

## **Accession to the EU: A Comparative Economic Analysis of Turkey and Bulgaria**

G. N. Naidu

Askar Choudhury

### **Abstract**

This paper examines the European Union membership classification of both Turkey and Bulgaria with respect to other 11 longstanding European Union (EU) member countries based on their economic profiles. Turkey's most recent effort to enter the European Union has been denied, while Bulgaria and Romania were admitted to the EU. Turkey's situation is so unique both geographically and politically that it offers a very interesting paradigm for economic integration analysis. Turkey's drive to join the EU has faced many impediments and confronted numerous challenges. The basic inspiration for European Union integration is to establish a single market for goods, services, and capital among the member nations. Since this is the motto, we have examined Turkey and Bulgaria on the basis of their economic profiles for integration into the union by analyzing the similarities/differences. Multivariate analyses of Mahalanobis  $D^2$ , canonical correlation, and canonical discriminant analysis show that Turkey may not yet have earned an economic status to be a member of EU on the basis of five economic factors that we have considered in this paper. However, given that Bulgaria also classified in a separate group than that of those existing EU members provides an opportunity for an argument in favor of Turkey.

### **I. Introduction and Background**

Turkey has been aspiring to become a member of the European Union for nearly four decades. Its desire to enter Single Market Europe was intensified in recent years with the enlargement of the EU. Turkey's most recent effort to enter the EU in 2002 has been denied by the EU at the Copenhagen Summit in December of 2002. Although, countries such as Poland, Hungary, Czech Republic, Greece, Cypress, Slovenia, Malta, and many others entered the EU in May of 2004. Bulgaria and Romania also got admitted to EU effective January 1, 2007 while Turkey still remains outside the union.

Turkey's position is so unique geographically and politically that it offers us a unique and interesting case for economic integration analysis. Turkey has been a staunch, loyal NATO member. Its capital city is located in Europe. Turkey's long standing economic relationship with the western world is undeniable. In 1963, European Community signed an association agreement with Turkey that envisioned the mutual lowering of trade and migration barriers. In 1973, a protocol addendum was signed and a joint commission was established for removing migration barriers between the EC and Turkey by 1986. But, no advancement has been made to lower trade and migration barriers until 1982 due to a military coup that took place in 1980. As a result, the EC suspended its relations with Turkey in 1982. In spite of all these negative developments, Turkey applied for EU membership in 1987 and it was rebuffed by the EU in 1989. Turkey's latest attempt to join EU foiled in December 2002 at the Copenhagen Summit. However, EU pledged Turkey that if it carries out certain criteria on human rights and democracy by December 2004, accession talks could begin "without further delay." Although, at

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Dr. G.N. Naidu and Dr. Askar Choudhury are from Illinois State University.

the same summit in Copenhagen EU added 10 new members to their list of nations while denying entry to Turkey. The basic motivation for European integration is to establish a single market for goods, services, and capital among the member nations of the EU. If this is the premise on which the EU expansion drive is advanced, then Turkey's economic profile should be compared to that of Bulgaria.

Turkey's drive to join the EU is not without hurdles or challenges. There is no certainty among the current EU members to accept Turkey. The grounds for this discord are varied and many. Valery Giscard d'Estaing, a former French president and an architect of EU's constitution, objected to Turkish membership because Turkey has "a different culture, a different approach, and a different way of life." Blocking Turkey from entering the EU contradicts the Union's motto: "Unity in Diversity." Resistance for Turkey's entry into EU comes from many directions. Some are culturally based and others are based on socio-political dynamics. At the center of this issue lies the concern about the continuing disharmony among Turks as to the cultural and social structure of their society. Turkey is a Muslim country with a majority of Sunni population. Turkey adopted a strict separation of State and religion. Under Turkey's brand of secularism, the state strictly controls the practice of religion. In the 1920s, Turkey was shaped by the ideology of Kemalism, after Mustafa Kemal Ataturk. The Kemalist ideology embraces republicanism, nationalism, statism, secularism, revolutionism (the quest for modernity) and populism. The rift between Kemalists and Islamists continues to exist and opens up wide from time to time. Kemalists seem to want to build a Turkish society that respects secularism as practiced by their European neighbors while the majority of Islamists interpret secularism as religious freedom to practice Sharia law in public. The issue came into the open when the parliament passed a law approving the female students wearing head scarf. The law was challenged by Kemalists in the court and the court struck down the law. In addition, the EU is concerned about how Turkey deals with the minority groups such as the Armenians and Kurds. Turkey is considered by many as a secular Muslim democracy. The courts and major institutions are dominated by the Kemalists while the Islamists dominate the military ranks. Kemalists petitioned the court to dissolve the current government for disobeying the secular constitution. The court wisely rejected the petition respecting the democratically elected government. This demonstrates that Turkey, in spite of the appearance of social disharmony, upholds the basic principles of secularism and democracy. These developments motivated the authors to examine Turkey's entry into EU purely on the basis of economic considerations.

