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LABOUR MARKET INEQUALITIES AND ECONOMIC DEVELOPMENT

Abstract. *Economists and policymakers have long considered that, in general, economic growth is accompanied by a certain level of inequality. Such inequalities were seen as a marginal effect of the development process, not necessarily a negative one. The financial crisis hit EU in late 2007. Even if the EU was in a favorable economic context with economic growth and development perspectives, it was also very fragile. The recent entry of many East European Countries in EU leaded to high disparities between countries in economic development, ITC use, R&D expenses and education level. By using GINI coefficients, Principal Components Analysis and linear regression method for panel data we try to identify the factors which restrict or favors the apparition of inequalities on the labor market.*

Key words*: inequality, labor market, vulnerability, panel data, regression.*

JEL Classification: **J7, J01, O30**

1. INTRODUCTION

Economists and policymakers have long considered that, in general, economic growth is accompanied by a certain level of inequality. Such inequalities were seen as a marginal effect of the development process, not necessarily a negative one. For a long time, inequalities have not been considered a problem in itself, but only in conjunction with the general level of poverty and wealth. However, high levels of inequality have a negative impact on long-term growth and are associated with various forms of social and economic exclusion.

There are many articles and studies on inequalities, particularly in developing countries. Some of them mention that the lack of social cohesion will increase the number of crimes and other forms of social and political conflicts. This is observed in those countries where a high level of inequality was accompanied by lower economic growth (Datt & Ravallion – 1992, Kanbur & Lustig – 1999).

Not all forms of inequalities have adverse effects, as there are personal choices that lead to inequalities, too. Thus, one can distinguish between ***functional***

inequalities – those that occur in a market economy as a result of taking a risk, of knowledge accumulation, of entrepreneurship, or of savings – and ***dysfunctional inequalities*** – arising from the lack of opportunities, from social and political exclusion of certain groups and other forms of discrimination as well.

Although many studies focus only or mainly on the analysis of income inequalities, they appear due to other economic, social and political factors, too. According to Justino and Acharya (2003), the most important factors are:

- Disparities in employment conditions of labor force, for examples differences between skilled and unskilled personnel;
- Differences in access to land and other physical assets;
- Discrepancies in the use and access to health, education and other social services;
- Variations in access rights to political power and legal institutions: voting rights, the possibility of membership in trade unions etc.

This paper begins with a literature review about the dimensions, effects and measures of inequalities. After that we try to find some factors which favor or restrict the gender inequalities on EU labor market by using GINI coefficients, Principal Components Analysis and linear regression method for panel data. Moreover, by using the same data we studied the impact of crisis on labor market inequalities.

2. LITERATURE REVIEW

Inequality types are not homogeneous in the entire society, as there are differences between urban and rural areas, between regions, between different population groups, based on gender or ethnicity.

Inequality studies on access to higher education were a constant concern in recent decades. Coleman (1990), Bourdieu and Passeron (1990), Collins (1975) published several papers on this subject. Voicu & Basil's work (2010) analyzes disparities in Romania between urban and rural areas, regarding access to higher education and their dynamics in the 20th century.

Koncky & al. (2007) say that the experience of developed countries shows that massive expansion of university education does not decrease educational inequality, but transfer it to another level. Quantitative differences disappear, however inequalities on access to universities or high quality specialties may appear (Lucas - 2001, Ayalon & al. - 2008).

Disparities between regions and between urban and rural areas tend to be closely related to inequalities in society. In developing countries, urban areas benefit more than rural areas of public services and infrastructure. Moreover, the income of rural population comes mostly from agriculture, being exposed to unfavorable conditions, to commerce and to some reduced revenues associated with it (IFAD, 2001).

