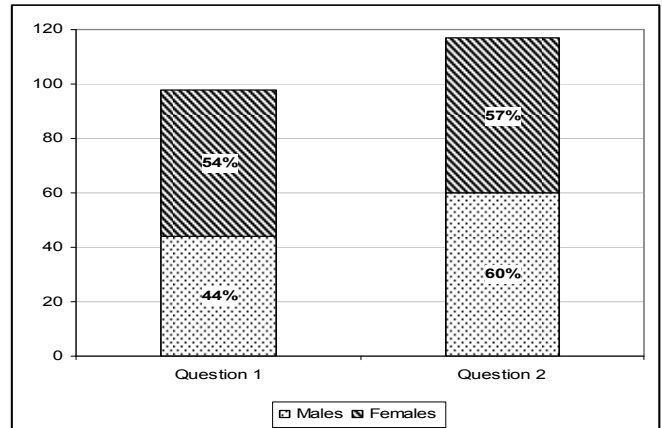


Fig. 2 Percentage of males and females that agree with Question 1 and Question 2

From Fig. 2 we notice high differences concerning men and women decision in choosing between work and family, meaning that most men (54%) believe women should sacrifice their work for family care, while only 44% of women would accept this.

The same favourable attitude towards men is noticed in the case men and women had to decide upon the priorities men and women should have in getting a job during economic crisis. Thus, almost 60% of men and women who answered question 2 believe that if when there is a job crisis men should be given priority in getting a job.

The analysis of discriminatory attitudes for the case of Romania shows that there is a consistent attitude that generates potential gender discrimination, even if the wage gap between women and men is not so large (with a downward dynamic in recent years). Men are more involved in extra familial activities and give more importance to their job, whereas women are more traditional and focus more on their family and house¹.

IV. MODELS AND METHODOLOGIES

In order to quantify the impact of minimum wage upon the main age and sex sub-groups of employment we first built the general demand and supply equations for each of the 6 sub-groups.

¹ PN II Research Project no. 91-050/2007 - Diminution of inequalities - pre-requisite for economic and social cohesion. Improving the quality of the European integration. The survey was conducted on a nationally representative sample from March to September 2010.

The general demand equation has the following form:

$$\ln p_{o_i} = \alpha_0 + \alpha_1 * t + \sum_{k=0}^3 \alpha_{k+2} \text{dlnmwe}(t - k) + \sum_{k=0}^3 \alpha_{k+6} \text{dlnq}(t - k) \quad (1)$$

where:

$\ln p_o$ – the natural logarithm of the employed population

t – the trend

dlnmwe – the first difference of the natural logarithm of the real minimum wage (deflated by the producer price index)

dlnq – the first difference of the natural logarithm of the gross domestic product (deflated by the GDP deflator)

The general supply equation is described as follows:

$$\ln p_{a_i} = \beta_0 + \beta_1 * t + \sum_{k=0}^3 \beta_{k+2} \text{dlnmwl}(t - k) + \beta_6 \ln n_i \quad (2)$$

where:

$\ln p_a$ – the natural logarithm of the employed population

t – the trend

dlnmwl – the first difference of the natural logarithm of the real minimum wage (deflated by the consumer price index)

$\ln n$ – the natural logarithm of the total population

Our study focuses on the effects of the real minimum wage upon labour force market. As theory suggests the employment is affected by the real minimum wage from the employer's point of view, which means that the minimum wage should be deflated by the producer price index. Comparative, the labour force participation is affected by the real minimum wage from the employee's point of view and therefore should be deflated by the consumer price index.

For estimating the 6 simultaneous equation models we made use of several econometric tools that will be further on presented in this section.

The method of least squares may not be applied to estimate a single equation embedded in a system of simultaneous equations if one or more of the explanatory variables are correlated with the disturbance term since the estimators become inconsistent. Therefore the two stages least squares (TSLS) method has to be applied.

