Effects of economic crisis on the distribution of earnings from Romania

Amalia CRISTESCU
Bucharest University of Economic Studies, Romania
cristescuamalia@gmail.com
Dorel AILENEI
Bucharest University of Economic Studies, Romania
dorel_ailenei@yahoo.com

Abstract. *The wage gap issue as well as that of income inequality has been a key topic in economics. The supervision of these gaps is essential in terms of labour stimulation and orientation in order to support social progress and to maintain the economic and social cohesion. Starting from a positive approach, but considering the risks of a limiting analysis, in this article, the authors analyzed the determinants of earnings inequality in Romania through an ordered-logit model. The model was based on the following explanatory variables of earnings inequality: gender, age, residence, education and the main sectors of economic activity.*

Keywords: earnings inequalities, economic crisis, ordered logit.

JEL Classification: J31, C50.

1. Introduction

Maintaining the wage gaps in an optimal area is a factor which stimulates the economic and social progress. Since Kuznets (1955) stated that increasing the wealth of different nations leads to a decrease in wage inequalities in developed countries until the increase of the public opinion pressure in favour of an effective and efficient social equity, the analysis of the differentials which occur related to the sources of income grew in economics. Given the dimensional limitations of a specialty article, this analysis takes into account the macroeconomic perspective on wage differences. Thus, it was found that wage differences are determined primarily by work experience, education, but also by the size and field of activity of the enterprise. The analysis of wage inequality must take into account certain economic and social factors, especially because these inequalities are also determinants of other labour market phenomena - migration (especially among the youth), flexicurity (intensely promoted in the EU) intra and inter-regional mobility of labour force (determinant factor in achieving economic and social cohesion), the labour market inclusion of vulnerable groups (16-24 years and 54-64 years).

At the EU level several studies were carried out on the impact of the current economic crisis on income and poverty levels in order to implement some optimal social policies. Thus, De Beer (2012) analyzed the impact of the crisis on employment, earnings and poverty in the EU, focusing on countries such as Denmark, Germany, Slovakia, Spain and Great Britain in the period 2008-2010. The analysis showed that wages had an anti-cyclical reaction in most countries, something that is contrary to the models seen during the previous recessions. De Beer argues that wage inequalities may be increased because of the potential regressive effects of the austerity programs promoted by the government.

The economic crisis has had a significant impact especially on the payment way of the public sector through the existing pressures on the budget spending. Callan et al. (2010) investigated the effects of the crisis on public sector income distribution, the strategies to reduce the public sector spending, and the way the wages in the public sector depend on the wage developments in the private sector. The analysis results indicated that the wage policies practiced by governments before the crisis were unsustainable (see the case of Ireland (Kelly et al. (2009)).

This study used micro-data for two years, 2008 and 2012, from the Household Labour Force Survey (HLFS) conducted by the National Statistics Institute.

The study focused on employed individuals, which is why the first step was to select only those individuals who declared they were employed. Also individuals who although were employed, they did not receive any wage, were excluded (family workers and/or self-employed people). Following these selections, we obtained a database with over 60,000 individuals for each year.

2. Analysis of wage distribution

The analysis on the distribution of earnings in relation to gender and the level of education reveals that women earn less than men regardless of their level of training (Figure 1). Interestingly, among those with no education, all women have lower earnings, falling in the lower deciles (deciles 1 + 2). Regarding the men with no education, almost half of them have low wages (46.66%), but unlike women, 6.66% of them are also found in the upper deciles (9 + 10).

Figure 1. *Distribution of net wage (deciles) in relation to gender and level of education*
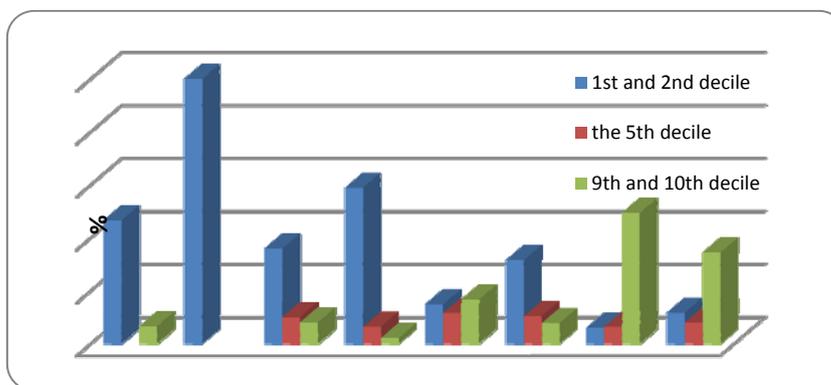