Inequalities between different population groups largely explain the persistance of poverty in developing countries. Several studies have shown that women tend to be paid less than men for similar tasks and generaly, households invest less in girls'

education than in boys' education. Thus, girls are often less educated than boys, with a poorer nutrition and a lower health level than boys, in many developing countries (Justino et al., 2003). Gender differences occur frequently and they can be observed in more economic ways: jobs segregation in the paid labor market, labor division in paid and unpaid, household distribution of income and resources, access to education and social security programs, credit financial markets. Women and men occupy different positions in society, the females being more prone to poverty, malnutrition, lack of education or labor overuse compared to males (Davis, 1981; Benera & Roldan, 1987; Wright, 1996).

A large number of studies determined how gender can influence the economic growth, at macro-economic level. Many of these studies were stimulated by the experience of structural adjustments in the '80s, the researchers considering that gender affects economic adjustment policies and investigating their feedback effects (Ashfar & Dennis, 1991; Benera & Feldman, 1992).

Seguino (2000) focuses on the mechanisms by which job segregation in paid employment, wages differences and education affect economic growth. He argues that if women are concentrated in export industries, that produce goods with flexible prices, women's wages artificially decrease due to their low bargaining power. By referring to men's salary, wages differences between the two genders can stimulate the exports expanding. Moreover, the empirical results on economic growth show that there is a direct (positive) relationship between the export, technical progress and economic growth, which leads to the following relationship between gender differences and economic growth:

Gender differences $\rightarrow$ *export expansion* $\rightarrow$ *technical progress* $\rightarrow$ *economic growth*

Other cross studies (Benavot, 1989, Hill & King, 1995) show that the education level attained by women has a positive effect on economic growth. The positive effect may decrease below its potential, if women are engaged in unskilled jobs, regardless of their training for skilled positions on labor market.

3. EMPIRICAL ANALYSIS

3.1. Theoretical aspects of inequality measures

Measuring inequality implies the choice of a variable of interest, the observation unit and the reference period, depending on the availability, on the theoretical and conceptual issues, and on the perception of inequality.

The variable of interest, most often used in economic studies is income or consumption expenditures. In developing countries, when defining inequality between households, consumption expenditures have a better quality due to expansion of self-employment in family farms or businesses, where it is often difficult to distinguish between income and profit (Deaton, 1997).

The observation unit is, in general, the household, whose consumption or total income equivalent depends on the household size and composition. Also, the

inequality may be calculated at individual level, if the earnings are taken into account.
The reference period is a week, a month or a year. New surveys on households and the usage of panel data, allow the calculation of inequalities on longer time periods, facilitating the analysis of persistent inequalities, their causes and consequences.
The most common measures of inequality, used in the literature will be described below, from the least complex to most complex.

a. Range: $A = y_{\max} - y_{\min}$. It can range between 0 when all income values are equal and *n* if a person gets the entire income, and all the other persons get nothing (zero income). As the range ignores the variable distribution between the extreme values, this measure of inequality does not provide much information.

b. Relative mean deviation represents the average of the individual deviations from the mean, in absolute value.

$$M = \frac{1}{n}\sum_{i=1}^{n}\left|\frac{y_i}{\bar{y}} - 1\right|$$

If the relative mean deviation is zero, then all the individual values are equal, and if M=2(1-1/n) then a person gets the entire income, while the others have no income. Relative mean deviation takes into account the whole distribution and not only the extreme values, but it is not sensitive to transfer from a richer person to a poorer one, as long as they are on the same side of the mean income.

c. Variance represents the arithmetic mean of the squared individual deviations from the average.

$$V = \frac{1}{n}\sum_{i=1}^{n}(y_i - \bar{y})^2$$

Variance is more sensitive to values located far from the average. It is highly sensitive to the mean value of the variable of interest. A distribution may be seen with a greater variability than another, though in reality the variability is smaller because the mean of the variable of interest is higher. For example, a distribution of income in lei will have a greater variation than the same distribution of income in euro, although their inequality is identical.

d. Coefficient of variation divides the variance by the mean in order to obtain the independence of inequality measure by the mean value of the variable.