One issue that needs to be tested when working with simultaneous equations is the identification problem. By the identification of an equation we mean whether numerical estimates of the parameters of a structural equation can be obtained from the estimated reduced-form coefficients. If this cannot be done, then we say that the equation under consideration is under-identified. If this can be done, we say the equation is identified (exactly identified or over-identified). If the particular equation is not identified that specific equation cannot be estimated. Otherwise, the equation can be estimated using different methods: the indirect least squares (for the exact identification case) and the two stage

least squares (for the over-identification case) [24].

In order to decide if an equation is identified or not there are two conditions that have to be verified: the order and the rank conditions of identification.

Before explaining the two conditions we want to introduce the notations:

M = number of endogenous variables in the model;

m = number of endogenous variables in a given equation;

K = number of predetermined variables in the model including the intercept;

k = number of predetermined variables in a given equation.

The order condition is: $K - k \geq m - 1$.

If $K - k = m - 1$, the equation is just identified, else $K - k > m - 1$, it is over-identified.

This condition is necessary, but not sufficient (even if it is satisfied, it may happen that an equation is not identified). We need both a necessary and sufficient condition for identification and the rank condition of identification is what we need.

The rank condition states [11]:

In a model containing M equations in M endogenous variables, an equation is identified if and only if at least one nonzero determinant of order $(M-1)*(M-1)$ can be constructed from the coefficients of the variables (both endogenous and predetermined) excluded from that particular equation but included in the other equations of the model.

These two conditions lead to the following general principles of identifiability of a structural equation in a system of M simultaneous equations:

1. If $K - k > m - 1$ and the rank of the A matrix is $M - 1$, the equation is overidentified;
2. If $K - k = m - 1$ and the rank of the matrix A is $M - 1$, the equation is exactly identified;
3. If $K - k \geq m - 1$ and the rank of the matrix A is less than $M - 1$, the equation is underidentified;
4. If $K - k < m - 1$, the structural equation is unidentified.

The rank of the A matrix in this case is bound to be less than $M - 1$. The matrix A is the one with the nonzero determinant.

In case the identification principles are met, in order to be able to make use of the system equations results, the residuals have to pass the following important conditions: the residuals should not be correlated or heteroskedastic and should have a normal distribution. In case the residuals are serially correlated or do not pass all of the above tests, the estimated coefficients will be biased and inconsistent and the equations should be re-specified before using any econometric results.

V. EXPERIMENTAL RESULTS

In a previous study [3] we estimated the Romanian general employment equation, within a system equation model that allowed quantifying the simultaneous impact of the national minimum wage upon the average gross wage, employment rate and prices in Romania, during the period q1 1999 - q4 2009. The employment equation had the following form, as presented in (3):

$$dn(t) = 0.17 + 6.2*dlmw(t-1) - 10.4*dlmw(t-3) - 5.7*dlmw(t-4) - 0.3*i(t) + 0.4*i(t-2) - 0.2*dx(t-2) \quad (3)$$

where:

$dlmw$ - the national nominal minimum wage

dn - the first difference of the employment rate

du - the unemployment rate

dx - the activity rate

i - the inflation rate

The results indicated that a 10% increase of the growth rate of the minimum wage generates a cumulated 0.9% decrease of the employment growth, from the 1st, 3rd and the 4th quarter lag, meaning that employers gradually adjust the employment level according to the frame of the planned wage funds.

Following a different approach, in this paper we are modelling the labour demand and supply for several age and sex sub-groups within simultaneous equations models in order to quantify the impact of minimum wage upon the labour market.

In order to obtain stationary variables [10], most of the series had to be transformed. Thus, we used the first difference of the natural logarithm of the national minimum wage ($dlmw$) and of the gross domestic product ($dlnq$), the natural logarithm of the number of people employed ($lnpo_i$), the number of people willing to work ($lnpa_i$) and of the total population ($lnni$), where $i=1, \dots, 6$, for the six age and sex sub-groups.