Turkey ranks as the seventh largest economy in the Council of Europe and 15<sup>th</sup> largest economy in the world. It is one of the G-20 industrial nations. Turkey is a founding member of OECD. Turkey's GDP growth rate averaged 7.4% annually between 2002 and 2007. World Bank forecast a 5.4% rate of growth in 2008 and slightly higher growth rate for 2009. The rate of consumer inflation is running at the rate of 9% for 2008, which is higher than most countries in Europe. Its unemployment rate is about 10%. It has an ongoing negative balance in Current Account. Turkey's budget (deficit) balance as % of GDP is about 3% and is expected to rise. Foreign direct investment is falling and the currency is declining in value. Turkey's economic trends were shaping up positively during the last few years.

While there are some sociopolitical dynamics at play on both sides of the issue, this paper sets aside the non-economic considerations.

Bulgaria spent nearly five centuries under Ottoman rule before a constitutional monarchy took over in 1878. After World War II, it became a communist state as part of the Eastern Bloc. In 1990, Bulgaria transitioned to democracy and free-market capitalism. Bulgaria is currently governed by a parliamentary democracy under a unitary constitutional republic. It has been a member of NATO since 2004 and entered the EU in 2007. Bulgaria's attempt to join EU was not exactly a cakewalk either. Just as Turkey did, Bulgaria also made a discernible progress on the economic front and in advancing democracy. Bulgaria made a successful transition to a relatively peaceful and stable democracy in a shorter timeframe than did Turkey. After signing its accession treaty in April 2005, its march towards stable and peaceful nation was not without hurdles. It had a difficult parliamentary election in 2006. After the parliament convened, it worked very hard and pushed towards achieving the EU membership with series of negotiations with the EU. The overarching goal of the EU enlargement process has been the achievement of peace and stability in Europe, and especially in the Balkans. Apparently, EU was satisfied with Bulgaria's progress towards this end. On September 26, 2006, European Commission issued an official report indicating Bulgaria's readiness to become EU member state. The EC president, in his address to European Parliament, stated that Bulgaria and Romania are ready to "take responsibility of EU membership." Thus Bulgaria and Romania entered the EU on January 1, 2007. The decision to accept the two countries into the EU was based on the presumption that the two nations will continue to make progress on overcoming some deficiencies in the areas of crime and corruption.

The paper examines the issue purely on the basis of economic profiles of Turkey and Bulgaria. Although Turkey has been negotiating with the EU for much longer period to get into EU, it was denied EU membership while Bulgaria and Romania were given the nod to enter EU effective January 1, 2007. There are multidimensional differences among these countries' economic profiles. The purpose of this paper is to compare Turkey and Bulgaria in terms of their economic profiles and see if they differentiate themselves on economic dimension. Perhaps, it is even more important to study which one of these two countries is closer to the EU members' states in terms of their economic profile. We exclude Romania from our analysis primarily due to inadequate economic data available for the time line considered in this paper.

## **II. Data and Variable Descriptions**

This paper compares Turkey and Bulgaria with the eleven longstanding members of the EU to see if they are cohesive enough in their economic profiles to fit well in the Union. Economic profile of each nation is created and assessed using the following five economic characteristics:

- 1) Growth Rate of GDP
- 2) Current Account Balance (% of GDP)
- 3) Inflation Rate
- 4) Unemployment Rate
- 5) Long-term Interest Rate

The data set for this study was obtained from "The Economist" and "OECD". Annual data of these thirteen countries for five different economic factors above were obtained and analyzed. Summary statistics for these data were reported in Table 1 for the period of 2002-2006.