$$CV = \frac{\sqrt{V}}{\bar{y}}$$

A transfer of income from a richer person to a poorer one will always reduce the coefficient of variation.

e. Standard deviation of logarithms assigns a greater importance to income transfers at the end of income distribution to lower income. By using the logarithms the inequality measure does not depend on measurement units.

$$H = \sqrt{\frac{\sum_{i=1}^{n} (\log \bar{y} - \log y_i)^2}{n}}$$

f. The Gini coefficient measures the average difference between all possible pairs of values in the population analyzed, as proportion of the sum of all values.

$$G = \frac{1}{2n\bar{y}(n-1)} \sum_{i=1}^{n} \sum_{j=1}^{n} |y_i - y_j|$$

Gini Coefficient may range between zero and 1. G=0 indicates a perfect equality of all values, while G=1 indicates that a single person gets the entire value and the others get nothing (all the other values are zero).

g. Theil index is a statistic indicator, used to measure economic inequality.

$$T = \frac{1}{n} \sum_{i=1}^{n} \left(\frac{y_i}{\bar{y}} \ln \frac{y_i}{\bar{y}} \right)$$

If the population can be divided into *k* regions (exclusive and exhaustive populations), the Theil index can be written as:

$$T = \left(\sum_{j=1}^{k} \left(\frac{n_j \bar{y}_j}{n\bar{y}} \ln \frac{\bar{y}_j}{\bar{y}} \right) \right) + \left(\sum_{j=1}^{k} \frac{1}{n} \frac{\bar{y}_j}{\bar{y}} \sum_{i=1}^{n_j} \frac{y_{ij}}{\bar{y}_j} \ln \frac{y_{ij}}{\bar{y}_j} \right) = B + W$$

Therefore, the Theil Index meets the decomposition principle.

h. Generalized measure of entropy is a class of measures, which has the general form:

$$GE(\alpha) = \frac{1}{\alpha^2 - \alpha} \left[\frac{1}{n} \sum_{i=1}^{n} \left(\frac{y_i}{\bar{y}} \right)^{\alpha} - 1 \right], \alpha \neq 0,1$$

$$GE(1) = \frac{1}{n} \sum_{i=1}^{n} \left(\frac{y_i}{\bar{y}} \ln \frac{y_i}{\bar{y}} \right) \text{ and } GE(0) = \frac{1}{n} \sum_{i=1}^{n} \left(\ln \frac{y_i}{\bar{y}} \right)$$

GE ranges between 0 and ∞, GE = 0 zero representing the equal distribution (all values are equal) while high values of the index representing high levels of inequality. For small values of α, GE is more sensitive to changes in the

bottom of the distribution and for large values of α GE is more sensitive to changes in the top of the distribution.

3.2. GINI coefficient for education inequality

Educational differences often lead to inequalities on labor market. An equitable distribution of human capital (basic level of education and health) is essential to increase individual productivity and ability to stay above the poverty line (Amartya Sen, 1980). Ensuring access to education and equal distribution of educational services is a win-win policy, to support developing or industrialized countries.

Many indicators were used to measure different aspects of education: school enrollment, attained educational level, quality of education resources and quality of education results.

Many authors have calculated GINI coefficients for education. For example, Maas and Criel (1982) estimated GINI coefficients for education inequality for 16 countries from East Africa, based on school enrollment. Ter Weele (1975) estimated GINI coefficients for education inequality based on variables related to the finance of education for East African countries. Rosthal (1978) calculated four indicators for the distribution of education in United States.