In section A the econometric models are described, whereas in section B we present two scenarios.

A. The Econometric Results

After checking the identification of the systems, we applied the TSLS method for each of the 6 age and sex sub-groups and made sure that the residuals are normally distributed and not serially correlated. The results in this paper show that the minimum wage exerts a significant negative effect on the employment and labour force levels of all the age and sex groups analyzed here.

Based on equation (4) from Table I, we notice that due to the insignificant influence of the trend, the 1% rise of the real minimum wage reduces the employment among young men with 0.85%. Furthermore, an increment of the output would encourage the employment in this category of workforce. We could say that in terms of employment among this age group, a greater emphasis has been laid on the union and social pressures rather than on minimum wage. Thus, the fact that unions pressurize employers makes the latter pay careful attention especially to the real minimum wage increase (which is a result of deflation).

Given the persistence of the low wages in this category of employees, the results are normal, specific to an equation of labour demand.

The negative influence that the increase of the real minimum wage has on the labour supply (the active population) may seem paradoxical, but if we consider the fact that the minimum

wage affects the employment in a negative way, we can say that this triggers a negative influence on the active population as well.

Table I Males and females 15-19 years sub-group

	Males		Females	
	15-19 years		15-19 years	
	LnPo	LnPa	LnPo	LnPa
	<i>Eq.4</i>	<i>Eq.5</i>	<i>Eq.6</i>	<i>Eq.7</i>
c	12.26 (0.00)	12.61 (0.00)	10.19 (0.00)	12.21 (0.00)
t	-0.02 (0.00)	-0.02 (0.00)	-0.03 (0.00)	-0.03 (0.00)
dlmw	-0.85 (0.00)		-0.73 (0.01)	
dlnq(t-3)	0.23 (0.01)		0.41 (0.00)	
dlmw1		-0.64 (0.00)		-0.57 (0.02)
dlmw1(t-3)		-0.61 (0.00)		-0.58 (0.02)
lnpo1 f(t-1)			0.55 (0.00)	
lnpo1 f(t-2)			-0.41 (0.01)	

This influence is distributed both on the current level and lag 3. By analyzing this situation we could say that there is a low level of enthusiasm among the young regarding the increment of the minimum wage.

Similar to (4) the trend influence in (6) is quite low as well, but it seems that the real minimum wage increase discourages employers to a lesser extent to hire women of 15-19 years old in contrast with the same age segment for males.

The output increase three quarters ago has a nearly double influence upon the employed female population of 15-19 years as opposed to the employed male population. But, unlike (4) there are two self-regressive components involved which indicate that if more young women were hired six months ago, the employers reduce current employment, but adjust this situation in a positive way through the employment made three months ago.

The labour supply is negatively influenced in the female segment, as well by the real minimum wage increase in the current level and three quarters ago. We can only see that the changes in the real minimum wage affect the young women to a lower extent than the working males in the same age group.

According to (4) and (6) the output increase three quarters ago encourages entrepreneurs to increase the young employment, whereas (5) and (7) indicate that the real minimum wage increase in the same period reduces the labour supply. Thus, if the active population drops and the employed population increase, we can state that the number of young people willing to work decreases, either by returning to study or because of the family income growth.

The econometric results of the system equation model of the

second age group (20-24 years) are presented in Table II. In equation (8) one can observe a decrease in the influence of the real minimum wage (0.26 in contrast with 0.85 in (4) from Table I), which reaffirms its prevalence among young people (15-19 years old). We could also note that the workers in this age group (20-24 years old) have had enough time to qualify and, thus, they can no longer be employed at the minimum wage level.

