AN EXAMINATION OF OKUN'S LAW: EVIDENCE FROM EUROPEAN TARGET COUNTRIES

Mattoscio Nicola
University of Chieti-Pescara, Italy Department of Quantitative Methods and Economic Theory

Bucciarelli Edgardo
University of Chieti-Pescara, Italy Department of Quantitative Methods and Economic Theory

Odoardi Iacopo
University of Chieti-Pescara, Italy School of Advanced Studies, Doctorate of Philosophy, XXIV cycle

Persico Tony Ernesto
University of Chieti-Pescara, Italy School of Advanced Studies, Doctorate of Philosophy, XXVII cycle

In this paper Okun's law is tested for six European selected countries in order to compare the responsiveness of unemployment to economic growth over the period 1981-2010. In the first section there is a survey of scientific works that have observed the empirical relationship between growth and unemployment. The countries selected are representative of different socio-economic contexts today existing in Europe, i.e. EU member countries, countries that adopt the Euro, and others which are candidates to join the EU or that although EU members have chosen not to adopt the Euro. Finally, we also refer to the U.S. and Canada, which are country-systems where the regularity of Okun's rule of thumb was conceived. In particular, we intend to represent the data of the macroeconomic variables GDP and unemployment rate in their annual variations for a time series sufficiently long to show the occurrence of the supposed regularity, and then to investigate specific cases, which represent changes compared to the expected variations. In addition to any changes occurred over time in the studied relationship, these empirical observations, along with the reported literature, will help to draw conclusions about the differences regarding the inflexibility and responsiveness to changes in the aggregated output by the labor market of the countries involved in the study.

1. Introduction

The Okun's law is the specific empirical regularity between the unemployment rate and the rate of growth of output formulated by Arthur M. Okun in 1962, which enabled him to find an achievable solution to the difficult problem of estimating an economy's potential output given the actual unemployment. This dependable relationship, although not based on any strong economic reasoning and not a structural feature of the economy, has held up well within the appropriate range of unemployment rates and it can also be exploited in modern global markets both to evaluate the responsiveness of unemployment to economic growth and to study the national labor market performances. Indeed, already from the original work, Okun did not fail to highlight how the labor market structure could corroborate or affect the validity of the estimated relationship. In particular, in Okun's thought, there are three variables that may arise in relation: the degree of participation in the labor market, the number of hours worked per employee and the productivity of labor. In this context, European countries are facing, among other issues, the challenge of the globalization process and are coping with the increasing competition from both the emerging competitors and big international players such as the United States, which, despite having generated the current economic and financial crisis, have been able to tackle, better than other

country-systems, the imbalances arising from the crisis, returning to grow also due to the structure of their labor market. From this point of view, on average the European Union (EU) is characterized by a higher inflexibility of the labor market. However, the EU consists of a set of countries that are only gradually being harmonized by the legislative standpoint and slowly from the socio-economic perspective. For this reason, there is still not a single definable economic standard as European, but there are still both really different and specific macro-regional social and economic dynamics.

The structure of the paper is as follows. Next section provides a review of the literature on Okun's law. The proposed operational framework is presented in section 3. Section 4 concludes, providing some findings and implications.

2. Related literature

Okun's formulation of the empirical regularity has-been tested in several studies over time, which have, *inter alia*, proceeded to re-determine for many countries the range of variation of the two variables directly involved, the GDP growth rate and the rate of unemployment (among the many contributions, see for example Smith 1975, Gordon 1984, Knoester 1986, Kaufman 1988, Prachowny 1993 and Weber 1995). Confirmations have been obtained by the law under investigation, although with obvious differences in the coefficients that regulate the relations between the two variables. In particular, the most responsiveness of employment levels has been observed in Anglo-Saxon countries, especially the United States and Canada. Nevertheless, the European area, mainly the EU-15, is mentioned in economic literature as a case of greater structural inflexibility of the labor market, largely due to the higher government guarantees applied to employed workers. Therefore, in many European countries there is a tendency for lower growth of the unemployment when there is simultaneously a period of economic recession; but at the same time, when the GDP rises again is not registered a strong increase of employment, given that production units cannot subsequently and rapidly reduce the labor inputs per unit of output. Moreover, there are studies based on the asymmetry of the Okun's empirical regularity (see, among others, Silvapulle *et al.*, 2004) claiming that the influence of positive changes of economic growth on unemployment is different from that concerning the negative changes. This asymmetry is observed in this work particularly in the light of the empirical evidence related to those EU countries considered in our analysis.