Regarding the level of education ISCED 1-2 women have the highest share in deciles 1+2 (58.84%) while men recorded a rate of 35.95%. In terms of the median income, the percentage differences between men and women are not significant (only 3.67 pp).

The smallest gender differences in earnings are observed in the secondary and post secondary education (ISCED 3-4). Women dominate the lower deciles (31.56%), but increase their percentage in deciles 9+10 (7.82%), which is less than half compared to men in higher deciles at this level of education – 16.76%.

On higher levels of education, as expected, higher earnings are prevalent for both women (34.44%) and men (49.45%).

Following the distribution of earnings by size levels (deciles), groups of occupations and fields of activity, there can be found some very interesting aspects. Thus, **lower earnings** (Figure 2a) are most common among workers in services (31%), Skilled workers (19%), Unskilled workers (18%), respectively Plant and machine operators and assemblers (13%).

Figure 2. *Structure of low earnings (decile 1 + 2) in relation to major occupational groups[1] (a) and groups of economic activity[2] (b)*
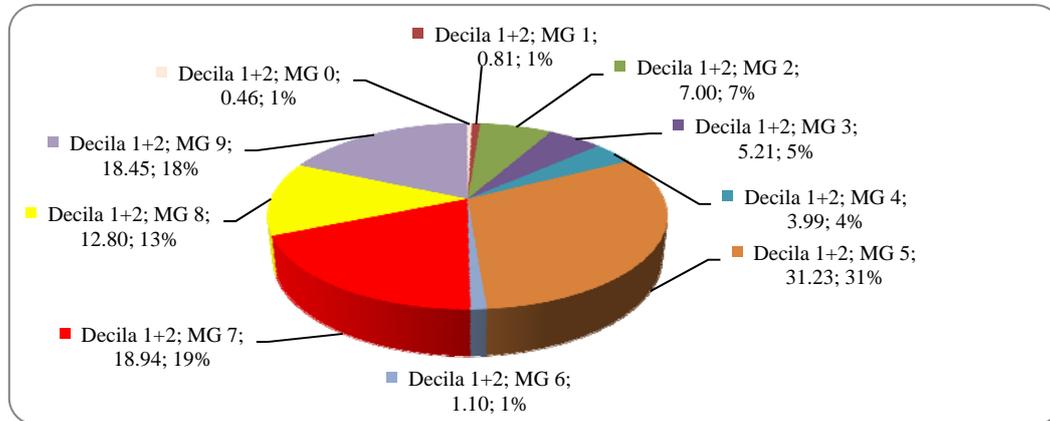

a)
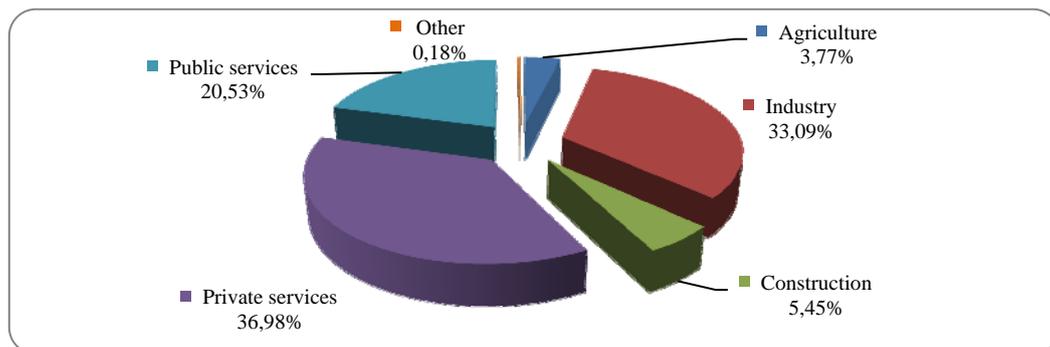
b)