Table II Males and females 20-24 years sub-group

	Males 20-24 years		Females 20-24 years	
	LnPo	LnPa	LnPo	LnPa
	<i>Eq. 8</i>	<i>Eq. 9</i>	<i>Eq. 10</i>	<i>Eq. 11</i>
c	4.02 (0.05)	-6.55 (0.00)	7.07 (0.00)	-3.24 (0.19)
t	0.00 (0.07)		-0.01 (0.01)	-0.01 (0.00)
dlnmwe			-0.30 (0.01)	
dlnmwe(t-3)	-0.26 (0.02)			
dlnq(t-3)			0.12 (0.01)	
dlnmwl		-0.24 (0.00)		-0.20 (0.01)
dlnmwl(t-3)		-0.29 (0.00)		-0.34 (0.00)
lnpo2m(t-1)	0.69 (0.00)			
lnn2m(t-1)		0.79 (0.00)		
lnpa2m(t-2)		0.67 (0.00)		
lnpo2f(t-1)			0.45 (0.01)	
lnn2f				0.82 (0.00)
lnnpa2f(t-1)				0.4 (0.01)

The positive coefficient of the 1st lag of the employed male population in the same age group can bear up a certain level of employment inertia to economic fluctuations. Thus, if the economic agents consider an economic situation to be favourable, they will continue hiring in the following quarter as well, just like dismissals will be made gradually in the case of a rather unfavourable economic situation.

Unlike (5) in (9) we sense a decrease of about 0.4 pp of the current real minimum wage influence upon the male working population of 20-24 years old.

The positive correlation with the 1st lag of the total male population in the same age group appears to be normal, especially if we consider the active population as part of the total population. Therewith, we could also consider that an increase of the total population will lead to an increase of

dependents, which will lead to an increase of labour supply.

The correlation with the total population can also be interpreted in terms of the average time spent on finding a job, which for this age segment is about three months. In terms of labour supply there is a certain level of inertia among the people who look for a job, just like in the case of labour demand. This time there is a two quarters delay, which could explain the frictional unemployment persistence.

In (10) we notice the same normal decreasing tendency of the minimum wage influence because in this age group (20-24 years old) we are already dealing with experience and qualification, which urges for another level of salary.

The inertial component still remains at a quarter, so that if a favourable economic conjuncture is expected, the hiring process will be carried on for another quarter and if not, the dismissals will be made gradually.

As a specificity in this equation (as opposed to (8)) we can sense a persistence of the output influence for this employed population age group as well, which can be interpreted by the fact that in case of an output increase, employers resort to both males and women (some of whom are housewives).

The negative influence of the real minimum wage still remains in equation (11), just like in the case of the male segment (see (9)). Thus, we notice that the minimum wage is not an incentive for the labour supply. The correlation with the female total population of the same age group is significant, especially because the total population is the one that supports the labour supply.

The lag of the active female population of the same age changes in relation to the lag of the male population from (9), which indicates that women react more quickly to incentives on the labour market whereas men are more inertial.

The econometric results of the system equation model of the third age group (25+ years) are presented in Table III. In equation (12) there can be noticed a decrease of the real minimum wage influence upon the employed male population over 25 years, which demonstrates that very few people in this category are employed at the minimum wage level.

A transfer of the inertial component to lag 2 can also be noticed, which can demonstrate that if employers foresee a good economic situation, they will keep hiring for two quarters in a row, whereas in the case of a rather bad economic situation, they will dismiss younger people first (for the 20-24 years age group the lag is three months) and then those with seniority and experience, who, in fact, employers find with greater difficulty.

The influence of the output increase is quite low, meaning that in the case of an output increase, the demand for additional workforce will be met mostly by young people (with low wages), especially if this increase of output is considered by employers to be a temporary one (the young will be the first to be dismissed).

Equation (13) shows that the mature workforce is no longer so sensitive to the changes in the minimum wage (a coefficient

of 0.07 at a current influence, respectively 0.06 at an influence three quarters ago). Instead it can be noticed that the active population over 25 years depends to a rather high proportion on "entries of total population" and more or less on an inertial component of lag 3.

