



# IMPACTS OF THE GREAT RECESSION ON GROWTH AND UNEMPLOYMENT IN GREECE

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**ABSTRACT** This study uses Okun's Law, the statistical relationship between a country's economic growth rate and its unemployment rate change, to answer two questions about Greece. First, was the long-run growth rate for Greece significantly different after the Great Recession ended? Second, did the statistical relationship between the real GDP growth rate and the change of the unemployment rate for Greece adjust during the Great Recession? This study uses quarterly real GDP growth rate and change of the unemployment rate data for Greece from Quarter 1 1998 through Quarter 3 2019 to answer these questions. The data was collected from the Federal Reserve Economic Data (FRED) at the Federal Reserve Bank of St. Louis. The results show that the long-run growth rate for Greece was 4% and was not significantly different after the Great Recession ended. The results also show that unlike the United States, there is not a significant statistical relationship between the real GDP growth rate and the change of the unemployment rate during the non-recession periods. This is likely because more than half the jobs in Greece are government jobs. The results reveal that there was a significant negative relationship between the real GDP growth rate and the unemployment rate change during the Great Recession for Greece. A 1% increase of the unemployment rate led to a 1.33% decrease of the Greece's growth rate.

**METHODOLOGY** This study uses a modified Okun's Law del to measure the structural effect of the Great Recession (GR) on long-run economic growth and the relationship between the change in the unemployment rate and economic growth rate for Greece. The regression equation is

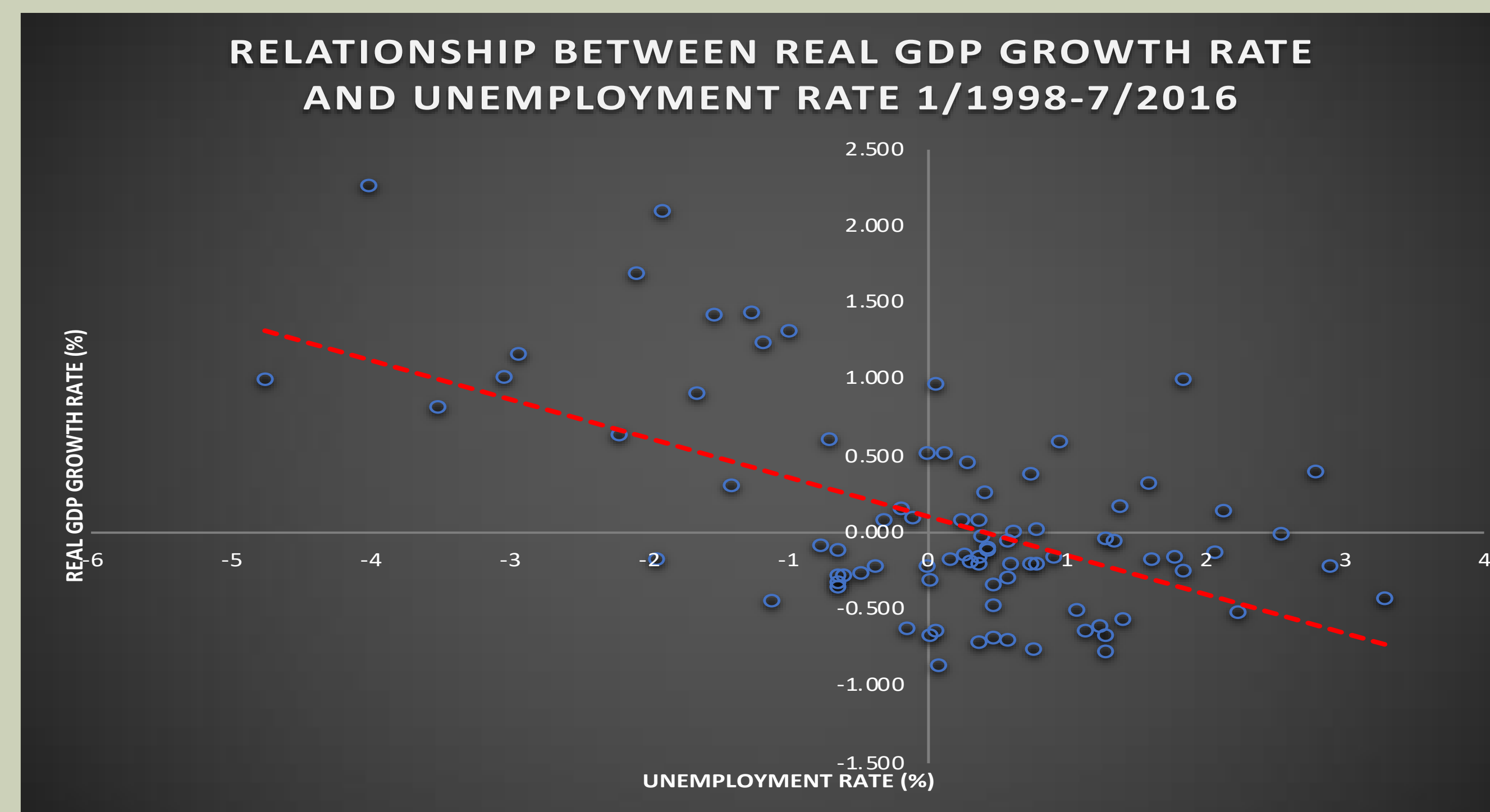
$$\frac{\Delta Y}{Y} = a_0 + a_1 * D_1 + a_2 * D_2 + c_0 \Delta u + c_1 \Delta u * D_1 + c_3 \Delta u * D_1 + \epsilon$$

