Athens Journal of Mediterranean Studies, 2024, 10: 1-14
https://doi.org/10.30958/ajms.X-Y-Z

Regional Effects of the Great Recession on Greek Unemployment Rates: A Graphical Analysis

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It is well documented that the Great Recession hit Greece very hard. External and internal factors have been put forward to explain why Greece was hit so hard relative to the other countries of the eurozone. Less attention has been paid to regional differences of the Great Recession impact. This study examines the effect of the Great Recession on the 13 NUTS2 regions of Greece, with an emphasis on the unemployment rate. Two issues are examined. First, the differences in the unemployment rates between the thirteen Greek regions are presented using available evidence from 1998 to 2022. Large differences in unemployment rates are observed. The second issue is the impact of the Great Recession on the convergence (or divergence) rates of the unemployment rates across regions.

Keywords: *Great Recession, unemployment rate, Greek regions, eurozone*

Introduction

Unemployment rates are among the most important macroeconomic indicators, along with the rate of economic growth and the inflation rate. Despite its serious measurement and reporting errors, the unemployment rate is used to guide economic policy. It is also one of the variables that has significant political repercussions. Mass unemployment undermines democracy[1] itself and can lead to the emergence of extreme political parties in power. The rise of the Nazis in Germany was primarily the result of mass unemployment during the depression of the 1920s and 1930s.

The Great Recession of the 2010s was the worst economic crisis since the Great Depression, also leading to political instability[2]. One of the hardest-hit economies in the Western world was the Greek economy. During the Great Recession, the impact on the Greek economy was historically unprecedented, as

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[1]On the democracy issue, see my papers Papanikos (2022a, 2022b, 2022c, 2022d, 2022e) and the comments by Meydani (2022) and Petratos (2022)

[2]In Greece, for example, we witnessed the rise of populist parties from both the right and the left. The first elections after the Great Recession occurred in 2012 and 2015. The 2012 elections resulted in a historical coalition government between the socialists and the center-right party, which had governed Greece separately since 1974. In the 2015 elections, a new coalition emerged, even more surprising, as it involved a populist party of the left and a populist party of the right. This occurred despite the election results favoring a coalition of center-left parties. I have extensively addressed this issue; please refer to Papanikos (2012a, 2012b, 2015a, 2015b, 2015c, 2015d, 2015e, 2015f, 2015g, 2015h).

documented by many studies[3]. However, less attention has been devoted to the regional impacts, despite the European Commission (2023) correctly pointing out that within countries, regional disparities are greater than between countries. This paper examines these regional disparities using NUTS2 Greek regional data. Additionally, it provides an introduction and assessment by comparing national unemployment rates of the euro countries.

The issue of unemployment has been studied by many authors. Avola (2015) examines the regional effects of labor market outcomes emphasizing the integration of natives with migrant workers[4]. The issue of good and bad jobs is at stake here, which is very similar to the problems that Greek regions are facing in the post-crisis and post-pandemic period. Agriculture and tourism require unskilled labor – jobs that are deemed undesirable by natives – to such an extent that the Greek government is seeking temporary workers from countries like India, Egypt, Armenia, Moldova, Georgia, the Philippines, and Vietnam. The quality of jobs is at the heart of regional differences in unemployment rates because most desirable jobs are available in the two main regions (cities) of Greece: Attiki (Athens) and Kentriki Makedonia (Thessaloniki).

Greece is a member of the European Union (EU) and the Eurozone. These institutions have policies that affect regional outcomes, including the unemployment rate. One of the advantages of economic integration is the freedom of movement of all factors of production, including labor. This has affected the demand for and supply of labor at the European level. For a radical approach to this issue, see Bifulco (2017) and Kall (2017). Bruneau and Girard (2021) use French data to investigate the association between human capital and labor productivity. The role of aggregate demand, technology, microeconomics in determining labor demand and supply has been examined by Amaghionyeodiwe and Annansingh-Jamieson (2017), Dyczkowska and Dyczkowsk (2018), Eğriboyun (2023), Genty et al. (2021), Hoti (2017), Koiranen and Rautamäki (2024), Laaksonen et al. (2023), Menguy (2019), Moussa et al. (2022), Ndamsa et al. (2020), Nguyen and LeBlanc (2018, 2021), and Reid (2023).

In this study, we do not examine the issue of regional differences in labor productivity, but it can potentially explain regional differences in the unemployment rate[5]; we will revisit this issue in the concluding remarks of this study.