Data analysis is carried out in two steps. First, we compare Turkey's economic profile with the seasoned members of the EU. Similar comparison is then made for Bulgaria. This comparative analysis was done by applying univariate test for mean comparison to see if Turkey's (or Bulgaria's) average economic profile is similar or dissimilar to the average economic profile of the other 11 nations in the EU. We also analyzed pair-wise correlation between countries' economic characteristics to observe the closeness of economic profiles. Second, closeness of these countries economy on multidimensional scale was tested using Mahalanobis squared distance  $D^2$  to incorporate multivariate assessment of these countries economic profiles.

### III. Multivariate Methodologies

Multivariate analyses of Hotelling's  $T^2$  or Mahalanobis  $D^2$  can be used to observe the similarities or differences between the EU countries and Turkey-Bulgaria based on five economic factors, namely Growth Rate of GDP, Current Account Balance (% of GDP), Inflation Rate, Unemployment Rate, and Long-term Interest Rate. Then, Canonical Discriminant Analysis was used to group similar countries together based on these economic characteristics.

Let us consider  $\mathbf{x}_{i1}, \mathbf{x}_{i2}, \dots, \mathbf{x}_{iN_i}$  are random samples from two multivariate normal populations,  $N_p(\mu_i, \Sigma_i)$  for  $i=1,2$ . Then, the test statistic Hotelling's  $T^2$  to test the difference between two mean vectors is defined as,

$$T^2 = \frac{N_1 N_2}{N_1 + N_2} (\hat{\mu}_1 - \hat{\mu}_2)' \hat{\Sigma}^{-1} (\hat{\mu}_1 - \hat{\mu}_2) \quad \text{and} \quad \hat{\Sigma} = \frac{(N_1 - 1)\hat{\Sigma}_1 + (N_2 - 1)\hat{\Sigma}_2}{N_1 + N_2 - 2}; \quad \text{where}$$

$\mu_1$  and  $\mu_2$  are the two mean vectors from two different populations and  $\Sigma$  is the pooled variance-covariance matrix (see Johnson 1998, p.420 for further details). Note that Hotelling's  $T^2$  is proportional to the Mahalanobis  $D^2$  to measure the distance between two mean vectors  $\mu_1$  and  $\mu_2$ . Therefore, Mahalanobis  $D^2$  measure alone is sufficient to perform the multivariate analysis and test the difference between two mean vectors at a multidimensional level. Consequently, only Mahalanobis  $D^2$  measure was used in this paper for the assessment of similarity/differences of these countries economic profiles. In addition, canonical correlation also aid into the classification decision making process.

These methodologies were used to observe the similarities and differences between two countries economic profiles on the basis of five economic factors collectively. Canonical discriminant analysis (a dimension reduction technique) was then used to classify countries that grouped together and worthy of belonging to the European Union on the basis of their economic characteristics. Thus, this device (or technique) classified countries according to their economic similarities and clustered them together into one group and at the same time keep them separated from another group of countries that have dissimilar economies. The resulting clusters of countries should then exhibit high internal (within-cluster) homogeneity and high external (between-cluster) heterogeneity. Accordingly, if the classification is successful, countries within the cluster will be closer together in-terms of their economy, and countries between clusters will be further apart.

#### IV. Empirical Classification Analysis

In this study, we examined the phenomenon of country classification in two phases. In the first phase, we have calculated the mean vectors of size five for five economic factors for each of the 13 different countries and their correlation (pair-wise) matrix to identify possible similarities or differences between countries in-terms economic characteristics by using univariate analysis as shown in Table 2 and Table 4. These preliminary analyses encouraged us to conduct multivariate analyses using Mahalanobis  $D^2$  and Canonical Correlation. Analyses were done using SAS programming software and the results were reported in Table 3 and Table 5. Results show that Mahalanobis  $D^2$  is consistently higher with Turkey and Bulgaria compared to other 11 countries considered in this paper. On occasion Portugal and Netherlands also exerted some higher values on these statistics. This leads us to employ Canonical Discriminant Analysis using SAS to separate and cluster countries that are together according to their economy. Results of univariate mean comparison tests (top half of Table 4) by economic factors reveal that all five economic factors are significantly differentiating country specific means with the most significant ones being GDP growth, Current Account Balance, and Unemployment rate with F statistics of 21.88 (p-value < 0.0001), 19.63 (p-value < 0.0001), and 19.58 (p-value < 0.0001) respectively. Country differences are found to be most widely separated according to their economic profiles by the first canonical function (Can1). Which is a linear combination of economic factors as follows:  $0.6513798 \text{ GDP growth rate} - 0.1946843 \text{ Current Account Balance} + 0.4562219 \text{ Inflation} + 0.54310126 \text{ Unemployment Rate} - 0.0931799 \text{ Long-term Interest Rate}$  with a high  $R^2$  of 0.936812 between this canonical variable and the country classification variable. Next we analyzed the eigenvalues and likelihood ratio test statistics to determine the dimensionality of the canonical space. Although, the first four canonical functions are statistically significant, first two functions alone account for 81.66% of the total variability and the eigenvalues of these two functions are greater than one. Therefore, these thirteen countries means seem to fall into a two-dimensional subspace within the five-dimensional space of economic factors. These two canonical variables were estimated to be