Table III Males and females 25+ years sub-group

	Males 25+ years		Females 25+ years	
	LnPo	LnPa	LnPo	LnPa
	Eq. 12	Eq. 13	Eq. 14	Eq. 15
c	8.25 (0.00)	-34.95 (0.00)	4.82 (0.03)	-78.96 (0.00)
t		-0.003 (0.00)		-0.01 (0.00)
dlnmwe				
dlnmwe(t-3)	-0.1 (0.05)		-0.27 (0.00)	
dlnq	0.08 (0.00)		0.10 (0.00)	
dlnmwl		-0.07 (0.01)		-0.17 (0.00)
dlnmwl(t-3)		-0.06 (0.03)		-0.14 (0.00)
lnp03m(t-2)	0.46 (0.00)			
lnn3m		2.96 (0.00)		
lnpa3m(t-3)		0.24 (0.02)		
lnp03f(t-1)			0.68 (0.00)	
lnn3f				5.95 (0.00)

We can interpret this considering that an increase in the output would lead to an increase in the mature labour supply, but as we have seen in (12), it appears that in this case employers look for young people - especially if they are not sure of the output increase on a longer period of time.

Among the employed population over 25 years (see (14)) the influence of the real minimum wage decreases, but not a lot in comparison to employed female population of 20-24 years old, which proves that women are willing to work at the minimum wage level after 25 years as well, when they are thought to have gained experience and/or completed their studies.

The 1st lag inertial component and the positive influence of the current output are maintained, even if the latter is reduced. Thus, we could say that when the entrepreneurs detect a current increase of the output, they easiest hire people paid at the minimum wage level, if possible over 25 years, thus ensuring the workforce demand for a short period of time, and if the entrepreneurs are certain of the output increase persistence, they re-establish their target towards the young –

who are also usually paid at the minimum wage level (lag 3) – see (4), (6) and (10).

The mature female workforce is not so sensitive to the changes in the minimum wage, but compared with the employed male population of the same age, the former is slightly more affected by the real minimum wage (see (13) and (15)).

There is a great influence of the current female total population which is actually the base providing the entries in the active population.

The inertial component could be found within the trend and not within the autoregressive (as in the case of (13)), but it still has an extremely negligible influence.

B. Scenarios

Since the minimum wage is considered a macroeconomic instrument for the government, we decided to test how the employment and the labour force of the young males and females in Romania are being affected by different minimum wage policies.

For that we chose the period 2010-2012 in order to forecast the demand and supply labour based on two hypothetical scenarios. We only focused our experiment until the year 2012 because of the high political and economical instability that characterized Romania in the last years, not to mention the economic crisis that is undergoing.

For the year 2010 it is already a fact that the minimum wage level didn't suffer any modification. The first plausible scenario (S1) assumes that the minimum wage will reach 670 Lei (almost 156 Euros) starting with the first quarter of 2011, since this is the maximum minimum wage level proposed by the IMF. For the year 2012 we expect, however, a second rise of the minimum wage to the level of 750 Lei (174 Euros).

In the second scenario (S2) we admit a delay in the government wage policies, by considering that the minimum wage will only be raised at 670 Lei starting with the third quarter of the year 2011 and then will be kept constant until the third quarter of the year 2012.

After freezing the minimum wage in January 2009, the Government agreed with the International Monetary Fund and the European Commission that the minimum wage in 2011 should not increase by more than the inflation rate of the last two years, or up to 670 lei. This increase could have different effects, such as: automatic increase of unemployment and social benefits (the unemployment benefit currently representing 75% of the minimum wage plus 3% to 10% of the average gross wage of the last 12 months, depending on the contribution period) or increase of traffic fines, given that a penalty point represents 10% of the minimum wage.

However, in order to prevent affecting the budgetary expenditure, the Government has engaged in negotiations with the IMF so that the unemployment benefits should no longer be calculated based on the minimum wage level, in order to avoid an increase of the unemployment benefits in 2011 simultaneously with the wage increase.