The paper is organized into five sections, including this introduction. The next section provides a simple theoretical framework of the convergence issue. Section three compares the unemployment rates of the Eurozone countries, and the

[3]See Papanikos (2015i & 2024) and the references cited therein. Markovits et al. (2017) examine how the Great Recession affected Greek workers' attitudes. As expected, unemployed workers had more negative attitudes and higher burnout. Sommeiller (2020) examines the effect of the Great Recession on poverty in Southern European countries.

[4]The issue of labor migration has become prominent, with numerous studies exploring it; for example, see Tsai and Yen (2017). Migration is closely related to another significant aspect of the labor market, which is aging. Fuchs (2015) addresses this issue by examining the aging of the German population in the labor market. Furthermore, this issue connects to the expectations of youth in advanced countries, as examined by Nelson and Braekkan (2017).

[5]European Commission (2023, p. 4) noted that "Positive trends in labour productivity reflect upward convergence, though disparities are still high between Member States and even more between EU regions.

subsequent section examines the Greek regional unemployment rates, including the important issue of convergence. The final section includes a discussion and the conclusions of this study.

A Simple Theoretical Framework

In the long run, spatial differences in unemployment rates will tend towards zero in well-integrated labor markets where there are no transaction costs of mobility. In the short run, spatial divergences in unemployment rates are possible due to the adjustments required to move between jobs. In the context of Greek regions, such costs could be prohibitive when a person, accustomed to receiving family support, potentially owns a house and a small farm that can generate additional income. The wage differential should be high enough to cover these costs, yet such differentials do not exist within Greece. This explains why it is easier to move abroad to another country than to a different region within Greece. The wage differential between Greece and other countries is much higher than the wage differential between Greek regions.

In the long run, it is assumed that the differentials in unemployment rates tend towards zero or a constant because some differentials exist due to the transaction costs mentioned above. This implies that in the long run:

$$\lim_{s\to\infty} E(|ur_{i,t+s} - \tilde{u}r_{t+s}|) = \alpha \quad \forall\ \alpha \geq 0$$

where:

$ur_{i,t+s}$: the unemployment rate in region or country (i) in period (t+s)
$\tilde{u}r_{t+s}$: the average unemployment rate of all regions or countries in the sample in period (t+s)

The difference between the unemployment rate of a region or a country and the corresponding average unemployment rate should follow a stationary process. This process defines stochastic convergence. If convergence takes place, then these differences in unemployment rates should decrease. Ultimately, these differences should converge to zero or reach a constant (α). The standard deviations should decline if the unemployment rates converge over time and increase if the unemployment rates diverge.

This simple approach to convergence/divergence of unemployment rates is examined using simple descriptive (graphical) statistical analysis. The next section examines the differences in unemployment rates within the euro countries, and the following section investigates the convergence and divergence of unemployment rates among the thirteen Greek regions. In the first case, we use the average unemployment rate of the twenty eurozone countries as a reference, and in the latter case, we utilize the national unemployment rate of Greece.

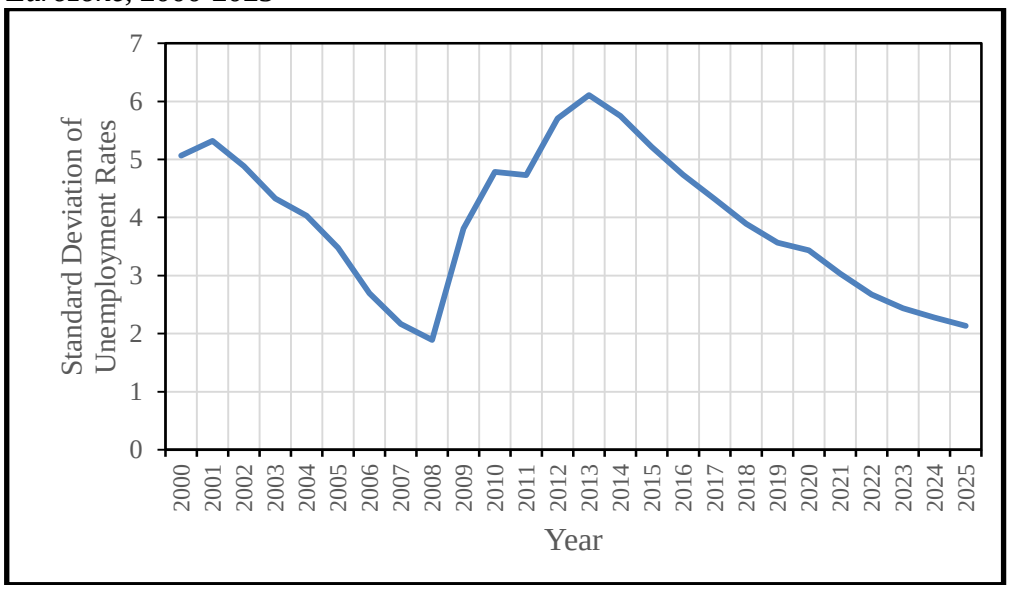
The Great Recession and the Unemployment Rate in the Eurozone