Vinod et al (2000) measured the education inequality by using GINI coefficients on attained education level in 85 countries for the period 1960-1990. They considered that the traditional method for the computation of GINI coefficient is not adequate for many reasons. First of all, surveys at individual or household level about the educational level are not available for many countries and the equation for the GINI coefficient computation could not be computed. Moreover, the number of years of completed education is a discrete variable and not a continuous one. Therefore, Vinod et al (2000) propose a modified formula for the computation of GINI coefficient for education inequality:

$$G_{ed} = \frac{1}{\mu}\sum_{i=2}^{n}\sum_{j=1}^{i-1} p_i \left| y_i - y_j \right| p_j$$

where:

- μ is the average number of years of education for the analyzed population ($\mu = \sum_{i=1}^{n} p_i y_i$);
- p_i and p_j are the proportions of the population with a certain level of education;
- y_i and y_j are the number of years of education on educational levels (duration in years of each educational level);
- n is the number of educational levels.

By using previous methodology we have computed GINI coefficient for education (G_{ed}) for all EU countries for the years: 1990, 1995, 2000, 2005 and 2010. We have used the World Bank data about: Percentage of population (age 15+) by educational attainment (Barro-Lee), Duration primary, Duration of total secondary. For the duration of tertiary education, we have considered that in all EU countries a complete cycle of tertiary education is in mean of 6 years.
Therefore, in G_{ed} formula:

- p_1 is the proportion of population with no education and $y_1=0$;
- p_2 is the proportion of population with incomplete primary education and $y_2= y_1+0.5C_p$, where C_p is Duration primary;
- p_3 is the proportion of population with primary education and $y_3= C_p$;
- p_4 is the proportion of population with incomplete secondary education and $y_4= y_3+0.5C_s$, where C_s is Duration of total secondary;
- p_5 is the proportion of population with secondary education and $y_5= C_s$;
- p_6 is the proportion of population with incomplete tertiary education and $y_6= y_6+0.5C_t$, where C_t is Duration of total tertiary;
- p_7 is the proportion of population with tertiary education and $y_7= C_t$.

During the analyzed period (1990-2010) there could be observed a decrease in education inequality in all EU countries. In order to obtain a classification of all countries taking into consideration the education inequality level and the evolution of this inequality from 1990 to 2010, we have used a nonhierarchical analysis (k-means clustering) and we have obtained a classification of countries in four groups. All variables (GINI coefficients for 1990, 1995, 2000, 2005, 2010) are significant for the classification with a level of significance of 0.01.

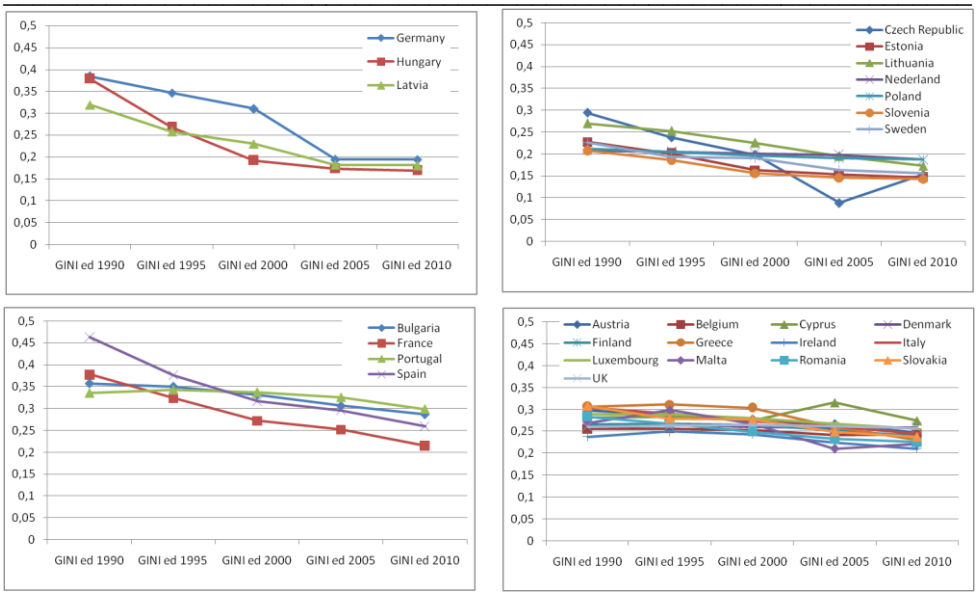

Figure 1 – GINI coefficients for education inequality, 1990-2010

The countries in first group (Germany, Hungary, and Latvia) have very high decrease of education inequality during the observed period, from very high values (up to 0.3) to very low values (down to 0.2) of GINI coefficient.

