

# The Impact of a Knowledge Based Economy on Labour Market

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## Abstract

*The transition to a knowledge based economy is a comprehensive and profound process generating changes in all components of economic activities. The aim of the paper is to test the effect of a knowledge based economy on the labour market.*

## 1. Introduction

The new economy is an economy based on knowledge and ideas. The key factor of prosperity and employment is knowledge. The transition to the new economy represents a comprehensive and profound process generating changes in all components of economic activities.

Peter Drucker considered traditional production factors- land, work and capital- would not disappear, but knowledge would be the only relevant resource today. So, knowledge becomes the essential part of the economic and social development system.

OECD recommends the new economy to be based directly on knowledge and information production, distribution and utilization. Productivity and economic growth depends on knowledge leading to a new focus on the role of information, technology and learning in economic performance.

In World Bank vision to benefit from knowledge revolution there are clear strategies which should satisfy the following: an institutional and economic framework to promote an efficient utilization of the knowledge; an educated population to create and use the knowledge, a dynamic information infrastructure; an efficient innovation system.

The target of the European Union was to become the most competitive knowledge based society in the world capable of sustainable economic growth with more and better jobs and greater social cohesion by 2010. Achieving this goal would help determine the quality of life of its citizens, the working conditions of its workers and the overall competitiveness of its industries and services. EU was emphasizing the desirability of an inclusive sustainable society. A sustainable society enjoys environmental sustainability, social sustainability, economic sustainability and cultural sustainability.

At the Second World Summit on the Knowledge Society (Crete, 2009) one of the topics were about intellectual and human capital development beside business and enterprise computing, social and humanistic computing, innovation, sustainable development and strategic management. The difference between knowledge economy and knowledge based economy is that in the first case knowledge is a product, while in the second case knowledge is a tool. In this context human capital (competencies) are a key component. European Commission recommends sixteen core indicators for monitoring progress towards the Lisbon objectives: participation in pre-school education, special needs education, early school leavers, literacy in reading, mathematics and science, language skills, ITC skills, civic skills, learning to learn skills, upper secondary completion rates, professional development of teachers and trainers, higher education graduates, cross-national mobility of students in higher education, participation of adults in lifelong learning, adult skills, educational attainment of the population, investment in education and training.

The aim of the paper is to test the effects of the knowledge based economy on the labour market in the European Union countries that have a statutory minimum wage. In this context the minimum wage level plays an important role because: increases the standard of living for the poorest and most vulnerable class in society, motivates people to work harder (Freeman 1994), increases the work ethic, encourages efficiency and automation of industry (Semmel, 1960), forces workers to train and increases technological development.

## 2. Descriptive statistics

Only 20 countries from the European Union have a statutory **minimum wage**, but the methodology and also the level vary a lot from country to country. For example, there are countries in which the minimum wage is determined separately for each economic sector through collective negotiations (Cyprus, Italy), countries in which the Government has limited power in settling the level (Ireland, Slovakia, and Slovenia), countries in which minimum wage level varies with age, education, occupation and marital status (Greece),

and countries in which young employment benefit from special levels (Belgium, Slovakia and Poland).

In the second semester of the year 2010 the minimum wage level in the EU varied from 123€ (in Bulgaria) to 1725 € (in Luxembourg). The gap between countries becomes even deeper if we express the minimum wage in purchasing power parity. In all EU countries considered the minimum wage level increased comparing to the previous year, but because of the depreciation of the local currency it looks like the level decreased (in Czech Republic, Hungary, Poland and Great Britain).

In some countries such as Belgium, Slovakia and Poland, young employees benefit from dedicated minimum wage levels. In Greece the minimum wage level varies with age, education, occupation and marital status. In France the minimum wage level is set by the Government and is adjusted every year with the price index and the medium wage. In the Netherlands, the Government decided to decrease the minimum wage level in 1981, 1983 and 1984. Dolado, Kramarz, Machin, Manning, Margolis, Teulings, Saint-Paul and Keen, M. (1996) have studied the effects of those decisions and have found that the number of the young employees have increased by 3%.