One of the arguments put forward to support European integration is upward convergence or regional cohesion. Greater integration not only enhances the wealth of all member countries but also reduces inequalities between them.

This section first examines the issue of convergence of unemployment rates in the eurozone countries and thereafter evaluates the unemployment rates of five eurozone countries that were hardest hit by the recession. We maintain a straightforward discussion and utilize the standard deviation of the unemployment rates as a measure of convergence[6].

Figure 1 shows the standard deviation of the unemployment rates of the twenty eurozone countries from 2000 to 2025. Data after 2023 are estimates from the European Commission. Although the initial eurozone consisted of twelve countries, all twenty are included. This is justified by the fact that convergence deepens once a decision to join is made, as adjustments take place, some initiated by government policies but the most significant ones by private sector expectations. If a country is in the process of becoming a member of the eurozone, its policies and the expectations of economic agents are such that the benefits and costs are realized before the actual adoption of the euro takes place. This phenomenon also occurred among the initial twelve eurozone countries. Hence, the starting year of 2000 is used, even though the euro was adopted in 2002.

Figure 1. *Convergence of Unemployment Rates in the Twenty Countries of the Eurozone,* 2000-2025



Source: Eurostat (after 2023, data are European Commission's estimates).

The graph reveals three important features of the convergence of unemployment rates in the euro countries since 2000. First, the adoption of the

[6]In my paper, Papanikos et al. (2004b), I examined convergence among the Greek regions in the 1980s using various measures of convergence.

euro drastically increased convergence from five standard deviation percentage points in 2000 to 1.9 in 2008. Second, the Great Recession, which hit the eurozone countries in 2008, increased the divergence of unemployment rates. The minimum value of the entire period in 2008 was 1.89, which jumped to 6.1 in 2013. As shown in Table 1, these two values represent the two extremes of the entire period, with a range of 4.2 percentage points. Third, after the Great Recession (post-2013), convergence picked up at a relatively high rate, with the exception of 2020 (the pandemic year) when the rate of increase in convergence slowed down. In 2019, it was 3.6 standard deviation percentage points, and in 2020, it was 3.4.

Table 1. *Summary Statistics of the Convergence Index (2000-2025)*

Statistic	**Value**
Mean	3.9412
Standard Error	0.2459
Median	3.9609
Range	4.2165
Minimum	1.8926
Maximum	6.1091

It appears that there is a positive association between convergence and the level of the unemployment rate. This implies that the Great Recession did not affect all Eurozone countries to the same extent. Some countries were hit much harder than others, leading to an increase in the divergence of unemployment rates.

Figure 2 demonstrates this positive relationship between the unemployment rate and the divergence of unemployment rates among the Euro countries. The simple fitted line explains the association between unemployment rates in the Euro area and the convergence rate very well. The coefficient of determination is 0.7673, and the implied correlation coefficient is 0.8760.

The Great Recession hit the hardest in five Eurozone countries: Greece, Ireland, Italy, Spain and Portugal. Figure 3 compares the unemployment rates of these five countries using a long time series of data[7]. The uniqueness of this group of countries lies in their loss of national independence in monetary policy, and consequently, the determination of the effective exchange rate. As argued in Papanikos (2015a), the Greek real effective exchange rate was the highest among the Eurozone countries during a period when an effective devaluation could have mitigated the impact of the Great Recession on the Greek economy[8]. This section compares the unemployment rates of Eurozone countries. Figure 3 displays the unemployment rates of five Eurozone countries: Greece, Ireland, Italy, Portugal, and Spain.

[7]A similar comparison at the national level has been addressed in many studies; for example, see Correia and Carvalho (2016).