The countries in the second group (Bulgaria, Portugal, France and Spain) have high decrease of education inequality during the observed period, but the education inequality still remains high (up to 0.2).

The countries in the third group (Czech Republic, Estonia, Lithuania, Netherlands, Poland, Slovenia and Sweden), even if they had low levels of education inequality in 1990, they continued to decrease during the analyzed period attaining levels of GINI coefficient between 0.14 to 0.19 in 2010. These countries have the lowest levels of education inequality on the entire analyzed period.

The countries in the fourth group (Austria, Denmark, Ireland, Great Britain, Belgium, Finland, Italy, Greece, Luxembourg, Romania, Slovakia, Cyprus and Malta) have an education inequality relatively constant, around 0.25, during the entire analyzed period.

3.3. Indicators for social development and technology development

In this section, by using Principal Component Analysis[1], we will construct two indicators, non correlated, one about the social development and the other one about technology development in EU countries, in 2005. The source data was World Bank database. The variables taken into consideration were:

- GDP per capita, PPP (current international $)
- Research and development expenditure (% of GDP)
- School life expectancy (years). Primary to tertiary. Total
- Internet users (per 100 people)
- Telephone lines (per 100 people)

The first principal component is determined by GDP per capita, School life expectancy and Telephone lines. This new variable explains 43.1% from the total information, and could be used as an *indicator of social development*. The second principal component, non-correlated with the first one, is determined by Research and development expenditure and Internet users. This new variable explains 37.7% from the total information and could be used as an *indicator of technology development.* These two new variables preserve 81% from the initial information.

Table 1 – The initial variables coordinates on the two principal components

	Principal components	
	Social development	Technological development
GDP per capita, PPP (current international $)	**0.842**	0.310
Research and development expenditure (% of GDP)	**0.841**	0.246
School life expectancy (years). Primary to tertiary. Total	**0.725**	0.422
Internet users (per 100 people)	0.327	**0.884**
Telephone lines (per 100 people)	0.324	**0.876**

3.4. The impact of education inequality, social development, technological development and ITC on gender inequalities on labor market

In order to identify some of the determinants of gender inequalities on labor market, we have used the regression model for panel data.

[1] Principal Component Analysis is a method of factorial analysis used for the reduction of data dimension, for obtaining suggestive graphical representation for the correlation of variables and groups of individuals, and for obtaining new variables, non correlated, linear combination between initial variables, which preserve as much as possible the initial information.

As endogenous variables, we have considered:

- The ratio of female to male vulnerable employment (Vulnerable employment, female/ Vulnerable employment, male);
- The ratio of female to male unemployment (Unemployment, female/ Unemployment, male);
- The ratio of female to male wages in manufacturing (%)

As exogenous variables, we have included successively: the GINI coefficients for education inequality, GDP growth, the variables constructed in the previous paragraph (Social development and Technological development) and all the variables taken into consideration in the Principal Component Analysis. All the data were taken from World Bank database for the years: 1990, 1995, 2000, 2005, 2010. By applying regression method for panel data, with random effects, we have identified some factors which contribute to gender inequalities on the labor market.

First of all, the ratio of female to male vulnerable employment decreases with the number of internet users increase, with GDP growth and with the education inequality decrease. The temporal effect is more important than the spatial one.

The ratio of female to male unemployment decreases with the number of internet users increase and with the education inequality decrease. In this case both temporal effect and spatial effect are equally important.

