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THE IMPACT OF ECONOMIC GROWTH ON GENDER SPECIFIC UNEMPLOYMENT IN THE EU

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Abstract

The relationship between unemployment and economic growth is known as Okun´s Law. Okun´s Law is used to estimate the reaction of unemployment rate on change in GDP growth. The purpose of this paper is therefore to examine the possibly asymmetric relationship between changes in output and gender specific unemployment rates by estimating Okun´s coefficients for all countries of the EU, as well as for selected groups of the EU countries. These groups include countries with similar characteristics that differ from other groups and represent the diversity among the EU. The results confirm that male unemployment is more sensitive to changes in GDP than the unemployment of females. Furthermore, findings differ on the country´s specifics with higher sensitivity in countries with lower economic performance.

Keywords: Okun´s Law, unemployment, economic growth

JEL classification: E24, E32

1. INTRODUCTION

The relationship between output and unemployment has become known as Okun´s Law (Okun, 1962, p. 99). This basic law of economics considers the economic growth as the main and only factor of changes in unemployment. In Okun´s original statement, 3% increase in output corresponds to a 1% decline in the rate of cyclical unemployment. Over the years Okun´s Law has been revised so that a one point increase in the cyclical unemployment rate is associated with two percentage points of negative growth in real gross domestic product (GDP). The relationship varies depending on the country and time period under consideration. In literature we can find some representative studies focused on demographic characteristics of the relationship between output and unemployment. The shocks to output may not impact unemployment rates equally across age, race and gender.

Several studies present statistical evidence of gender differences in unemployment due to the business cycle (Queneau and Sen, 2008; Peiro *et al.*, 2012). Lynch and Hyclak (1984) find that unemployment rates of men, teens and non-whites are more sensitive to output deviations from its full employment level. They also find that the unemployment rate of

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non-white teenagers fall in the current period, while the unemployment rates of the other groups react with a lag. Belaire-Franch and Peiró (2015) using nonlinear Markov switching regime model observed, that the male unemployment is much more sensitive to business cycle than female unemployment and this statement is observed more in UK than in the US. The response of male unemployment is almost double than of female unemployment in expansions, and more than double in contractions. Bisping and Patron (2005) examined the degree to which the cyclical nature of unemployment might vary across race and gender groups using VAR models. They also find that demographic groups do not experience a similar response and males are generally more responsive to shocks than females.

Hutengs and Stadtmann (2014) show that young people in Scandinavian countries are predominantly and significantly more exposed to business cycle fluctuations than older ones. This especially holds for the male population. According to their study, the recent economic crisis led to a strong gap between male and female youth unemployment, caused by a much sharper increase in the male unemployment rate. Furthermore, the male Okun´s coefficients are significantly higher than female ones and the unemployment changes of women are not so well explained by GDP growth only. Ewing *et al.* (2002, 2005) and Hotchkiss and Robertson (2012) argue that the female participation decisions are more dependent on changes in labour market conditions, and this could explain why female unemployment is less affected by cyclical shocks. The different behaviour could also lie in the fact that women are less likely to be laid off than men.

The purpose of this study is therefore to examine the possibly asymmetric relationship between changes in output and gender specific unemployment rates by estimating Okun´s coefficients for all countries of the European Union (EU) and selected groups of countries with similar characteristics. To achieve this we have specified two hypotheses. First, the unemployment of males is more sensitive to changes in GDP than the unemployment of females. Second, the impact of the GDP changes on the unemployment of males and females is more visible in EU countries with lower economic performance due to higher gap between real and potential product. Section 2 provides a general description of the data and methodology. Section 3 discusses the regression approach and results. Section 4 concludes.

2. DATA AND METHODOLOGY

To estimate the relationship between an economic performance and unemployment, the Okun´s Law is an adequate theoretical background. As known, we may express this relationship by three different approaches as given by Knotek (2007).