[8]The Greek economy has other characteristics, such as its unique geography with numerous inhabited islands, which impose additional costs for infrastructure and regulation. I have examined these unique characteristics elsewhere; please refer to Papanikos (2004a, 2004b, 2015a, 2015b).

Figure 2. *The Scatter Diagram of the Unemployment Rate in the Eurozone Area and Convergence*, 2000-2025

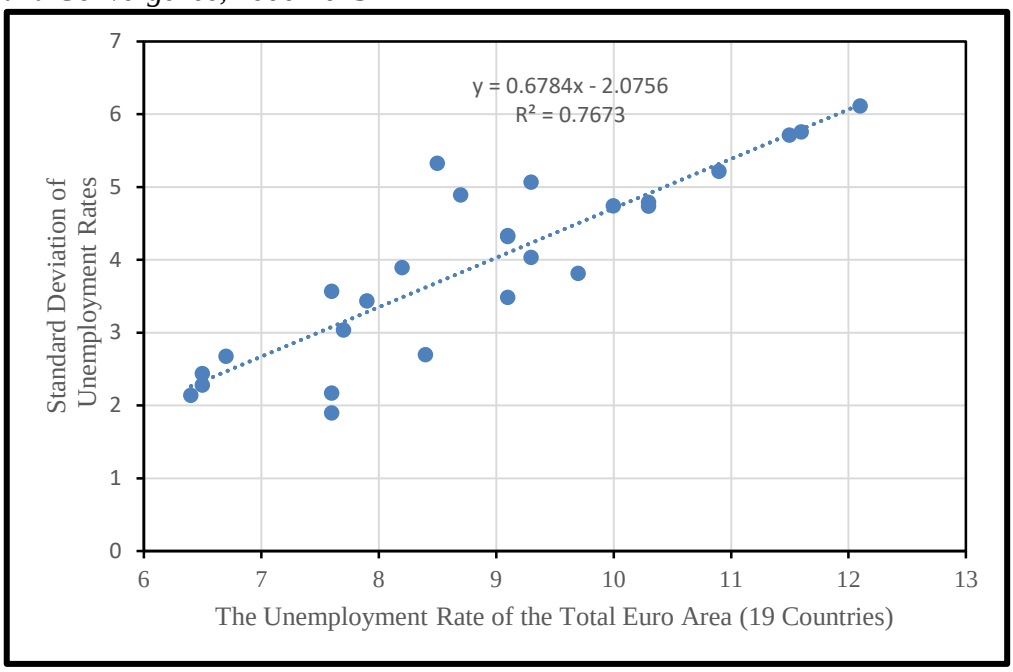
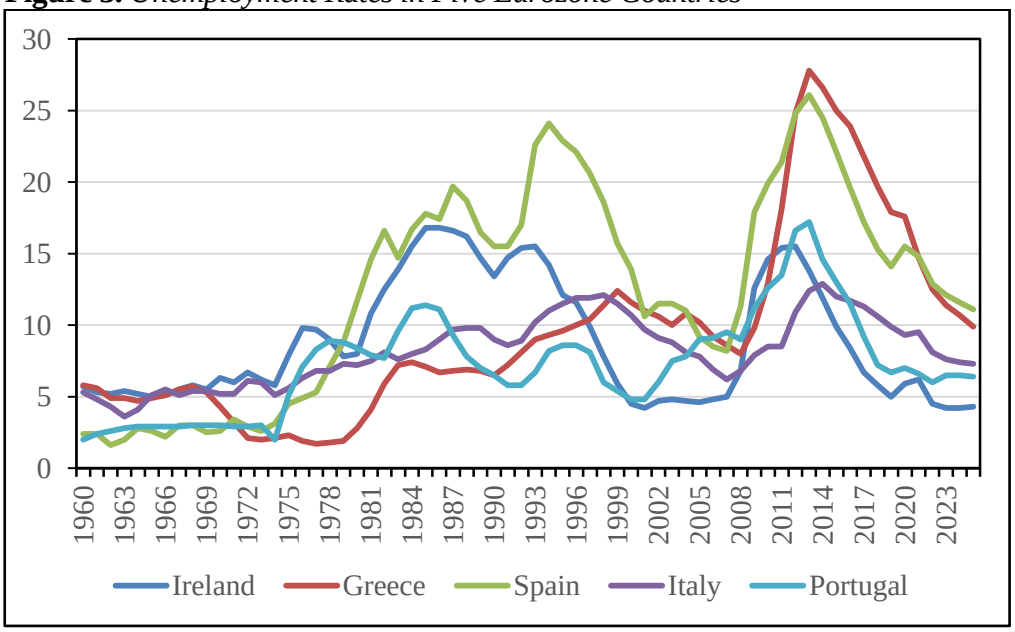


Figure 3. *Unemployment Rates in Five Eurozone Countries*



Source: Eurostat.