Interestingly, skilled workers exceed with one percentage point the share of unskilled workers with lower wages. The effect can be explained by the low wages in these deciles (500-780 lei) and by the effect of the minimum wage which covers much of the first deciles (700 lei). In other words, it was expected that unskilled workers dominate the share of low wages, but apparently the field of activity significantly influences the profile of this wage area. This hypothesis is supported by the fact that the Services sector (Figure 2b) also dominates the low earnings area (57.51%), surpassing even the share of workers in Services, which can be explained if we consider the significant weight of Public Services (20.53%), where the salary was visibly affected by wage cuts of 25%. Similarly, the large share of skilled and unskilled workers (37%) in the low earnings area is consistent with the large share (33.09%) of the Industry sector (which uses a large number of workers with this qualification profile). The difference between the two shares (3,91pp) can be attributed to the Construction sector of activity which has a share of 5.45% in the low earnings area.

It is surprising that in the area of low wages we can also find military occupations (0.46%) and members of the legislative, executive, senior government leaders, managers

and senior officials (0.81%), but the shares are low and refer especially to the entry-level and auxiliary staff. As for the structure of low earnings based on fields of activity, the share of Agriculture (only 3.77%) is just as surprising, highlighting the delay of the market economy system entrance in this field of activity. In other words, due to the fact that agriculture in Romania still has a low intake of added value, it might have been expected that its share in low wages was higher. The explanation is related to the large gap between the employed population and the labour force in agriculture. Under these circumstances, we can speak of workers specialized in agriculture (better paid), but also of self-employed workers, day labourers and other categories of workers (with lower wages).

The median area of wages (Figure 3) is dominated by Skilled workers (25%), followed by Service workers (18%), Plant and machine operators and assemblers (15%) and Specialists in various fields (14%).

Figure 3. *Structure of median earnings (decile 5) in relation to major occupational groups (a) and groups of economic activity (b)*
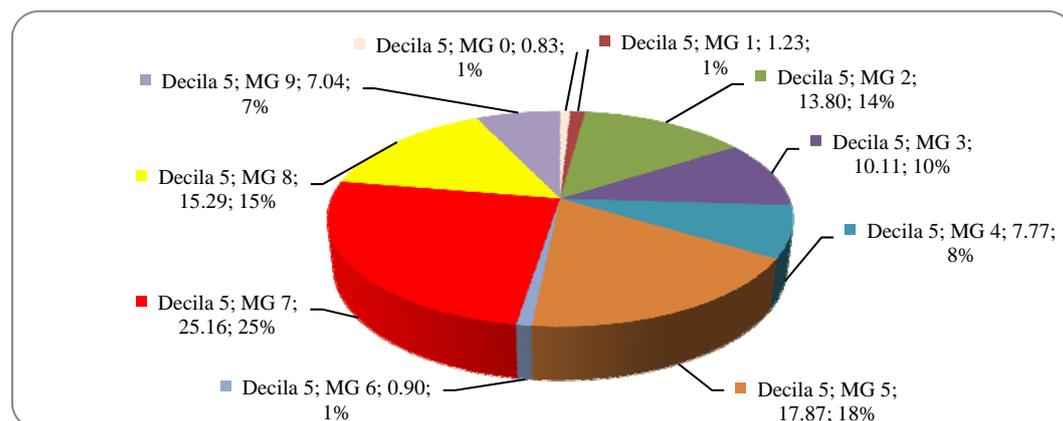