Economic development and knowledge are closely related. Real GDP per capita is calculated as the ratio of real GDP to the average population of a specific year. It is often used as an indicator of how well off a country is, since it is a measure of average real income in that country. However, it is not a complete measure of economic welfare.

In EU-27 the real GDP growth rate was 1.7 in 2010. The highest rate was in Slovakia (4.1) and Lithuania (3.6) while the lowest rate was in Greece (-5.2), Romania (-1), Ireland (-0.9) and Spain (-0.6).

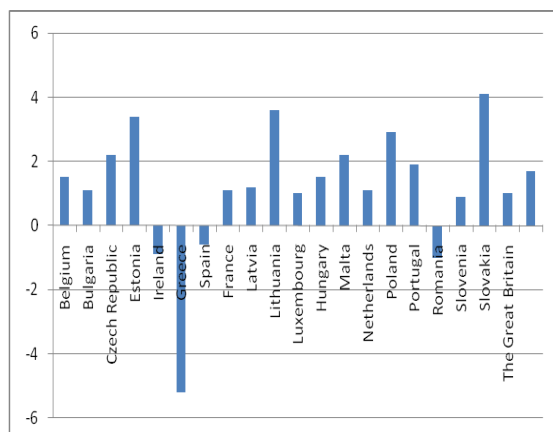


Figure 1. The growth rate of real GDP per capita

**Resource productivity** and resource intensity are key concepts used in sustainability measurement. The sustainability objective is to maximize resource productivity while minimizing resource intensity.

In the knowledge economy higher resource productivity will augment employment and wages without reducing the profit rate on the reduced capital stock (Hoedl).

Resource productivity is GDP divided by domestic material consumption (DMC). DMC measures the total amount of materials directly used by an economy. It is defined as the annual quantity of raw materials extracted from the domestic territory of the focal economy, plus all physical imports minus all physical exports. In the EU, overall, the resource productivity is 1.57. The countries that scored highest are Netherlands (3.46), Luxembourg (3.4), Malta (3.36) and Great Britain (2.94), while the lowest values were in Romania (0.21), Bulgaria (0.22), Estonia (0.35) and Latvia (0.39).

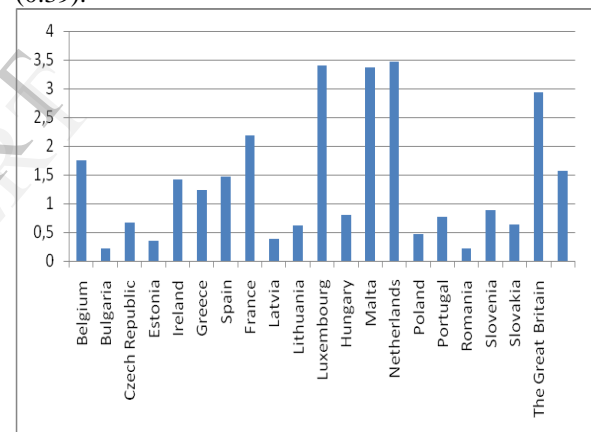


Figure 2. Resource productivity

Improvements to public services, especially education are needed to boost opportunities for young people and help adults adapt to the changing demands of the knowledge economy. With globalization, workers will need to continuously adapt and acquire the new skills demanded for the knowledge economy.

**People at risk of poverty** correspond to the sum of persons who are: at risk of poverty or severely materially deprived or living in households with very low work intensity. Persons are only counted once even if they are present in several sub-indicators. At risk-of-poverty are persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income (after social transfers).

One target from Europe 2020 strategy stipulates that the number of people at risk of poverty and social exclusion should be reduced by 20 million by 2020. Romania settled that 580 000 people less should be at risk of poverty. Poland settled an ambitious target, meaning 1 500 000 people should earn enough for not being at risk of poverty. Bulgaria (41.6) and Romania (41.4) have the highest rate, followed by Latvia (38.1) and Lithuania (33.4). The lowest rates are in Czech Republic (14.4), Luxembourg (17.1), Slovenia (18.3) and France (19.2).