A number of interesting observations can be made by examining Figure 3. Up to 1975, Portugal and Spain had very similar unemployment rates, both lower than 3.5%, while Ireland and Italy had slightly higher rates, though not exceeding 6%. Greece, until 1972, had rates similar to Ireland and Italy. However, after 1972, the Greek unemployment rate became the lowest among the group of five countries, a trend that persisted up to 1990.

The 1992 recession significantly impacted Spain and Ireland. Although Ireland managed to recover, Spain's unemployment rate remained persistently high throughout the entire period under consideration[9].

Examining national unemployment rates masks differences that might exist at the regional level. In some cases, national policies to combat unemployment may prove ineffective due to structural differences at the regional level. The next section examines the differences in unemployment rates among the 13 Greek regions.

Regional Disparities of the Unemployment Rates in Greece

Greece is divided into 13 NUTS2 regions called peripheries. Table 3 provides labor market raw data statistics of the 13 regions, and Table 4 offers summary statistics for 2022.

The first thing these data illustrate is the great diversity among the 13 regions. This is clearly seen when examining the dispersion of data in Table 4: minimum, maximum, and the range of data. Half of Greek employment occurs in the two largest cities of Greece: Athens (region of Attiki) and Thessaloniki (region of Kentriki Makedonia). Historically—though not shown in the tables—this is the result of a long process of internal migration, which resulted in a significant movement of urbanization primarily after the Second World War. Many reasons can explain this rush into the cities, but they go beyond the scope of this paper.

The focus of this paper is on the unemployment rate, particularly the differences in unemployment rates. The Greek national unemployment rate was 12.44% in 2022. We use this rate to calculate regional unemployment rate differences. Regions with rates above (positive difference) or below (negative difference) this rate appear in the last column of Table 4. Four regions were performing better than the regional average: Attiki, Kriti, Notio, and Voreio Aigaio. It is not a coincidence that these regions had a relatively record number of tourist inflows in 2022. All the other regions had unemployment rates above the national average. Attiki (Athens) had the lowest unemployment rate at 9.98%, which is 2.46% lower than the national average. Dytiki Makedonia had the largest unemployment rate deviation from the national average, at 5.23%. Many regions had unemployment rates very close to the national unemployment rate, i.e., less than 1%. These regions were Dytiki Ellada, Ionia Nisia, Kriti, Peloponissos, and Voreio Aigaio.

[9]The unemployment rates of Spain and Greece are examined by Fernández et al. (2024).

Table 3. *Labor Market Statistics by Region (2022)*

	Periphery (Region)	**E**	**U**	**LF**	**UR**	**URDIF**
1	Anatoliki Makedonia, Thraki	213.6	36.9	250.5	14.73%	2.29%
2	Attiki	1575.4	174.6	1750	9.98%	-2.46%
3	Dytiki Elláda	241.1	34.8	275.9	12.61%	0.17%
4	Dytiki Makedonia	89	19.1	108.1	17.67%	5.23%
5	Ionia Nisia	74.7	11.1	85.8	12.94%	0.50%
6	Ipeiros	117.8	18.1	135.9	13.32%	0.88%
7	Kentriki Makedonia	682.7	117.3	800	14.66%	2.22%
8	Kriti	250.5	34.4	284.9	12.07%	-0.36%
9	Notio Aigaio	126.1	15.1	141.2	10.69%	-1.74%
10	Peloponnisos	216.4	31.1	247.5	12.57%	0.13%
11	Sterea Elláda	209.1	33.5	242.6	13.81%	1.37%
12	Thessalia	269.6	52.4	322	16.27%	3.83%
13	Voreio Aigaio	74.6	9.7	84.3	11.51%	-0.93%
	Total Greece	**4140.6**	**588.2**	**4728.8**	**12.44%**	**0.00%**

Source: https://www.statistics.gr/el/statistics/-/publication/SJO03/-.