3. Operational framework: analysis of the European context

Following Okun's law, we investigate the occurrence of, and models for estimating, the empirical relevance given by the relationship between economic growth and unemployment fluctuations for six EU select countries during the last thirty years: Germany, a key State for the birth and economic stability of the European Union; Italy and Spain, since they are two economies belonging to the Mediterranean macro-region, which represent different economic production structures; United Kingdom, EU member which has deliberately chosen not to adopt the Euro; Romania as a candidate for the Euro Area; Croatia which instead will enter the EU with effect from July 2013. Finally, to this analysis we add the two countries which can be considered as a benchmark in this study type, namely the U.S. and Canada, since they are national contexts in which the relationship discovered by Okun should be stronger. The variables considered are the annual change in percentage of Gross Domestic Product (US$ constant prices) and annual variation of the unemployment rate (percent of total labor force) on IMF data from 1981 to 2010 (2012).
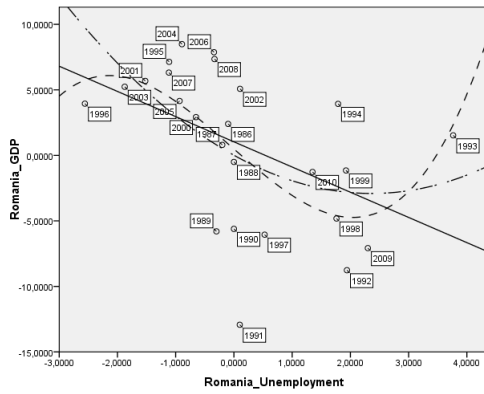
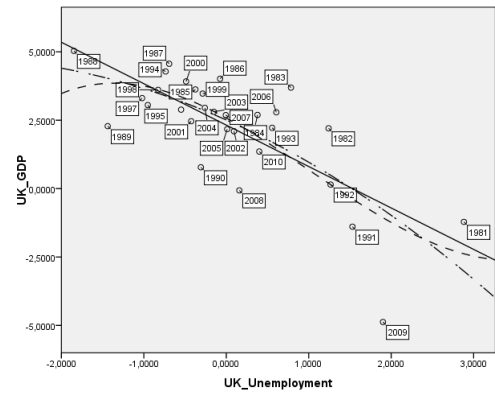*Germany (1981-2010)*   *United Kingdom (1981-2010)*
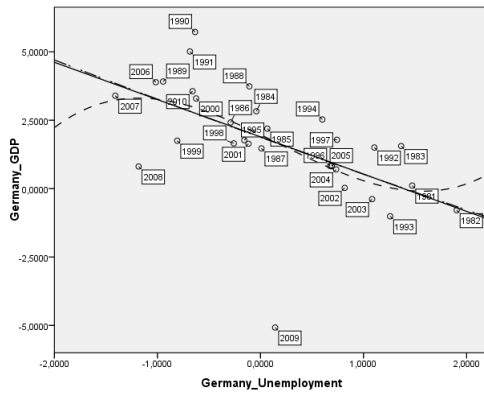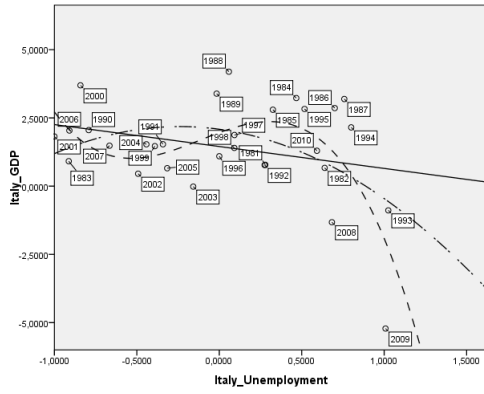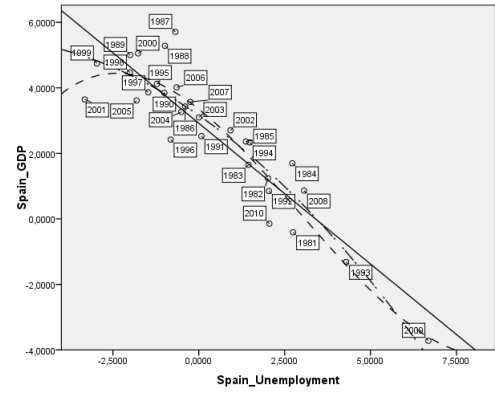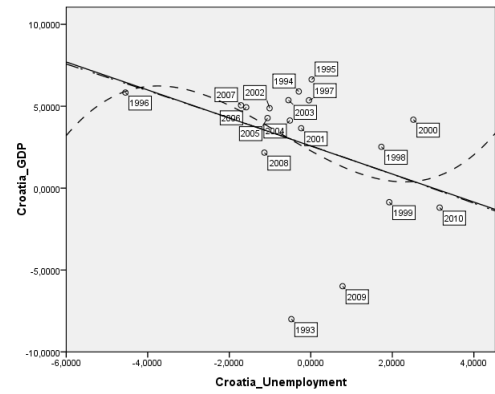
Italy (1981-2010)