a)
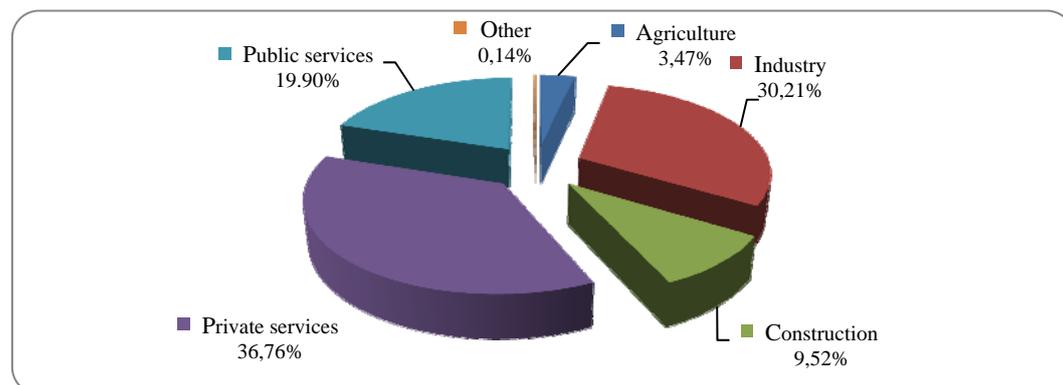
b)

Thus, the contribution of professional profiles in this area of payment is normal because in this category of workers there can be medium and high skilled workers, then workers in highly skilled services (higher education) and specialists in various fields, which by definition involves high skilled qualification. Another element of normality is illustrated by the much lower share of unskilled workers (7% as opposed to 18% in the low wages area). This normality is supported by increasing shares of technicians and other technical professionals (from 5% to 10%) and administrative officials (from 4% to 8%). Likewise, the military personnel and members of the legislative and the executive, senior government leaders, managers and senior officials have very low shares (1%) in the median wage.

The correlation of the distribution of occupational profiles and the profile of the fields of activity (Fig. 3b) is supported, as in the previous case, by the Services sector (with almost the same percentage (36.76%) and by the Industry sector (with a slightly lower share, 30.21%). This time Construction has a much higher share (9.52% versus 5.45% in the first case) on account of higher skilled occupations and industry-specific wage increases (overtime work and high risk). We note that Agriculture remains at the same low level of contribution to the median wage (3.4%). If we consider that in the case of high salaries the contribution of Agriculture is low (2.97%) the assumption that there are some failures on the labour market in this field of activity is supported.

The high earnings area (Figure 4) is dominated by Specialists in various fields of activity (40%), as evidence of the fact that the market economy principles/capitalist work on the labour market in Romania.

This aspect is supported by the still significant share of skilled workers (14%) of the plant and machine operators and assemblers (12%) and technicians and associate professionals (12%), in the case of highly skilled workers. This distribution of the well-paid professionals categories correlate correctly with the distribution of the fields of activity by the Industry dominance (where specialists, technicians and operators etc. are wanted by employers) and the Services (particularly in the banking and financial intermediation and consulting in various areas).

Figure 4. *Structure of high earnings (decile 9 + 10) in relation to major occupational groups (a) and groups of economic activity (b)*
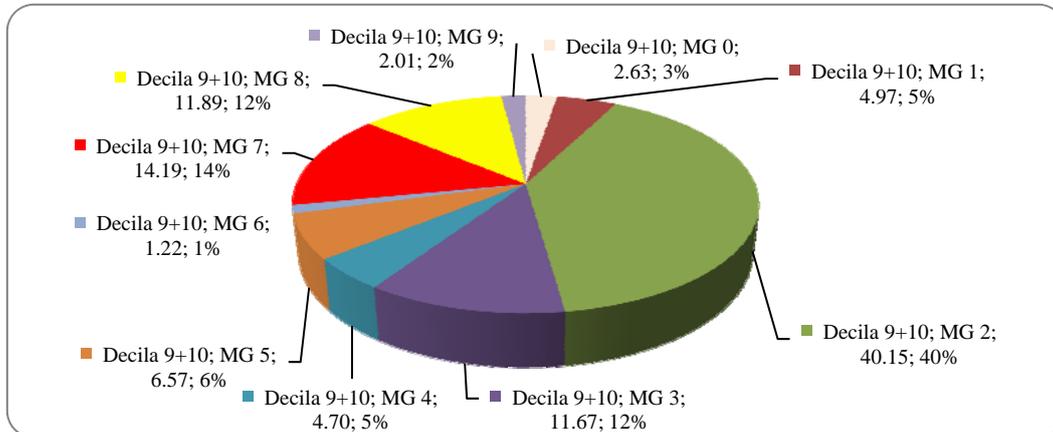
a)
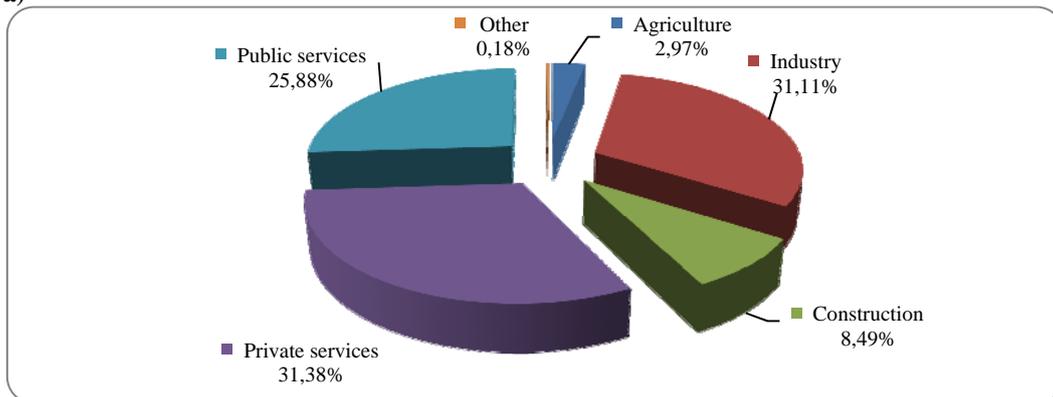
b)