Table 4. *Labor Market Summary Statistics by Region (2022)*

	E	**U**	**LF**	**UR**	**URDIF**
Mean	319	45	364	0.1329	0.0086
Median	214	34	248	0.1294	0.0050
Standard Deviation	409	48	456	0.0216	0.0216
Kurtosis	9	4	8	0.1082	0.1082
Skewness	3	2	3	0.5246	0.5246
Range	1501	165	1666	0.0769	0.0769
Minimum	75	10	84	0.0998	-0.0246
Maximum	1575	175	1750	0.1767	0.0523

The main question of this paper is how the three important events of the 21st century affected regional convergence in Greece. These events are as follows, in chronological order:

a) How has the European Monetary Union and the adoption of the common currency affected the convergence of the thirteen regions?
b) How has the Great Recession impacted the convergence process of the Greek regions?
c) Did the pandemic have any effect on the regional convergence of Greece?

Figure 4 shows the standard deviations of Greek regions' unemployment rates from 1988 to 2022. Prior to the EMU, the standard deviation was increasing, indicating divergence. In 1996, a new government with a very strong and fresh mandate vowed to do whatever possible for Greece to become a member of the eurozone with the first wave of countries that decided to join. This had an immediate impact on the regional convergence indicator. Convergence increased (the standard deviation of the unemployment rate differences from the Greek national rate decreased) from 3.62% in 1996 to 3.15% in 1997 and 2.11% in 1998. In the early years of the euro in circulation, the convergence rate (from 2002 to

2005) decreased. One explanation might be the huge investments made in Athens to host the 2004 Olympic Games. After 2005, the convergence rate increased (the standard deviation fell) until 2010. The Great Recession had a significant impact on Greek convergence both in its level and its variability. It reached record values in 2012 of 4.43% and 4.56% in 2016.

The pandemic did not have any considerable impact on the convergence index. It seems that COVID-19 affected all the Greek regions equally, leaving the convergence rate unchanged. The convergence rate increases but still has not reached the record number of 2007 of 1.62%.

Figure 5 presents the range of Greek regional unemployment rates, which is a crude measure of dispersion based only on the two extreme values of maximum and minimum, while the standard deviation of the unemployment rate differences takes into consideration all values of the distribution. The range, in this context, is more important than the standard deviation because of political reasons. It shows how hard one particular region has been affected, which has serious repercussions for policy making. However, the analysis of the three basic assertions of this paper does not differ from the one presented above when Figure 3 was analyzed.