Firstly, the difference version, where:

*the change in the unemployment rate = a + b * growth of real output*

This is expressed as:

$$\Delta UR_t = a + b * gGDP_t \quad (1)$$

Second is the gap version giving the level of unemployment by gap of output that is:

*unemployment = a + b * gap between actual and potential output*

or:

$$UR_t = a + b * GDPgap_t \quad (2)$$

Third version is the dynamic approach that assumes the relationship between the change of unemployment and economic growth in present and previous period, as well as the change of unemployment in previous period. Then, dynamic version is given by following equation:

$$\Delta UR_t = a + b * gGDP_t + c * gGDP_{t-1} + d * UR_{t-1} \quad (3)$$

We have used the sample of EU28 countries for period 2000 – 2013, e.g. 14 periods in annual base. Furthermore, we have analysed selected groups of countries, which are the core countries, north countries, countries PIIGS and the Visegrad group (V4) countries. The reasons for selection of these groups are particular economic features, geographical location and similar historical and cultural development. Selected groups of countries represent the diversity of the EU. The core and north countries we consider to be more developed and the PIIGS and V4 counties we supposed to have lower economic performance. The core countries represent the major EU economies – Germany, France and Great Britain. Analysis continues with north countries. These represent welfare states with outstanding social system and stable economic and political environment. That includes Scandinavian countries – Finland and Sweden; and one of most developed EU and world country – Denmark. PIIGS countries are Portugal, Italy, Ireland, Greece and Spain. These countries are characterized by substantial instability of their economies mainly in period after the 2008 financial crisis. According to our hypotheses we suppose that unemployment in these countries is more volatile, particularly in male unemployment that is sensitive to cyclical development. The last group are V4 countries, sc. Czech Republic, Hungary, Poland and Slovakia. These new member countries of the EU are catching up the EU15 countries by nominal and real convergence. We expect a large change of male and female unemployment rate as a result of cyclical development of these economies.

3. RESULTS

Although we have introduced three versions of Okun´s Law, their results are very similar. Due to this, analysis covers only the first introduced - difference version. We start the analysis with the run of panel regression with fixed effects for EU 28 countries, followed by regressions with using data of unemployment for males and females separately. Further, we have made the same regressions for specified groups of countries. The results of estimation with dependent variable unemployment rate for entire population and by genders are listed in the following tables.

Table no. 1 – Estimation result of Okun´s Law for EU 28 and selected group of countries – total unemployment

unemployment rate – total [ΔUR_{it}]

	EU28		core countries		north countries		PIIGS		V4	
const	0.821452 (0.0706137)	***	0.274528 (0.123129)	**	0.329169 (0.128961)	**	1.11693 (0.153045)	***	0.607638 (0.237403)	**
$gGDP_{it}$	-0.334277 (0.0176435)	***	-0.232369 (0.0514155)	***	-0.206189 (0.0424242)	***	-0.447090 (0.0460503)	***	-0.278777 (0.0551184)	***
R^2	0.558840		0.390676		0.432193		0.631254		0.413566	

- dependent variable in square brackets
- standard errors in parentheses
*- ***, **, * - statistical significance on 1%, 5%, and 10% level*

Results of the analysis are as the same as we have expected. We have found out the existence of disparity in unemployment development, respectively unemployment changes due to changes in economic growth between genders. Analysing the Okun´s Law, it is valid and significant in EU countries as well as in core, north, PIIGS and V4 countries. Obviously, the Okun´s coefficients should gains higher values coming out from higher level of unemployment in developing economies as well as from higher rates of economic growth. 1% GDP growth thus might cause the larger change in unemployment rates for whole population, as well as for males and females.

Firstly, we have analysed the validity of Okun´s Law for entire EU and groups of countries considering total unemployment. The coefficients and constants of difference version are significant and might be interpret as follows. Constant reflects the change in unemployment in case of zero GDP growth. In all run panel regression is the constant positive, i.e. stagnation causes the rise in unemployment rate. It can be described as a result of technological changes, factor substitution, productivity or labour growth. However, as assumed, the constant differ among the analysed countries. Its higher value is in PIIGS countries, followed by V4 countries. Thus, the rise in unemployment rate is the largest in less developed countries. Under the zero GDP growth, unemployment rate rise in PIIGS countries by 1.12 percentage points. Unemployment rate in the V4 countries would rise in such situation by 0.61 percentage points, while only 0.27 or 0.33 percentage points in core, respectively north countries. The growth in unemployment rate, if analysing the all EU28 countries under the zero growth (stagnation) is 0.82 percentage points.

The GDP growth results in declining unemployment rate. As seen, the negative coefficients of gGDP have proved such assumption. The 1% of economic growth thus decreases unemployment by the percentage points given by analysis. The higher decline in unemployment is in PIIGS countries, i.e. the 1% GDP growth causes the decline in unemployment rate by 0.45 percentage points. Okun´s coefficients for core, north and V4 countries are almost similar; differ only from 0.21 percentage points in north countries to 0.28 percentage points in V4 countries. Analysis of EU28 data gives the result of 0.33 percentage points of fall in unemployment rate caused by 1% of economic growth. As results show, the higher volatility in unemployment rate is in PIIGS countries. The development of unemployment rate in PIIGS countries largely depends on economic performance. On the other hand, unemployment rate is more stable in core and north countries with smaller reaction on economic performance.