3. Econometric analysis

For econometric analysis we used a non-linear model "ordered logit". This model can be viewed as an extension of the binary logit model (Cameron, AC, Trivedi, PK, 2009). In this case the dependent variable is a categorical variable corresponding to the decile of earnings, which takes values from 1 to 10.

According to Agresti (2010) the logit model is a one-time classification model, for which the estimates are based on a maximum likelihood function in order to determine the conditional probability of an individual to belong to a category based on certain independent variables. Thus, the logit model describes a relationship between the Y binary variable which takes the values 1 or 0, and the k explanatory variables x_1, x_2, ..., x_k.

The personal characteristics of individuals were quantified by means of gender, age and residence. For the gender and the residence variables we have built one dummy variable that takes the value 1 if the individual is a male from the urban area, or 0 otherwise. In terms of age, we grouped the individuals into the following age categories: 15-24 years, 25-34 years, 35-54 years, 55-64 years and over 65 years. Based on these five groups we built 5 dummy variables, each taking the value 1 if the respondent is aged in the specified category and 0 if not. In the case of the logistic regression models, when these type of categorical variables transformed into dummy variables are used, one of the dummy variables is excluded from the model, and the results of the others are analyzed in terms of the excluded variable. In this case, we excluded from the model the age group 25-34 years.

The human capital of the individual was evaluated based on education. Initially, based on the questionnaire, the respondents had 13 possible answers. For the analysis in this study we decided to group the initial response alternatives into four categories: no education (ISCED 0); primary or lower secondary education (ISCED 1-2); upper secondary or post-secondary non-tertiary education (ISCED3-4) and higher education (ISCED 5-6). For the econometric estimation, this variable was transformed into 4 dummy variables built on the same principle as those related to age (the new variable takes the value 1 if the respondent falls into a certain education category and the value 0 if not). In this case, the category considered as a basis for comparison was that of people with secondary education.

Also, in order to consider the economic characteristics of individuals, we included in the study the activity sector (NACE Rev. 2) of the employing unit. The sections of the national economy were grouped into five broad categories (Agriculture, Industry, Construction, Private services, Public services). This variable was also broken into five dummy variables, and in this case the basis for comparison was the variable regarding the Public services category.