The ratio of female to male wages in manufacturing increases with the number of telephone lines increase and with GDP growth. In this case the spatial effect is more important than the temporal one. The model in which we have included the variables for social and technological development as exogenous variables is not significant.

Tabel 2: Panel data estimators

	The ratio of female to male vulnerable employment				**The ratio of female to male unemployment**			**The ratio of female to male wages in manufacturing**		
	M1	**M2**	**M3**	**M4**	**M1**	**M2**	**M3**	**M1**	**M2**	**M3**
Constant	52.35***	58.22***	68.88***	81.79***	102.18***	137.13***	105.86***	9.75 NS	-10.87NS	-43.75**
GINI for ed.	92.58**	112.87***	97.9**	88.72**	65.29NS	-	120.06*	97.72 NS	-	100.85
Social dev.	-1.00NS	-	-	-	9.73*	-	-	8.78*	-	-
Technological dev.	-3.14***	-	-	-	-11.02***	-	-	-8.59**	-	-
GDP growth	-	-	-1.64***	-1.61***	-	-	-	-	-	2.17**
Internet users	-	-0.145**	-0.21***	-0.23***	-	-0.57***	-0.37***	-	-0.3*	-
Telephone lines	-	-	-	-0.26*	-	-0.03NS	-	-	1.57***	1.13***
GDP per capita	-	-	-	-	-	0.00 NS	-	-	-0.000*	-

School life exp.	-	-	-	-	-	-0.05 ^{NS}	-	-	0.27 ^{NS}	-
R&D expenditure	-	-1.89^{NS}	-0.94^{NS}	-	-	3.04 ^{NS}	-	-	6.53*	-
R^2 *within groups*	0.37	0.33	0.39	0.40	0.31	0.27	0.27	0.36	0.24	0.15
R^2 *between groups*	0.15	0.1	0.16	0.17	0.4	0.23	0.25	0.003	0.35	0.32
R^2 *total*	0.13	0.16	0.22	0.23	0.26	0.15	0.21	0.08	0.28	0.21
N	66	115	115	115	66	119	119	66	136	135

Note : 1. Social development: first principal component; Technological development: second principal component;
2. For the parameter estimation we have used STATA software
3. * significance level 0.1; ** significance level 0.05; *** significance level 0.01.

3.5. Factors that favor or restrict negative effects of the crisis on the labor market

In order to identify some of the factors that favor or restrict negative effects of crisis on the labor market, we have used the multiple regressions. As endogenous variables we have used: the change of total unemployment in 2010 compared to 2008, the change in young (16-24) unemployment in 2010 compared to 2008; the change of total employment in 2010 compared to 2008; the change of the share of partial employment in total employment in 2010 compared to 2008; the change of the share of part time employment in total employment in 2010 compared to 2008. As exogenous variables we have used the same variables as in the previous analysis. Because the two new variables constructed by using Principal Component Analysis have not shown statistical significance in the related model, they were removed from our analysis. All the models and coefficients were significant with at least 0.1 significance level.

In countries where the GDP growth, educational level and education inequality were high, the crisis had a very bad effect on unemployment, young unemployment and total employment. These countries are characterized by low levels of GDP per capita and a dependency on exports. Public debt – not so high at the beginning of the crisis – has increased to its end. In many economic sectors the activity was restrained, accompanied by an increase in unemployment. Due to shortage of vacancies, young graduates have poor employment opportunities, leading to an increase in youth unemployment.
In EU countries with high levels of school life expectancy and low levels of research and development expenditure, the part-time employment share on total employment increases during the crisis. A possible explanation could be that young people in these countries are enrolled for quite long periods in the educational system. Due to the increased precarity of living conditions during the crisis-period, they prefer to be employed in part-time jobs, in order to deal with life

difficulties, even if they hadn't completed their education yet. Moreover, low levels of R&D expenditure make impossible the creation of new technologies, which require an updated knowledge. Therefore young persons are hired on less desirable, less demanding jobs, before completing their education process.