Table no. 2 – Estimation result of Okun´s Law for EU 28 and selected group of countries – unemployment of males

unemployment rate – males [ΔURm_{it}]

	EU28		core countries		north countries		PIIGS		V4	
const	0.991041 (0.0809342)	***	0.402369 (0.132828)	***	0.459150 (0.150515)	***	1.28009 (0.163401)	***	0.664052 (0.243949)	***
$gGDP_{it}$	-0.392276 (0.0202221)	***	-0.288142 (0.0554653)	***	-0.279374 (0.0495149)	***	-0.470842 (0.0491665)	***	-0.303557 (0.0566382)	***
R^2	0.567361		0.447934		0.485350		0.622876		0.433337	

- dependent variable in square brackets
- standard errors in parentheses
*- ***, **, * - statistical significance on 1%, 5%, and 10% level*

Further analysis focuses on gender differences in unemployment rates of males and females as reaction on changes in GDP growth. The assumption we try to prove is that unemployment of males is more volatile than unemployment of females (or unemployment of females is more stable). This is caused due to higher proportion of males working in more cyclical industries (manufacturing, electronics, etc.). On the other hand, females usually work in industries with lower or any reaction on business cycles such as education or health services and their employment depends on other features of labour market and economy.

Table no. 3 – Estimation result of Okun´s Law for EU 28 and selected group of countries – unemployment of females

unemployment rate – females [ΔURf_{it}]

	EU28		core countries		north countries		PIIGS		V4	
const	0.623492 (0.0722170)	***	0.120985 (0.123620)		0.173717 (0.128983)		0.877979 (0.166709)	***	0.510009 (0.252345)	**
$gGDP_{it}$	-0.271847 (0.0180441)	***	-0.162535 (0.0516202)	***	-0.117179 (0.0424317)	***	-0.420612 (0.0501618)	***	-0.239982 (0.0585876)	***
R^2	0.450552		0.273612		0.262047		0.566677		0.335657	

- dependent variable in square brackets
- standard errors in parentheses
*- ***, **, * - statistical significance on 1%, 5%, and 10% level*

Firstly, consider the unemployment of males. Results of panel regressions show the significance of constants and Okun´s coefficients in entire EU sample, as well as in selected group of countries. However, to compare with total unemployment, constants attain higher value. The same with negative numbers occurs in values for Okun´s coefficients. Stagnation in economic growth causes the growth of male´s unemployment by 1.28 percentage points in PIIGS countries and only 0.40 percentage points in core countries. These changes are higher in comparison with analysis of total unemployment that includes both genders. To explain the Okun´s coefficients for analysis of male´s unemployment, 1 percentage points of GDP growth decreases the unemployment of males by 0.47 percentage points in PIIGS countries and by 0.29, 0.28 and 0.30 percentage points in core, north and V4 countries, respectively. Results show the higher volatility of male´s unemployment due to economic growth. The difference between Okun´s coefficient for total unemployment and unemployment of males is not higher than 0.07 percentage points (in case of north countries) and constant is higher no more than 0.16 percentage points (in case of PIIGS countries). Although these results show only small difference between total and males unemployment reaction on GDP growth, it is multiplied by the size of growth. Thus, the higher economic growth, the more obvious is this difference. Further, even small percentage difference in unemployment rates represents a high number of confined workers measured in absolute terms. To continue on analysis of Okun´s Law for female unemployment, results shows the insignificance of constant in core and north countries, that means the most developed countries. PIIGS and V4 countries' constants are significant with lower values when compare to analysis of total unemployment. Further on, the GDP growth contribution to decrease the unemployment of females is lower than in total unemployment. Okun´s coefficient is the lowest in case of north countries, followed by core and V4 countries. Its higher value with a relatively high margin is in PIIGS countries, where the 1% increase in economic performance causes the decline in unemployment rate by 0.42 percentage points,

while it is only 0.12 percentage points in north countries. To compare with total unemployment, Okun´s coefficients differ no more than 0.09 percentage points that is the case of north countries. The lowest difference is in PIIGS countries (0.02 percentage points) and V4 countries (0.04 percentage points).