Spain (1981-2010)

Romania (1986-2010)

Croatia (1993-2010)

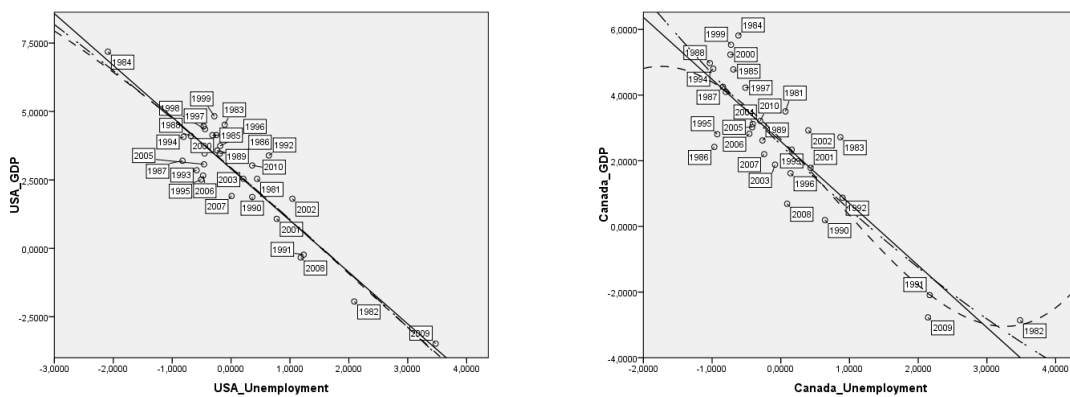*U.S. (1981-2010)*

Canada (1981-2010)

239

Figure no 1 - Data representation of the percentage annual variation in the unemployment rate and the GDP (over the period from 1981 to 2010); graphical representation of the estimation models of dependence (elaborations made by the authors on IMF data, 2012).

In the previous graphs we show the time series for each EU member, where each point represents the combination of the annual variation in GDP and the corresponding variations in the unemployment rate (U_t–U_{t-1}). In each of the graphs, three models are considered for estimating the dependence, linear (continuous line), quadratic (tract point) and cubic (dashed function), in which the GDP variation is considered as dependent variable and the variation in the unemployment rate is the independent variable.

Table no 1 - The model parameters estimated for the eight selected countries (GDP is the dependent variable and unemployment is the independent variable), IMF data (2012).

	Equation	Model Summary					Parameter Estimates			
		R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
GERMANY	Linear	0,328	13,645	1	28	0,001	1,891	-1,362		
	Quadratic	0,328	6,581	2	27	0,005	1,876	-1,370	0,021	
	Cubic	0,341	4,488	3	26	0,011	1,967	-1,813	-0,192	0,325
UK	Linear	0,545	33,571	1	28	0	2,320	-1,514		
	Quadratic	0,565	17,551	2	27	0	2,507	-1,344	-0,199	
	Cubic	0,579	11,937	3	26	0	2,579	-1,650	-0,365	0,118
ITALY	Linear	0,076	2,310	1	28	0,140	1,451	-0,803		
	Quadratic	0,181	2,991	2	27	0,067	2,083	-0,822	-1,716	
	Cubic	0,389	5,520	3	26	0,005	1,958	2,224	-1,556	-4,542
SPAIN	Linear	0,829	135,301	1	28	0	2,920	-0,860		
	Quadratic	0,861	83,811	2	27	0	3,160	-0,729	-0,056	
	Cubic	0,878	62,627	3	26	0	3,347	-0,834	-0,124	0,014
ROMANIA	Linear	0,230	6,881	1	23	0,015	1,034	-1,924		
	Quadratic	0,288	4,452	2	22	0,024	0,011	-2,471	0,523	
	Cubic	0,365	4,019	3	21	0,021	0,486	-3,886	0,044	0,297
CROATIA	Linear	0,135	2,495	1	16	0,134	2,571	-0,856		
	Quadratic	0,135	1,17	2	15	0,337	2,583	-0,859	-0,004	
	Cubic	0,146	0,801	3	14	0,514	2,275	-1,369	0,115	0,053
USA	Linear	0,835	141,57	1	28	0	2,906	-1,890		
	Quadratic	0,836	68,661	2	27	0	2,934	-1,844	-0,032	
	Cubic	0,836	44,114	3	26	0	2,940	-1,868	-0,046	0,007
CANADA	Linear	0,780	99,514	1	28	0	2,589	-1,889		
	Quadratic	0,785	49,194	2	27	0	2,485	-2,067	0,100	
	Cubic	0,794	33,466	3	26	0	2,656	-2,154	-0,286	0,126

