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Unemployment and Economic Growth of European Union: a Panel Data Analysis

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Abstract

This study presents the new regression estimates of the relationship between unemployment and economic growth for 13 selected European Union member countries over the period 1993-2012. Pooled OLS and Fixed effect techniques are used to analyze the panel data for measuring group effects, individual country effects, and time effects while exploring the relationship between unemployment rate and economic growth. Results demonstrate that higher unemployment rate has significant negative impact on GDP per capita (a proxy for economic growth). The results also investigated that economic growth seems to be significantly affected by Internet users and Military expenditures. Based on results the author has concluded that reduction in unemployment rate would be a better option for more and sustained economic growth and also improving the welfare of the people.

Keywords: unemployment, economic growth, panel data, fixed effect model, EU.

1. Introduction

European Union has achieved a well-built position with one voice by acting together on the global state rather than with 28 disconnected strategies. They have more than 505 million populations. EU is a single largest market of the world with transparent rules and regulations and also secures the legal investment framework. But, EU labor markets are characterized by pervasive unemployment and underemployment. EU member countries not only vary in sizes but they also have different nature and structure of population which is still changing qualitatively and quantitatively. Economic growth, development and low level of unemployment are dreams for every economy. As man has constantly investigated to develop his material state through effectual use of tangible and intangible resources, such as improving growth and development, low level of unemployment, price stability, and stable currency value etc. unemployment is a continuing concern for every economy. Economic growth is driven by country's structural changes. Structural changes can not contribute in economic growth and development if social costs for structural changes are high and one of them is persistent unemployment.

Unemployment rate has negative consequences for the economic well-being of human being (Levine, 2012). According to ILO population report in 2012, number of unemployed individuals in the world has increased by 4 million in 2012 with total reaching to 197 million, in 2013 unemployment will reach up to 5.1 million and further more 3 million people will be jobless in 2014. After five years of world financial crisis, economic growth has decelerated also with a rise in unemployment. It is an economic reality that country's qualitative and quantitative nature of workforce directly impacts its GDP per capita. Workforce of any country is not only a productive agent of goods and services but these also play a role in country's purchasing power which in-turn is a fuel for the economy. So the degree to which persistent unemployment influence the economic growth of EU region needs to be investigated.

Low level of unemployment and stable economic growth are main objectives of every economy. The author has critically reviewed some of important empirical researches, which are providing the evidence for literature review.

Osinubi (2005) explore the possibility of relationship among unemployment, poverty and economic growth. The results have been found by using multi-equation model by collecting the time series data for 31 years from 1970 to 2000. He concluded that increase in employment will lead to increase the output and hence cause economic growth. On the other hand, a decrease in employment rate will decrease the output and then economic growth. Blanchard (2006) conducts the study about European unemployment on evolution of facts and ideas. From survey reports, he found that European Unemployment started to increase in 1970s; further increased in 1980s and it reached a plateau in 1990s and is still high. He considered the 30 years data from 15 European countries and found that total factor productivity growth started to decline.

Wang & Abrams (2007) constructed a simple model of government outlays, growth and unemployment, by taking data of 20 OECD countries during recent three decades started from 1970 to 1999. They examined that the negative relationship between unemployment and growth is due to another cause called government outlays. Adjemian *et al.* (2010) examine the relationship that how labor market institutions affect unemployment and then economic growth. The data set covers 183 European regions and period from 1980 to 2003. They show that high labor costs and trade union power lead to higher unemployment rate and lower economic growth rate. Ahmed *et al.* (2011) explore the relationship among unemployment and growth (GDP) of Nigerian Economy, by taking the secondary data for just 9 years from 2000 to 2008. They used regression techniques and showed that unemployment effect is 65.5 percent on the Nigerian GDP growth and there exist a negative relationship between unemployment and economic growth. Stephen (2012) explored the relationship between urban unemployment crisis on economic growth of Nigerian economy, also combining with inflation rate and investment level. Estimates showed that there exists a negative relationship between urban unemployment and economic growth. Stephen suggested that integrated vocational training programs and economic activities toward self-reliance and self-employment should be encouraged so that the unemployment rate can be minimized.

2. Data Description and Methodology

EU consists of 28 member countries but data is taken only for 13 member countries. For best explanation of the relationship between the unemployment rate and economic growth only those countries are selected who have membership before 1996 except Luxemburg because it is performing as an outlier.

Data set consists of 20 years period from 1993 to 2012. The observed data was time series as well as cross section data that were converted to panel data.