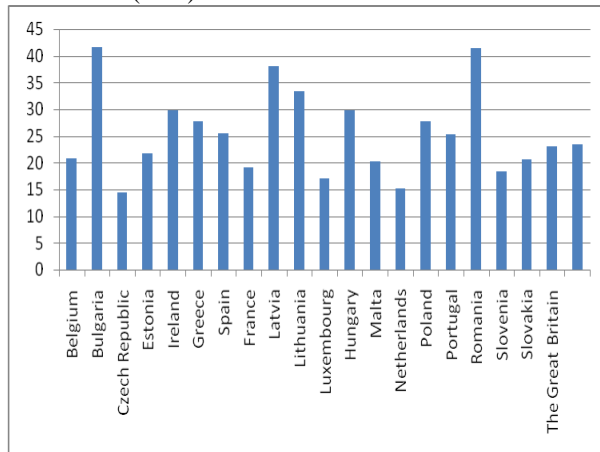


Figure 3. People at risk of poverty

**Public expenditure on education** is defined as total public expenditure on education, expressed as a percentage of GDP. The public sector funds education either by bearing directly the current and capital expenses of educational institutions or by supporting students and their families with scholarships and public loans as well as by transferring public subsidies for educational activities to private firms or non-profit organizations.

Expenditure on education may help foster economic growth, enhance productivity, contribute to people's personal and social development, and help reduce social inequalities.

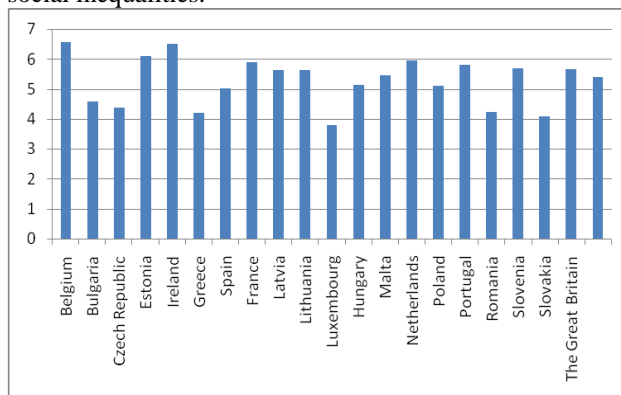


Figure 4. Public expenditure on education

At the level of EU-27, government expenditure on education increased in relative terms, from 5.2 % of GDP in 2002, to 5.5 % of GDP in 2010. The lowest were in Romania (3.4 %), Bulgaria and Greece (3.8 %), Germany (4.3 %) and Slovakia (4.5 %). The highest rates were in Belgium (6.57), Ireland (6.5) and Estonia (6.09). Considering the absolute values of the GDP, the gap between countries became deeper.

**Low educational attainment** is defined as the percentage of people aged 25 to 64 with an education level ISCED (International Standard Classification of Education) of 2 or less. ISCED levels 0-2: pre-primary, primary and lower secondary education.

In the European Union the share of low achievers in reading literacy among pupils in lower secondary education has decreased from 2000 (21.3%) to 2009 (20%). Vocational programmes have been successful to reduce early school leaving in some member states. Learning mobility is increasing but it still not an opportunity open to all young people. It is more developed in third-level education. Learning mobility remains lower in vocational education. Public spending on education as a percentage of GDP has stagnated since 2000 and the volume of private spending, which plays such an important role in the US, especially in higher education, has hardly changed.

European Commission highlighted that an early entrance to the education system means a solid base for success in school and labour market. By 2020 at least of 95 % of children between 4 years old and starting age for compulsory school should participate in early childhood education. The percentage has risen from 85.6% (in 2000) to 92.5% (in 2009).

Malta (71) and Portugal (68.1) scored highest, while Lithuania (8), Czech Republic (8.1) and Slovakia (9) scored lowest.