Table 3: Multiple regression estimates

	Total unemployment 2010/2008	**Young unemployment 2010/2008**	**Total employment 2010/2008**	**Part time employment 2010/2008**	**Temporary employment 2010/2008**
Constant	-2.813**	-1.663**	1.468***	13.119***	-1.051^{NS}
GINI for ed.	2.213*	2.224**	-0.38***	-	0.842^{NS}
GDP growth	0.199***	0.192***	-0.02***	-	0.071***
Internet users	-	-	-	-	-0.004^{NS}
GDP per capita	-	-	-	-	0.000*
School life exp.	0.202***	0.126***	-0.02***	-1.62***	0.091*
R&D expenditure	-	-	-	0.054***	-
R^2	0.727	0.822	0.829	0.363	0.546
R^2 *ajustat*	0.688	0.796	0.805	0.305	0.427
N	25	25	25	25	25

Note : 1. For the parameter estimation we have used STATA software
2. * significance level 0.1; ** significance level 0.05; *** significance level 0.01.

The EU countries with GDP growth, high levels of GDP per capita and high levels of school life expectancy, the temporary employment share on total employment increases during the crisis. In these countries, in which high rates of GDP growth are sustained by higher educated labor force, the crisis effects were not so dramatic. Thus, there has been no downturn, no severe reduction in the number of jobs. Conversely, there were enough resources to create new jobs, but not necessarily qualitative, well-paid jobs. Therefore, those in search of better – paid jobs had some difficulties in finding them and preferred less desirable positions, for short-term. In addition, during the crisis, it appeared in the economy some employment opportunities on short-term (seasonal jobs, for instance), leading to an increase in the share of temporary employment.

4. Conclusions

Usually, inequalities accompany the economic growth, as a marginal effect (not necessarily negative) of the development process. Inequality types are not homogeneous in the entire society, as there are differences between urban and rural areas, between regions, between different population groups, based on gender or ethnicity. To measure the inequality level, it is necessary to choose and identify the

variable of interest, the observation unit and the reference period. In literature there are a variety of ways to measure the inequality level, including the range, the relative mean deviation, the variance, the coefficient of variation, standard deviation of logarithms or the Theil index.

In the present article we focused on Gini Coefficient – as an alternative measure of inequalities in education. Our analysis revealed a decrease in education inequality during the 1990-2010 period, for all European countries.

By applying a nonhierarchical analysis, the European countries were grouped into four clusters, by education inequality level and by the evolution of this inequality.

By using the Principal Component Analysis, we have constructed two indicators (non-correlated): a social-development measure (the first principal component, which explains 43,1% of the total information) and a technology-development measure (the second principal component, which explains 37,7% of the total information).

In order to identify some of the determinants of gender inequalities on labor market, we have used the regression model for panel data. Thus, we have identified some factors which contribute to gender inequalities on labor market. The first one is the ratio of female to male vulnerable employment which decreases when the number of internet users increase, when GDP grows and the education inequality decreases. The temporal effect is more important than the spatial one. The second factor is the ratio of female to male unemployment which decreases when the number of internet users increase and education inequality decreases. In this case both temporal effect and spatial effect are equally important. The third factor is the ratio of female to male wages in manufacturing which increases when the number of telephone lines increases and GDP grows. In this case the spatial effect is more important than the temporal one.

In order to identify some of the factors that favor or restrict negative effects of crisis on the labor market, we have used the multiple regressions. In countries where the GDP growth, educational level and education inequality were high, the crisis had a very bad effect on unemployment, young unemployment and total employment. In EU countries with high levels of school life expectancy and low levels of research and development expenditure, the part-time employment share on total employment increases during the crisis. Moreover, the EU countries with GDP growth, high levels of GDP per capita and high levels of school life expectancy, the temporary employment share on total employment increases during the crisis.

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