where  $\frac{\Delta Y}{Y}$  is the quarterly economic growth rate,  $a_0$  is the long-run quarterly growth rate,  $a_2$  is the change in the long-run quarterly growth rate during the GR,  $a_3$  is the change in the long-run quarterly growth rate after the GR,  $c_0$  is the influence a 1% change of the unemployment rate has on economic growth rate,  $c_1$  is the change of the influence a 1% change of the unemployment rate has on economic growth rate during the GR,  $c_3$  is the change of the influence a 1% change of the unemployment rate has on economic growth rate after the GR,  $D_1$  recession,  $D_1$  post-recession, and  $\Delta u$  is the unemployment rate change.

$$\begin{aligned} H_0: a_i &= 0 & H_0: c_i &= 0 \\ H_A: a_i &\neq 0 & H_A: c_i &\neq 0 \quad \text{for } i = 1, 2, \text{ and } 3 \end{aligned}$$

Index of Economic Freedom			
Rule of Law		Government Size	
Property Rights	57 +	Tax Burden	59 -
Judicial Effectiveness	48.6 -	Government Spending	31.5 +
Government Integrity	51.2 +	Fiscal Health	80 +
Regulatory Efficiency		Open Markets	
Business Freedom	73.7 -	Trade Freedom	81.4 +
Labor Freedom	52 -	Investment Freedom	55
Monetary Freedom	79.4 +	Financial Freedom	50

**Table 1:** Select Greece Index of Economic Freedom scores. Source: The Heritage Foundation



**Chart 1** shows a negative relationship between the real GDP growth rate and the unemployment rate from January 1998 through July 2016. Source: FRED

Greece Okun's Law with Dummies					
Greece					
<b>Regression Statistics</b>					
Multiple R		0.718			
R Square		0.515			
Adjusted R Square		0.485			
Standard Error		1.061			
Observations		86			
<b>ANOVA</b>					
	df	SS	MS	F	Significance F
Regression	5	95.562	19.112	16.990	2.04871E-11
Residual	80	89.992	1.125		
Total	85	185.554			
<b>Coefficients</b>					
	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.996	0.184	5.422	6.07511E-07	
Dummy 1 Recession	-1.285	0.266	-4.839	6.24387E-06	
Dummy 2 Post Recession	-0.630	0.665	-0.948	0.346	
Unemployment Rate	0.087	0.541	0.161	0.873	
Recession X Change Unemployment	-1.331	0.583	-2.284	0.025	
Post Recession X Change Unemployment	-0.352	1.256	-0.280	0.780	

**Table 2** shows the regression results. If the p-value  $\leq 0.05$ , the null hypothesis is rejected, and the coefficient is significantly different from zero. If the p-value  $> 0.05$ , the results fail to reject the null hypothesis. The growth rate results are quarterly values.

**BACKGROUND** The Index of Economic Freedom scores the economic freedom of countries based on 12 categories ranging from private property rights to government fiscal responsibility. At a rank of 100, the overall score for Greece is 59.9, mostly unfree. Countries that have a higher economic freedom score tend to have a stronger long-run economy. Table 1 shows select categories for Greece. A + means the category is improving and a - means the category is declining. The low scores on Labor Freedom and Government Spending reflect the high level of regulations, large percent of government jobs, and heavy dependence of Greek citizens on the Greek government.

Greece is one of 27 countries that comprise the European Union. During and following the Great Recession, Greece suffered a severe economic crisis due in part to government overspending and structural rigidities. The structural rigidities included early retirement ages and about 50% of all employment with the government. In 2010 and 2015, Greece required three bailout agreements with the European Commission, the European Central Bank, the IMF, and the European Stability Mechanism for a combined total of \$300 billion to emerge out of its economic crisis. As of 2018, Greece had exited its third bailout.

- RESULTS** Table 2 reports the results of the regression.
- The  $R^2 = 0.718$ , indicating 71.8% of the GDP growth rate can be attributed to the recession and the unemployment rate change.
  - $a_0$  the long-run quarterly growth rate = 0.998% or an annual long-run growth rate is approximately 4%.
  - $a_1$  is significantly different from zero. The quarterly growth rate during the recession was -0.287 or an average annual decline of 1.15%.
  - $a_2$  is not significantly different from the pre-recession period. The GR did not change the long-run growth rate of Greece.
  - $c_0$  is not significantly different from zero. Unlike the United States, the Okun's Law model does not find a statistically significant relationship between the unemployment rate change and the GDP growth rate.
  - $c_1$  is significantly different from zero. During the GR, a 1% increase of the unemployment rate change leads to a 1.33% decrease of the GDP growth rate.
  - $c_2$  is not significantly different from zero. The GR did not change the statistical relationship between the unemployment rate change and the GDP growth rate.

**CONCLUSION** While the long-run growth rate and the relationship between the unemployment rate change and the economic growth rate changed during the Great Recession, the change was only temporary. The Great Recession did not permanently change the long-run economic growth rate or the short-run relationship between the unemployment rate change and economic growth rate.