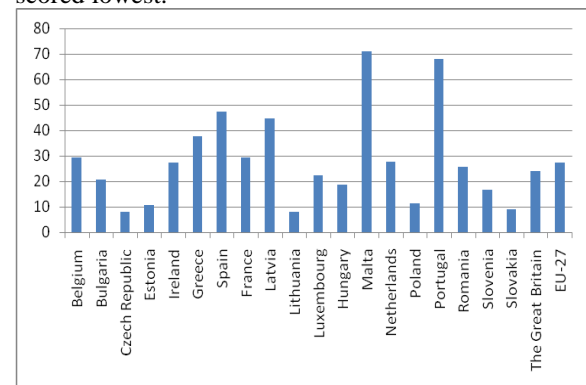


Figure 5. Low educational attainment

One of the specific targets from Lisbon Strategy was an employment rate of 50% among older workers. **The employment rate of older workers** is calculated by dividing the number of persons in employment and

aged 55 to 64 by the total population of the same age group

The highest employment rates of older workers are in Estonia (53.8), Netherlands (53.7) and Ireland (50.2) and the lowest are in Malta (30.2), Hungary (34.4), Poland (34).

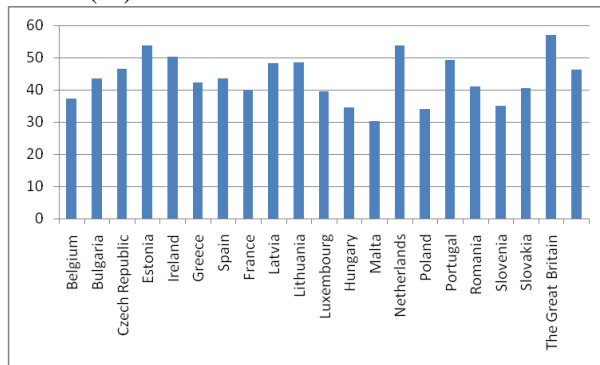


Figure 6. Employment rate of older workers

**Long-term unemployed** (12 months and more) comprise persons aged at least 15, who are not living in collective households, who will be without work during the next two weeks, who would be available to start work within the next two weeks and who are seeking work (have actively sought employment at some time during the previous four weeks or are not seeking a job because they have already found a job to start later).

There is obvious that long time unemployment creates a negative impact on personal health self-esteem, person's career and has negative consequences on professional development and individual earnings prospects. The longer people remain unemployed, the harder it becomes to find a job, especially due to the risk of skills depreciation.

In 2010 the EU-27 rate for long term unemployment is 3.9%. The highest rate for the considered countries were in Slovakia (9.3), Latvia (8.9) and Estonia (7.7) while the lowest were registered in Netherlands (1.2), Romania and Great Britain (2.5), Poland and Czech Republic (3).

In 2011, those unemployed for more than a year in the EU totaled almost 10 million from which 3 million had been unemployed for 12 to 17 months, 1.6 million for 18 to 23 months, 3.2 million for 24 to 47 months and 1.9 million for more than 48 months.

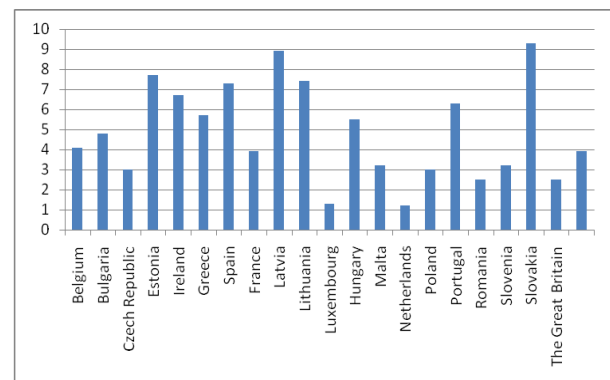


Figure 7. Long term unemployment

### 3. Correlation matrix

Our analysis only covers the EU countries that have a regulated minimum wage (i.e. Belgium, Bulgaria, the Czech Republic, Estonia, Ireland, Greece, Spain, France, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, and the United Kingdom). Our working variables are: real GDP per capita, resource productivity, people at risk of poverty, employment rate of the older workers, long term unemployment, public expenditure on education, low education attainment and minimum wage.