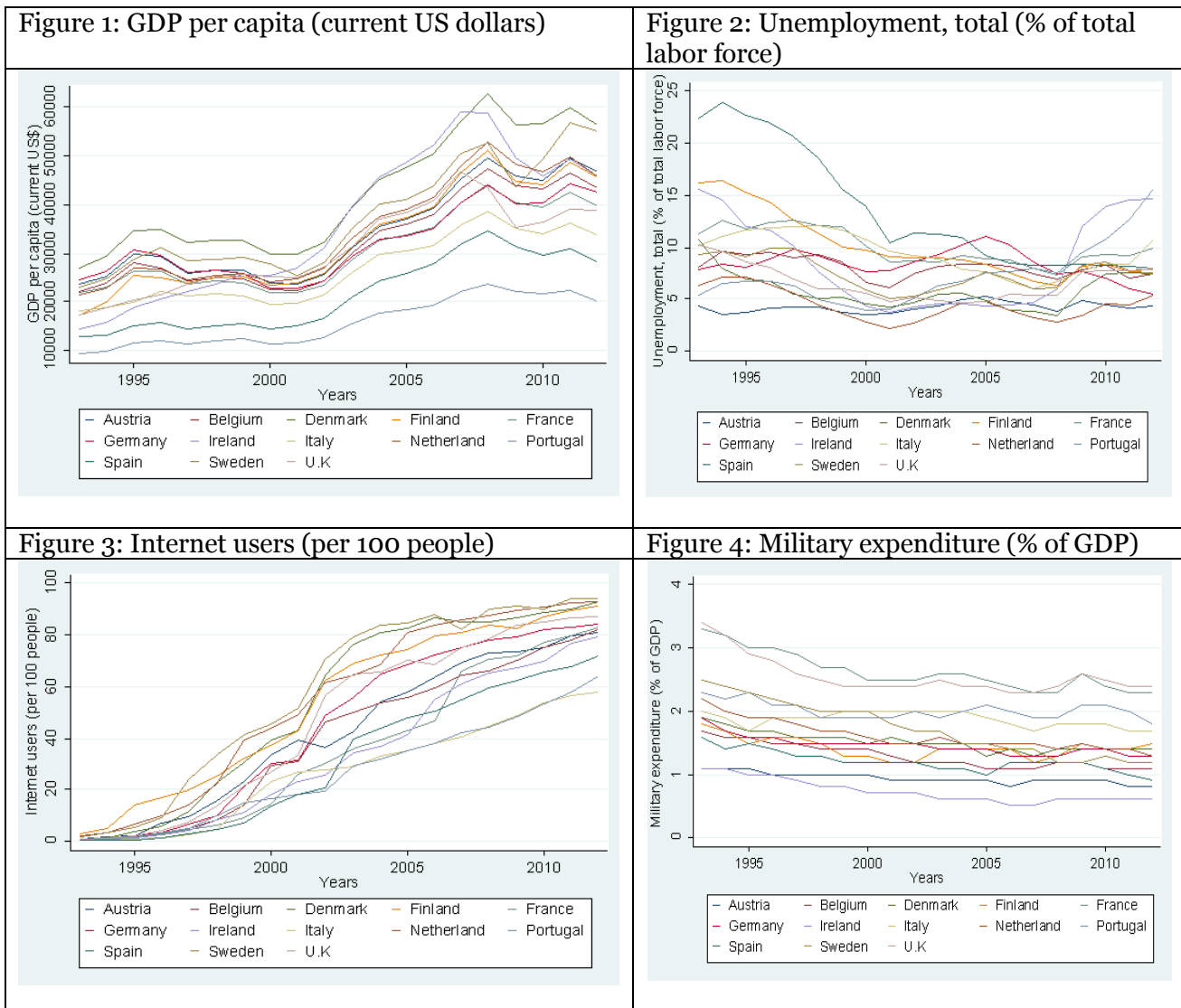
Table 2.1 Descriptive Statistic

Variables	Mean	Std. Dev.	Minimum	Maximum	Observations
GDPPC	31418.12	11569.99	9407.46	62596.49	260
UEM	8.03	3.59	2.10	23.90	260
IU	42.13	31.27	.12	94.00	260
ME	1.62	.58	.53	3.42	260

1. Source: World Bank Development Indicators.

2. Notes: GDPPC = GDP per capita (current US\$), IU = Internet users (per 100 people), UEM = Unemployment, Total (% of total Labor Force), ME = Military expenditure (% of GDP)

Table 2.1 provides the descriptive statistics about data. Total number of observations were 260 because there are thirteen countries (n=13) and twenty years time period (t=20) so $n \times T = 13 \times 20 = 260$. Here, GDP per capita is a dependent variable. Graphical presentation for unemployment, growth, internet users and military expenditure are presented in figure 1 to 4.