On the one hand, some firms may refuse to pay the

increased minimum wage leading to a movement of some employees to the informal economy [1]. But, considering the fact that the marginal increase in costs is relatively low, an inverse phenomenon may also occur, generating a pressure from the employees to be engaged in the formal economy, due to the increase of the minimum wage. On the other hand, any extra income to a low level of wage, will, in general, go directly to current consumption, leading to an increase of the VAT receipts generated by the extra consumption.

Since our study only focuses on quantifying the minimum wage impact upon labour force market, we built our scenarios on the assumption that all the other macroeconomic variables used in our system equation models will follow the same trend as they had in the previous years. The forecasted values of the variables were obtained using the methods of exponential smoothing [12]. For the GDP quarterly series we applied the Holt-Winters - multiplicative smoothing method, whereas for the 6 age-sex sub-groups of the total population we applied the Holt-Winters - no seasonal smoothing method. The forecasted values of CPI and PPI used for deflating the minimum wage in the labour demand and supply equations were based on the expectations of the National Bank of Romania.

The two scenarios were built for the 15-19 and 20-24 age sub-groups (males and females) because the young employment are the most affected age sub-groups by the changes in the minim wage since they are the majority of the employed population paid at this level.

The next four graphs represent the predicted values obtained from the two scenarios for the 15-19 and 20-24 age sub-groups (males and females).

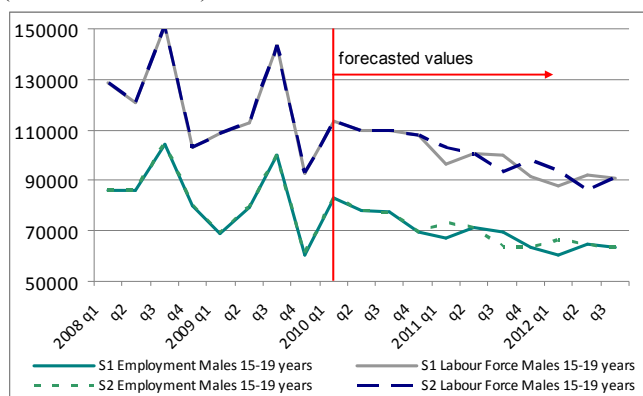


Fig. 3 Predictions of the 15-19 years males' employment and labour force

In Fig. 3 we can observe that the predicted values from the two scenarios are not so different, neither for the labour force nor for the employment. The employment and the labour force figures are higher in the scenario that keeps the minimum wage unchanged. We can say that the labour market reacts quickly to the minimum wage movements.

In the case of females aged 15-19 (Fig. 4), the situation is not very different from that in Fig. 3. Again, the fluctuations of the minimum wage affect the level of the employment and of the labour force.

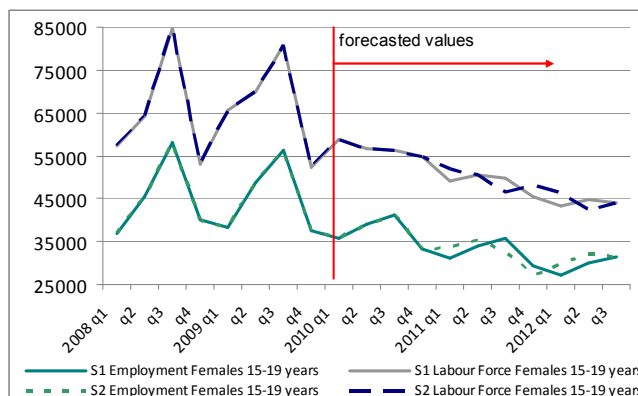


Fig. 4 Predictions of the 15-19 years females' employment and labour force

It is important to say that, in the third quarter of 2012, the figures provided by the two scenarios are quite similar.