Table 1. *Econometric results*

Dependent variable: Wage decile		Probability relationship 2008	Probability relationship 2012
Gender (basis: female)	male	132,4%	134,8%
Residence (basis: rural)	urban	54,8%	44,8%
Age group (basis: 25-34 years)	15-24 years	-38,6%	-26,3%
	35-54 years	29,7%	29,6%
	55-64 years	62,6%	43,1%
	over 65 years	21%	57,6%
Education level (basis: ISCED 3-4)	ISCED 0	-83,6%	-83,3%
	ISCED 1-2	-60,1%	-63%
	ISCED 5-6	557,9%	356,8%
Sector of economic activity (basis: Public services)	Agriculture	-49,1%	9%
	Industry	-16,6%	8,9%
	Construction	7,1%	24,8%
	Services	-19,9%	-8,7%

Regarding gender inequality, the results indicate that the chances of having higher earnings (to be assigned to an upper decile) were, in 2008, with 132.4% higher for men than women. This significant difference between gender wage increases in 2012 with

134.8% higher chances for men of earning better than women. This change in better opportunities for men is a result of the economic crisis, as women accepted that in such situations men keep their job (Ailenei, 2012). Moreover, the crisis also affected mainly banking, financial and real estate services which are sectors dominated by women.

The dependence of the wage gap on the residence is significant, as in urban areas the chances of getting a higher salary than in rural areas was 54% higher in 2008. However, because of the economic crisis effects which have negatively affected economic activities in the urban area, these chances are significantly reduced reaching 44% in 2012.

As for the pay gap variation by age it is observed that young people between 15 and 24 have the lowest chance of earning (being 38.6% lower than the reference age group 25-34). This situation improved by 2012 (when the chance gap was reduced to -26.3%). This result must be correlated with the decrease of the earning chances for the 55-64 age group (workers with maximum experience, beneficiaries of seniority bonuses, loyalty etc.). From this perspective it is possible that there is a manifestation of a substitution effect of this category of workers with young graduates of the education system (cheaper labor force, but still better paid compared with 2008). The substitution effect is based on the need for companies to make salary savings because of the economic crisis. Accordingly, the age category 55- 64 loses its leader position in terms of earning chances in favour of the age category of over 65 years (there is a reversal of the ratio of chances from 62.6%/21% in 2008 to 43.1%/57.6% in 2012). This means that the substitution effect mentioned above did not affect the age group of over 65, because here we are dealing with top management, or with highly qualified specialists, and the gap increase can occur because of the changes in the age groups structure of the workforce (most likely unemployment affecting the age group 55-64 years, there may also have been early retirements because of the economic crisis). Interestingly, the age group of the majority of workers (35-54 years) retain their chances of earning (29.6% compared with the referential, only a very small reduction of 0,1pp in 2012), probably as a dynamic with the same direction as the reference group (25-34 years) during the crisis.

Our analysis shows that education is by far the most influential feature of the pay gap. Thus, the chances of a worker with higher education (ISCED 5-6) to have a salary higher than a worker with secondary education were 557.9% higher in 2008. Even if the economic crisis affected high wages to a great extent, the wage gap remained favourable to the high education workforce in 2012 as well (earning chances reduced to 356.8%). The decrease of opportunities is explained by decreases in salaries and through the substitution effects mentioned above. There can also be observed a conservation of unfavorable chances of earning of the group of workers with no education (ISCED 0) (-83.3% in 2012 versus -83.6% in 2008), as here we are dealing with unskilled workers performing maintenance and cleaning activities. Similarly, our analysis reveals the presence of a negative gap regarding the workforce with lower-secondary level of education (ISCED 1-2) (8 grades) in relation to the earning chances of workers with upper-secondary education (ISCED 3-4) (-60.1% in 2008 and -63% in 2012 with a slight worsening of the situation because of the economic crisis).

Regarding the sectors of activity, the referential used were the public services. From this perspective, in 2008, the only sector of activity that offered better chances of earning (7.1% higher) was the construction sector. This is explained by the fact that the construction sector is close to the top of a long period of boom, wages include certain bonuses for difficult and dangerous conditions of work and the working time is often extended to more than 8 hours/day. The other sectors of activity analyzed offer less chances in terms of wage level in relation to public services, which is explained by the inclusion in this heterogeneous group of services of the defense and public security activities, the judiciary and other high level public institutions. The lowest earning opportunities are offered by agriculture (-49.1% lower than the referential), followed by other services (-19.9% lower) and industry (-16.6% lower). This is attributed mainly to the structure of the workforce in relation to the level of qualification required for these activities. Thus, it is clear that in agriculture predominate unskilled labor force and/or low-skilled labour force, just as in some services as hotel, catering, etc. The dominant skill level is not very high. The same situation is also reflected in industry.