The methodology adopted for this research is empirical an experimental. The research study has aim to observe whether unemployment rate has significant impact on economic growth for thirteen selected EU member countries. Research study model after including other explanatory variables, the model is as follows:

$$GDPPC_{it} = f(UEM_{it}, IU_{it}, ME_{it}, ...) \dots (i)$$

Where,

$GDPPC$ = GDP per capita (current US dollars)

IU = Internet users (per 100 people)

UEM = Unemployment, Total (% of total Labor Force)

ME = Military expenditure (% of GDP)

Here, ‘i’ shows individual country effects and ‘t’ shows time effects in explanatory variables and the assumption of U_{it} is that $U_{it} \approx IID(0, \sigma_u^2)$, i.e. errors are independently identically distributed with zero mean and stable variances.

3. Results and Discussion

After conducting the panel data analysis and choosing between Random Effect Model and Fixed Effect Model, the Hausman (1978) test is used which favors for FEM. The adopted data analysis is distributed in three sections. First: Group effects with constant slope coefficient, second: Individual country effects with constant slope coefficient, third: time effects with constant slope coefficients.

3.1 Group Effects with Constant Slope Coefficient

The results for group effects with constant slope coefficients are presented in table 3.1. Concluded fact is that null hypothesis cannot be rejected that unemployment does not explain the GDP per capita for selected thirteen EU member states.

Table 3.1: Pooled OLS Results for period 1993-2012. DV is GDP per capita (current US dollars)

	<i>Model-1a (Pooled OLS)</i>	<i>Model-1b (Pooled OLS)</i>	<i>Model-1c (Pooled OLS)</i>
<i>UEM</i>	-1208.11***	-342.08***	-329.32***
<i>IU</i>		286.27***	273.87***
<i>ME</i>			-2485.23***
<i>Intercept/Constant</i>	41114.62***	22103.08***	26544.94***
<i>F Test</i>	42.16***	257.42***	182.35***
<i>R²</i>	.14	.67	.68
<i>Adj. R²</i>	.13	.66	.67
<i>Obs.</i>	260	260	260

***, **, and * represents significance level at 1%, 5% and 10% respectively.

Unemployment rate is consistently negatively correlated to GDP per capita in all models and models are statistically significant. Here, Internet users are positively correlated and military expenditures are negatively correlated to GDP per capita. In Model-1a, one unit increase in unemployment will cause to reduce 1208.11 units in GDP per capita, holding all other variables constant. A goodness of fit measure R^2 is increasing with the addition of more explanatory variables that means included variables are going to response more for better explanation of the model. Adjusted R^2 of .67 in Pooled OLS Model-1c means that this model accounts for 67 percent of total variation in GDP per capita for thirteen selected EU member countries.

3.2 Individual Country Effects with Constant Slope Coefficients

Table 3.2 presents the results by using Least Square Dummy Variables (LSDV) a technique of Fixed Effect Model (FEM). The research study examines the country effects by introducing country dummy variables. There are thirteen countries and we have only introduces twelve dummies to prevent from dummy variable trap. There is no dummy for Austria, as Austria is a comparing country. Akbar *et al.* in 2011 used Pakistan as a comparison country.

Each country dummy intercepts has deviation from its group specific intercept that baseline intercept (intercept for Austria). These differences in country’s intercept are due to the unique features of managerial talent or managerial style etc.

Table 3.2: FEM Results for period 1993-2012. DV is GDP per capita (current US dollars).

	<i>Model-2a (Fixed Effect)</i>	<i>Model-2b (Fixed Effect)</i>	<i>Model-2c (Fixed Effect)</i>
<i>UEM</i>	-1207.78***	- 106.49***	-91.76***
<i>IU</i>		275.26***	270.18***
<i>ME</i>			- 985.21***
<i>Dummy for Belgium</i>	42376.44	22526.65	23893.54
<i>Dummy for Denmark</i>	49430.26***	28172.21***	29869.03**
<i>Dummy for Finland</i>	45313.73*	19435.36**	20966.48*
<i>Dummy for France</i>	42841.18	22025.37	24646.3
<i>Dummy for Germany</i>	42346.09	20749.04	22302.36
<i>Dummy for Ireland</i>	46464.43**	27543.9**	28316.18**
<i>Dummy for Italy</i>	38208.21	20339.44*	22174.74
<i>Dummy for Netherlands</i>	40022.02	20181.05*	21987.01
<i>Dummy for Portugal</i>	24715.59***	9317.15***	11341.76***
<i>Dummy for Spain</i>	38079.31	14430.65***	15576.28***
<i>Dummy for Sweden</i>	46366.19**	22034.90	23919.71
<i>Dummy for U. K</i>	38891.23	18786.66***	21456.87
<i>Intercept(baseline or dummy for Austria)</i>	39400.47***	23248.94***	24335.99***
<i>F Test</i>	12.46***	83.61***	77.79***
<i>R²</i>	.40	.83	.83
<i>Adj. R²</i>	.37	.82	.82
<i>Obs.</i>	260	260	260