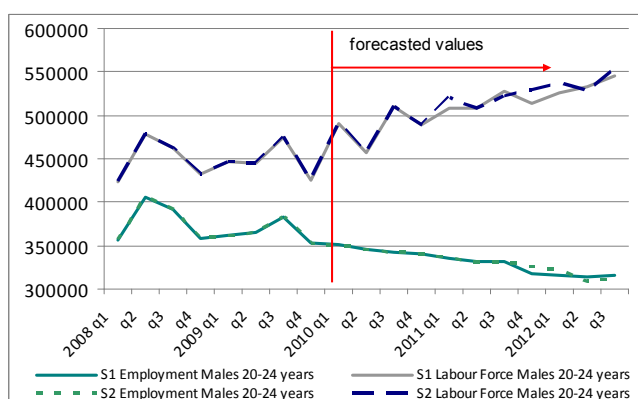


Fig. 5 Predictions of the 20-24 years males' employment and labour force

For the case of males aged 20-24 years, the labour force has an upward trend, as compared to that in Fig. 3. As for the employment, we can say that the differences in the two series (the one from S1 and the other from S2) appear with a delay starting only with the last quarter of 2011 (Fig. 5).

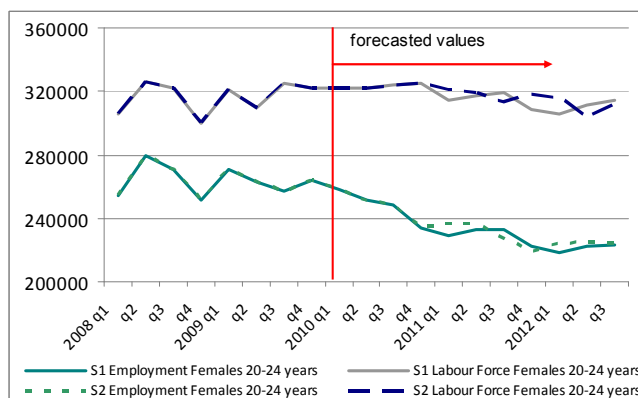


Fig. 6 Predictions of the 20-24 years females' employment and labour force

In Fig. 6 we represented the predicted values of the employment and labour force for the 20-24 years females sub-group. In this case the differences between the two scenarios appear from the beginning of the year 2011.

VI. CONCLUSIONS

In this paper we present several system equations models for 6 age and sex sub-groups that describe labour demand and supply in order to identify the impact of the national minimum wage upon labour force market in Romania, during the period q1 2000 - q4 2009. The results show that the real minimum wage has a significant negative effect on the employment and labour force levels for all age and sex groups. However, when taking the employment and labour force effects together, our results indicate that the real minimum wage has a more significant and negative effect on the first age group of employment and labour force.

Comparisons between our findings and earlier results reveal quite a lot of similarities. Taking Schaafsma and Walsh, Newmark and Wascher and Andreica and Cataniciu as representative of previous work, these studies generally support the negative effects of the minimum wage on employment and labour supply.

Based on the conclusions drawn from the estimated models and from their forecasts, we brought some novelty to the minimum wage impact studies for the case of Romania.

The seriousness of the economic crisis affects a large number of workers in the labour market, including many of those who had secure jobs. In some countries, the most affected fixed-term employees that get fired are women, young and migrant workers. Vulnerable groups in the labour market are of great concern because they have less access to the social protection system. In countries where security systems are poor, displaced workers could be forced to enter the informal economy, where most of them would struggle to survive. Until normal conditions reinstall in the credit markets, there would still be threats of layoffs, wages cut-downs or high unemployment.

Thus, overcoming and limiting the impact of the crisis can be facilitated by improving the coherence between macroeconomic policies and employment policies. More investments will be needed in active labour market policies and in training programs for workers. There should be no more cuts in the funds allocated to education and training and, where possible, even some new investments in training men, women and young people in the process of getting employed.

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