The situation changes radically as a result of the global economic crisis effects on the Romanian economy, when the budget deficit increased. After cutting 25% of the wage in the case of workers in public administration, three of the four industry sectors analyzed offered better chances of earning in 2012. The construction sector which was also affected by the crisis offered 24.8% better earning opportunities, followed by agriculture (9% higher which was a great surprise) and industry (with only 8.9% higher). The better position of agriculture in relation to industry is explained by the fact that the first signs of recovery of the Romanian economy were supported by good agricultural production and export growth in this sector. The only sector of activity that maintains the negative gap of earning opportunities is the private services (even if there is a major improvement from -19.9% in 2008 to -8.7% in 2012). This situation is explained by the fact that the services sector is the most vulnerable one to the shocks of the economic crisis. Since demand is greatly flexible (especially in relation to the foodservice and industrial goods), it undergoes a sharp contraction. In addition, this sector also includes banking and financial services, the sector that was affected the most by the global financial and economic crisis.

4. Conclusions

Wage differences have multiple determinations, our analysis revealing only a part of them considered more important or easier to highlight. Thus, the analysis focused mainly on factors such as gender, major groups of occupation, industry, residence and age. The statistical analysis revealed a prevalence of gender wage differentials in extreme areas (deciles 1 and 2, respectively 9 and 10), but in favor of the male labor force, coupled with a good correlation between the distribution of wages by major occupational groups and by sectors of activity.

As for the chances of wage gaps the logistic regression analysis (ordered logit) reveals that the most important factor is by far the level of education, workers with higher education surpassing all lower levels. However, the economic crisis reduced to a great extent the gap between the level of higher education in relation to the medium one, because of some significant salary cuts and substitution effects of highly skilled and experienced personnel in favour of young university graduates.

The gender gap (social perspective) is widening during the economic crisis amid a significant breakdown of the banking and real estate sectors where the share of female staff is higher than the male one. In addition, the gender structure of the workforce has changed unfavorably for women (who are more dedicated to household activities, i.e. more willing to give up work in crisis situations on favour of men/husbands).

Although traditionally the wage opportunities gap is unfavorable to the rural area, the economic crisis has reduced this gap amid its prevalence in urban areas and the dominance of other income categories in rural areas.

Amid the government austerity policies promoted during the economic crisis peak there are significant changes that occur in the structure of earning opportunity gaps by sector of activity. Thus, in 2008 only one sector of activity (Construction) surpassed the Public services sector in terms of earning opportunities. One might say that the current economic crisis set the odds in favor of a market economy, as the year 2012 reversed the opportunities in favor of the productive sectors (Agriculture, Industry and Construction). The jams in the banking and real estate sectors caused by the economic crisis maintain the opportunities deficit of the private services sector in 2012 as well.

There was also a uniformity of the distribution of earnings, as the wage differences between individuals working in different sectors of the national economy are much lower compared to 2008.

Acknowledgements

Notes

[1] MG1 - Major group 1: legislators, senior officials and managers; MG2 - Major group 2: professionals; MG3 - Major group 3: technicians and associate professionals; MG4 - Major group 4: clerks; MG5 - Major group 5: service workers and shop and market sales workers; MG6 – Major group 6: skilled agricultural and fishery workers; MG7 – Major group 7: craft and related trades workers; MG8 – Major group 8: plant and machine operators and assemblers; MG9 – Major group 9: elementary occupations.

[2] *Agriculture* (Agriculture, forestry and fishing)

Industry (Mining and quarrying; Manufacturing; Electricity, gas, steam and air conditioning supply; Water supply, sewerage, waste management and remediation activities)

Construction (Construction)

Private services (Wholesale and retail trade, repair of motor vehicles and motorcycles; Transportation and storage; Accommodation and food service activities; Information and communication; Financial and insurance activities; Real estate activities; Professional, scientific and technical activities; Administrative and support service activities)

Public services (Public administration and defence, compulsory social security; Education; Human health and social work activities; Arts, entertainment and recreation)

Other service activities

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