***, **, and * represents significance level at 1 %, 5 % and 10 % respectively.

3.3 Time Effects with Constant Slope Coefficients

Results for Fixed Effect Model have been presented in table 3.3. The overall conclusion from table 3.3 is that GDP per capita function, a proxy for economic growth for thirteen selected EU member countries have changed due to explanatory variables effects and time effects also. In all three models, individual time dummies were individually statistically significant which suggest that GDP per capita have changed much over a time. Again for time effects, time dummies are introduced, which are only nineteen time dummies, to prevent from dummy variable trap. 1993 have no dummy because 1993 is a comparison time period.

Table 3.3: FEM Results for period 1993-2012. DV is GDP per capita (current US dollars).

	<i>Model-3a (Fixed Effect)</i>	<i>Model-3b (Fixed Effect)</i>	<i>Model-3c (Fixed Effect)</i>
<i>UEM</i>	- 863.10***	-553.45***	-550.21***
<i>IU</i>		318.71***	312.18***
<i>ME</i>			- 2920.38***
<i>Dummy value for time 1994</i>	30243.79	26404.09	32104.79
<i>Dummy value for time 1995</i>	33268.04*	29086.38*	34473.84
<i>Dummy value for time 1996</i>	33657.15*	28815.60	34134.44
<i>Dummy value for time 1997</i>	31620.33	25804.65	30961.39
<i>Dummy value for time 1998</i>	31586.12	24379.06	29376.92
<i>Dummy value for time 1999</i>	31025.83	21763.27	26694.09**
<i>Dummy value for time 2000</i>	28461.19	17228.36***	22087.03***
<i>Dummy value for time 2001</i>	27881.31	15314.89***	20114.40***
<i>Dummy value for time 2002</i>	30328.43	14313.63***	19150.24***
<i>Dummy value for time 2003</i>	36176.38***	32675.52***	22477.46***
<i>Dummy value for time 2004</i>	40774.70***	20689.49	25541.85**
<i>Dummy value for time 2005</i>	42097.34***	20817.65	25578.75**
<i>Dummy value for time 2006</i>	43867.16***	21438.75	26132.90*
<i>Dummy value for time 2007</i>	48924.57***	25356.34	29973.93
<i>Dummy value for time 2008</i>	51658.14***	27102.35	31837.82
<i>Dummy value for time 2009</i>	48002.73***	22205.44	27167.00
<i>Dummy value for time 2010</i>	48095.03***	21182.51	26022.84*
<i>Dummy value for time 2011</i>	51356.05***	23543.53	28202.10
<i>Dummy value for time 2012</i>	49215.11***	20523.69	25107.31*
<i>Intercept(baseline or dummy value for time 1993)</i>	28662.03***	25123.61***	31129.34***
<i>F Test</i>	24.28***	39.36***	41.94***
<i>R²</i>	.67	.78	.80
<i>Adj. R²</i>	.64	.75	.78
<i>Obs.</i>	260	260	260

***, **, and * represents significance level at 1%, 5% and 10% respectively.

4. Limitations and Future Findings

In policy implication terms, causes of unemployment should also investigated, which will also closely linked with the question of reduced unemployment. Analysis presented in the study is complete and comprehensive but still there are some limitations causing further suggestions for future research. First: analysis covers only thirteen EU member countries, further analysis can also be conducted for all EU member countries, second: as main explanatory variable is unemployment that have different causes for different EU member countries which needs to be explored in depth.

5. Conclusion

Panel data for thirteen EU member countries is selected to capture group effects, individual country effects and time effects of unemployment on GDP per capita, a proxy for economic growth.

The research study consistently found that high unemployment rate causes to decrease in economic growth. Growth of EU member countries is negatively influenced by unemployment rate. All in all, research study supports the view that there is scope for developed as well as for developing countries. Research conclusion underlines that increased unemployment rate decreases the economic growth and welfare of the people.

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