Figure 4. *Convergence of Unemployment Rates*

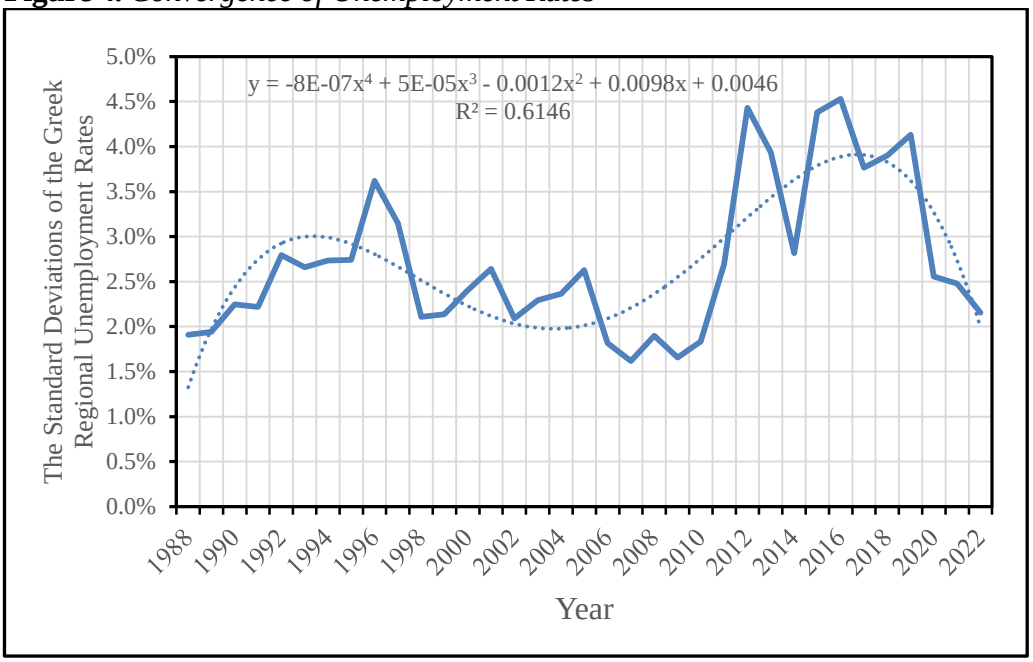
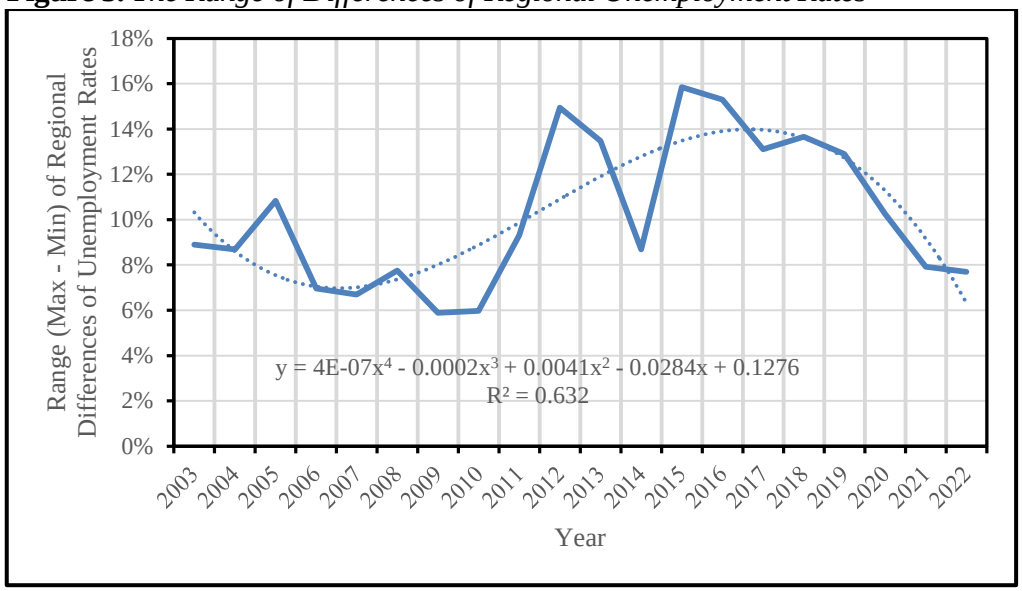


Figure 5. *The Range of Differences of Regional Unemployment Rates*



Recapitulating the above findings, descriptive measures of divergence show that Greek regional convergence was positively affected by the adoption of the euro, negatively impacted by the Great Recession, and was not affected by the pandemic.

Discussion and Conclusions

One conclusion that might emerge from the above analysis is that when the economy is performing well, convergence in the eurozone is also positive. Conversely, when the economy is struggling, it appears that each country and region is left to address economic challenges independently.

Even more concerning, during economic downturns such as the Great Recession, countries and regions within a single country often engage in a blame game, leading to potentially serious political repercussions. Fortunately, albeit at the eleventh hour, eurozone leaders, or some of them, recognized that the situation was more complex than initially perceived and adjusted their policies towards the hardest-hit countries, as was the case with Greece. It seems they have been vindicated when examining Greece's basic macroeconomic indicators today, including the unemployment rate. Greece was able to return to what can be considered its long-run unemployment rate within a few years without compromising political and social stability. One can only speculate what would have happened to Greece had it chosen to abandon the eurozone.

The main conclusions drawn from this paper's graphical analysis of unemployment data suggest that regional disparities in unemployment rates within a single country are as pronounced as the differences between countries in the eurozone. In the Greek context, which was the focal point of this paper, regional convergence of unemployment rates was positively influenced by Greece's participation in the eurozone and negatively impacted by the Great Recession. The

evidence indicates that the pandemic did not affect the convergence rate of the thirteen Greek regions.

As indicated by the title of the paper, this is a graphical (descriptive) analysis of unemployment rate differences. It illustrates how convergence evolved during the 21st century and its correlation with three pivotal developments: the establishment of the Eurozone, the Great Recession, and COVID-19. No attempt was made to uncover the causes of differences among countries and regions. Undoubtedly, demand effects are significant contributors, but other factors such as labor productivity may also play a role in explaining long-term differences in unemployment rates. Demand effects typically have transient impacts, whereas productivity differences may have enduring effects. Determining the extent to which variations in unemployment rates between countries and regions are due to transient or enduring effects necessitates a different methodology, which remains a topic for future research.

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