made by the authors

In Table no 1 it can be observed that by applying different estimation models Okun's law is always respected, with the functions characterized by a decreasing trend. Table no 1 also shows those countries (U.S., Canada, U.K. and Spain) in which the three estimation models are more representative of the phenomenon, with a higher R square and values for Fisher statistics which provide the best fit to the observed data. For the other countries, on the contrary, the low values of the statistical measures show that the dependency relationship is weak, and the correlation between the same variables highlights fewer relationships. The models produce estimates of the "worst-case" concerning Italy. In fact, there are anomalous data showing for some years a growth of GDP accompanied with increased levels of unemployment (in Figure no 1, see the top right of the graph related to Italy). Naturally, as discussed below, these dynamics might have a practical explanation linked to the known inflexibility of the Italian labor dismissal protection and the related lack of promoting the empowerment of workers laid off. The other major economy belonging to the Mediterranean macro-region, Spain, shows a rather good fit, with an almost constant growth of GDP accompanied with a progressive reductions in the unemployment rate. As can be seen from the Spanish graph, in fact, already the linear model is very good for representing the phenomenon, with about no outlier cases. For Romania and Croatia we have the shorter time series and, therefore, the results presented are less significant. However, the latter two countries have a structure of their labor markets at least partially inflexible and show extreme points, such as the critical year of the current crisis, 2009, where to a strong decrease in the GDP has not meant a decline in employment as strong as happened in Spain (increased over the previous year by more than six percentage points). Germany represent an intermediate case, where the estimation of the models is influenced by extreme cases which are in particular the 2008 and 2009, until now the most critical years on the side of the economic crisis. In fact, in 2009, there was a considerable decline in the GDP of the countries surveyed, from 3 to 7 percentage points, but the ones with more inflexible systems of labor did not show a simultaneous and equally marked adjustment in the unemployment rate. Finally, the two countries studied as a useful international comparison, the U.S. and Canada, and representing the case studies more investigated in the economic literature referred to Okun's law, show a clear-cut dependency relationship between the two variables. For these two countries, all the three kinds of estimation models fit the data really well, highlighting the lower inflexibility of the related labor markets. We notice that the only European country with the R squares ranging similar to the two overseas countries is the Spain, followed by the U.K., so it is more appropriate to make comparisons between these two countries. Indeed, we observe that the first beta of the linear model shows a greater slope of the function for the U.S. case, and therefore it appears as the country in which there is the greatest reactivity between the two variables (Romania has a higher value of beta1 but estimated on less data, and a lower R-Square). By analyzing the range of variation of the variables we note that Italian unemployment changes very low, about a point above and below zero, the worse the country represented by the estimation models. This means the high inflexibility of the Italian labor market, especially for the legal protection against dismissal or lay-off, which *de facto* is a disincentive for firms to recruit new labor force (on these findings see also OECD 1994, Siebert 1997, Nicoletti *et al.* 2000, Bauer *et al.* 2004). The confirmation of the foregoing remarks is also from the average of same variations (considered in absolute values), which is extremely low for Italy, with a result equal to 0,5 compared with about 0,7 of the Anglo-Saxon countries (U.S., Canada and U.K.) and Germany, and more than 1 related to the other countries. In Italy such inflexibility is also transmitted in less variability of GDP, with negative effects on the general economic context because, as seen from the data, such resistance have brought in the last two decades to a nearly constant growth of GDP just above zero, at much lower levels than, for example, the other countries considered in this work. The most noticeable variation with a negative sign for Italy (-5.22%) took place in 2009, when other countries (except for Romania and Croatia), although affected by international economic and

financial crisis, registered decreases of GDP lower while suffering from an immediate decrease in employment levels.