There are significant positive correlations between minimum wage and resource productivity, people at risk of poverty and low education attainment. Negative significant correlations occur between resource productivity and long time unemployment, resource productivity and people at risk of poverty, people at risk of poverty and minimum wage.

### 4. Factor analysis

For the variable we considered real Growth rate of the GDP per capita, minimum wage at purchasing power parity, people at risk of poverty, employment rate for the older workers and resource productivity.

The results of the Bartlett's and KMO tests prove that the analysis is suited. The Bartlett's test rejects the null hypothesis (the correlation matrix is identity). The values of the KMO tests (0.509) are above the minimum level.

Table 1. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.509
Bartlett's Test of Sphericity	Approx. Chi-Square	34.562
	Df	15
	Sig.	.003

We calculated the factor scores using the varimax method, and we computed the proper values for the correlation matrix. We have retained three proper values, to which we associate proper vectors that define the new coordination axis.

We chose three factorial axes (see Table 2) that explain 80.827% of the initial data set (39.29% for the first, 21.939% for the second and 19.598% for the third). The initial variables were replaced with three new variables that are uncorrelated.

Table 2. Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	2.357	39.290	39.290
2	1.316	21.939	61.229
3	1.176	19.598	80.827
4	.675	11.256	92.083
5	.330	5.501	97.584
6	.145	2.416	100.000

Every factor that we have obtained is significantly correlated with the initial variable (see Table 3), as follows: The first one is positively correlated with the minimum wage and resource productivity. In turn, it is negatively correlated with people at risk of poverty. We call this factor *development*. The second one is positive correlated with real GDP per capita, and public expenditure on education. We call this factor *progress*. The third one is significantly correlated with employment rate of older workers and people at risk of poverty. We call this factor *social care*.

Table 3. Component matrix

	Component		
	1	2	3
RGDP	-.110	.688	-.661
public_expenditure_on_education	.360	.700	.246
minimum_wage	.918	-.161	.194
People_at_risk_of_poverty	-.744	-.086	.479
Employment_rate_older_workers	.129	.536	.637
Resource_productivity	.896	-.180	-.073

## 5. Cluster analysis

We use a non hierarchical, k-means algorithm to determine the clusters. We obtain the optimum number of clusters by using the variance analysis. Our 20 countries were grouped into three clusters, based on common characteristics. In the first cluster we group the countries that have the highest levels of the minimum wage and resource productivity, and the lowest values for people at risk of poverty and employment rate for older workers. The countries

included in this cluster are: Belgium, Ireland, France, Luxembourg and Netherland.

The countries (Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania and Slovakia) in the second cluster are characterized by low levels of the minimum wage and resource productivity and high rates of the people at risk of poverty and real GDP growth per capita.

The last cluster contains the following countries: Greece, Spain, Malta, Portugal and the Great Britain. The centre of the cluster for the public expenditure on education and employment rate of older workers is the highest.

## 6. Conclusions

The countries included in the first cluster are most economically developed, so the transition to the new economy had positive influence on the labour market. The distance from the minimum wage to the mean (in percentage) is greater than for the countries included in other clusters. Having in mind that inclusive growth means to raise Europe employment rate, investing in skills and training, ensuring the benefits of growth reach all parts of the EU we can say that these countries are likely to achieve the targets from Europe 2020 strategy. The countries included in the first cluster were less affected by the crisis than the others.

The second cluster groups countries with low minimum wage levels but with high growth of real GDP per capita, meaning that the transition is not totally finished.

The majority of the countries from the third cluster were vulnerable during the crisis. Excepting Slovenia and Malta, the increasing of the unemployment rate registered the highest cotes. The people from these countries had the lowest job security during the crisis.



## 7. Acknowledgement

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