To analyse the gender differences, we use the Okun´s coefficients for unemployment of males and females. According to coefficients, the 1% GDP growth causes the highest decline in unemployment in PIIGS countries, followed by V4, core and north countries in total, male, as well as in female unemployment. The important result is given by the comparison of Okun´s coefficients for same group of countries in male and female unemployment analysis. The lowest difference between coefficients for males and females are in PIIGS countries with difference only 0.05 percentage points, followed by V4 countries (0.06 percentage points). The highest difference is in north countries (0.16 percentage points) and core countries (0.13 percentage points). These results indicate that the highest gender diversity in change of unemployment as a reaction to GDP growth is in most developed members of EU countries. The reason may be a high average income, a high social security for women or an income effect of wages.

The results, as we have described it, have proved the differences between genders. However, the small difference in Okun´s coefficient does it just slightly. We assume, the difference might be seen more obvious by interpretation of results in charge of the growth that is necessary for the fall in the unemployment rate by 1 percentage point. Such growths are in following table.

Table no. 4 – The economic growth necessary for 1 percentage point decline in unemployment rate (according to estimation of Okun´s coefficient; in %)

gender/countries	EU28	core countries	north countries	PIIGS	V4
total	2.99	4.30	4.85	2.24	3.59
male	2.55	3.47	3.58	2.12	3.29
female	3.68	6.15	8.53	2.38	4.17

Note: Estimated growths consider Okun´s coefficients and assume the hysteresis in labour market (that is, constant does not enter the calculation formula)

The growth necessary for fall in unemployment by 1 percentage point has divided the countries into two groups. The most developed - core and north countries require a higher growth in order to decrease unemployment rate. Also, gender differences are evident. To decrease the male unemployment, the growth has to be approximately 3.5%, but it has to be more than 6% in core countries and even more – 8.53% in north countries for females. On the other hand, PIIGS and V4 countries require lower economic growth and have not such different results for genders. Almost the same result for genders is clear in PIIGS countries. Here, the difference between the growths is only 0.26 percentage points. A little higher difference is in V4 countries (0.88 percentage points). To compare, in core and north countries, the difference is 2.68 percentage points, respectively 4.95 percentage points. To conclude, the difference between the growths necessary to decrease male and female unemployment by 1 percentage point for EU28 countries is 1.13 percentage points.

4. CONCLUSIONS

The relation between economic growth and unemployment is well known macroeconomic phenomenon. For that reason it is in interest of many economists in various forms and specifications. The paper deals with the estimation of the GDP change impact on the gender specific unemployment for the whole EU and separately for selected groups of countries with similar characteristics – core countries, north countries, countries PIIGS and V4 countries. Economic growth influences unemployment of males and females differently. Reaction of male unemployment is steeper, while it is more modest in case of females. Thus, response of male unemployment to business cycle is more evident. Okun´s coefficients in analysis confirm this assumption. In all EU countries and selected groups, Okun´s coefficients for male unemployment are higher in absolute term. With respect to results, we have accepted the first hypothesis that unemployment of males is more sensitive to changes in GDP than unemployment of females. Such result is not surprising. Males more often occupy vacancies in sectors very sensitive to business cycle as manufacturing, construction or electronics. On the other hand, females are usually employed in stable sectors of economy such as administration, health care or education.

To be more precise, we have analysed the difference between reaction of male and female unemployment in selected groups of countries. The highest spread of Okun´s coefficients for male and female unemployment is in the group of north countries, followed by the group of core EU countries. To the contrary, the spread in PIIGS and V4 countries is less than the half of the spread in countries with better economic performance. The reaction of males and females unemployment is very similar in countries with lower economic performance, while it differs in more developed countries.

Furthermore, the paper deals with comparison of results between selected groups of the EU countries with better and lower economic performance. The question that has arisen is if the GDP changes influences more group of core and north countries or the PIIGS and V4 countries. Due to results presented in section 3, we have accepted the second hypothesis. The impact of the GDP changes on unemployment of males and females is more visible in the EU countries with lower economic performance. Thus, these countries have to be more attentive to changes in economic performance. The same decrease of their GDP as in core or north countries causes the higher increase in unemployment rate. Such situation was obvious mainly in PIIGS countries after the 2008 financial crisis has arisen. To compare, the increase of unemployment rate in core and north countries was lower.

The results point out on the gender differences in unemployment reaction on GDP growth in the European Union with the higher divergence between most developed EU countries (core and north countries) than in case of less developed EU members (PIIGS countries and V4 countries).

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