4. Findings, implications and conclusion

Economists regard the Okun's rule of thumb in order to investigate the economic effects of employment. Furthermore, policymakers may use Okun's law as a real-time rule of thumb in order to evaluate conditions in the labor and the product markets. In this study we confirm that a long run relationship exists between unemployment and output, and the results show that an inverse relationship between unemployment and output holds for the six EU selected countries. Therefore, the Okun's law can be used to give a first explanation to the European economic context, because every effort in decreasing the level of unemployment is an effort towards increasing the level of output. Hence, structural reforms of labor market rigidities must persist and more flexibility in labor markets must become an essential feature for Europe. Moreover, the six EU selected countries can enhance their socio-economic development path by investing in activities that reduce the level of unemployment. These activities should include the empowerment of individuals and mainly of the unemployed job seekers and of those workers expelled from the labor market, job creation and entrepreneurial development efforts that are aimed towards employment generation. Addressing this challenge may contribute to the reduction of unemployment, which will ultimately increase the level of output. In particular, in the paper we analyze the responsiveness of the labor market related to the economic growth dynamics by three types of estimation models of the dependence between the two variables under investigation: the annual variation for GDP and the annual variation in unemployment rate.

We have chosen countries that represent in different ways the complex European situation, and based on Okun's law we also carried out an international comparison considering U.S. and Canada as benchmarks, since they are countries in which there is a less inflexibility of the labor market than the European countries. Moreover, the inflexibility of European labor market, especially for dismissals, shape a system established on greater rights and protections, but at the same time it can become an overriding constraint for firms to increase the number of employees during periods of economic growth and for foreign direct investments. We note that in those countries where the dependable relationship between the two considered variables is weaker the employment levels are slightly changed on average, with a stringent provisions against dismissal, but also with an adverse effect on general economic trends. In fact, within these countries-contexts the data show how effective is the lack of dynamism in terms of GDP changes and, as a further demonstration, these are countries that have suffered most of the recent international financial and economic crisis. It can be seen that in those countries where there is a good degree of estimation of the three models of dependence, starting from the linear one, and where the variations of the two variables are higher but not extreme, there are more positive evidence of growth levels. In summary, the adaptability of the workforce to the needs of the economic system can be a significant support to the ongoing processes of growth and development.

Bibliography
Journals
1. Bauer, Thomas K., Bender, Stefan and Bonin, Holger. "Dismissal Protection and Worker Flows in Small Establishments." Economica 74, 296, (2007): 804-821.
2. Gordon, Robert J.. "Unemployment and Potential Output in the 1980's." *Brookings Papers Economic Activity* 15, (1984): 537-564.
3. Kaufman, Roger T.. "An International Comparison of Okun's Law." *Journal of Comparative Economics* 12, (1988): 182-203.
4. Knoester, Anthonie. "Okun's Law Revisited." *Weltwirtsch Arch.* 122, 4 (1986): 657-666.

5. Okun, Arthur M.. "Potential GNP: Its Measurement and Significance." *Proceedings of the Business and Economic Statistics Section*, American Statistical Association, Washington, D.C., (1962): 98-103.

6. Prachowny, Martin F. J.. "Okun's Law: Theoretical Foundations and Revised Estimates." *Review of Economics and Statistics* 75, (1993): 331-336.

7. Siebert, Horst. "Labor Market Rigidities: At the Root of Unemployment in Europe." *Journal of Economic Perspectives* 11, 3, (1997): 37-54.

8. Silvapulle, Paramsothy, Moosa, Imad A., Silvapulle, Mervyn J.. "Asymmetry in Okun's Law.", *The Canadian Journal of Economics* 37, 2, (2004): 353-374.

9. Smith, Gary. "Okun's Law Revisited." *Quarterly Review of Economics and Business* 15, (1975): 37-54.

10. Weber, Christian E.. "Cyclical Output, Cyclical Unemployment, and Okun's Coefficient: A New Approach." *Journal of Applied Economics* 10, (1995): 433-445.

Books

1. Nicoletti, G., Haffner, R., Nickell, S., Scarpetta, S., Zoega, G.. "European Integration, Liberalization and Labour Market Performance." In *Welfare and Employment in a United Europe*, edited by Bertola, G., Boeri, T. and Nicoletti, G., MIT Press, 2000.

2. OECD. *Jobs Strategy*. Paris: OECD, 1994.