$$\begin{aligned} \text{CAN1} &= 0.6513798 \text{ GDP growth rate} - 0.1946843 \text{ Current Account Balance} + 0.4562219 \\ &\text{Inflation} + 0.54310126 \text{ Unemployment Rate} - 0.0931799 \text{ Long-term Interest} \quad \text{and} \\ \text{CAN2} &= 0.4410642 \text{ GDP growth rate} - 0.0238839 \text{ Current Account Balance} - 0.1213042 \\ &\text{Inflation} - 0.5711502 \text{ Unemployment Rate} + 0.1373904 \text{ Long-term Interest.} \end{aligned}$$

These functions were then calculated (also known as z-scores, see Hair et. al., 1998, p.263) for each country and plotted in Graph 1 to observe the clustered outcome of countries. This suggested that there are two different distinct clusters formation by the first canonical function. One formed by Turkey and Bulgaria and the other cluster formed by rest of the EU countries. This result is also supported by higher Mahalanobis  $D^2$  for Turkey and Bulgaria as reported in Table 3. Second canonical function provides classification between Turkey and Bulgaria themselves. It is interesting to note that the first canonical variable which discriminates Turkey-Bulgaria with respect to other EU countries accounts for 66.20% of the total variation. Also note that the distance between clusters formed by the first canonical function (Can1) is much greater than the distance between clusters formed by the second canonical function (Can2) as can be seen with respect to axis (x and y) in Graph 1. However, second canonical function also formed another separation between Turkey and Bulgaria. This probably indicates that Turkey may not have achieved the necessary economic status to enter the EU for the time period considered in this paper.

## V. Discussion and Conclusion

Turkey's position is so unique both geographically and politically that it offers a very interesting instance for economic integration analysis. Economic relationship of Turkey with the western world is exceptionally long and mutually beneficial to both. Turkey's drive to join the EU has faced many impediments and confronted numerous challenges. Financial Times, a venerable European news paper endorsed EU membership for Turkey. In spite of that, there is some hesitancy among the current EU members to accept Turkey into the union. Bulgaria and Romania were accepted into the union in 2007. The basic motivation for European Union integration is to establish a single market for goods, services, and capital among the member nations. Therefore, this paper examined and compared the economic profiles of Turkey and Bulgaria to see how similar or dissimilar these two countries on the economic dimensions.

This paper applied the classification and clustering (integration) methodology to economic data collected for 13 European countries. Multivariate analyses that included Mahalanobis  $D^2$ , canonical correlation, and canonical discriminant analysis revealed that Turkey may not be classified as a member of EU yet on the basis of five economic factors that we have considered in this paper. However, Bulgaria is also classified as a separate cluster with respect to other EU members. This provides an opportunity for the Turkey's economic policy makers to align their country's economy for future consideration for acceptance into the EU. Specifically, Turkey would like to place a considerable emphasis on the long-term stabilization of their interest rate and inflation. If the policy makers concentrate on these economic factors and implement necessary policies, Turkey may eventually achieve an economy that is similar to the long-lasting EU member nations. At that stage Turkey can legitimately lay a claim for EU membership.

TABLE 1: Summary Statistics of Factors by Countries

Countries	Factors	Mean	Std Dev	Minimum	Maximum
Austria	GDP	1.9	0.9137833	0.9	3.1
	CB	0.9016	1.5426812	-0.965	3.2
	INF	1.78	0.3898718	1.4	2.3
	UNMP	5.8552	1.6100196	4	7.2
	I-RATE	4.0910	0.5824679	3.38	4.9
Belgium	GDP	1.92	0.9121403	1	3
	CB	3.36	1.0734757	2	4.59
	INF	1.98	0.501996	1.6	2.8
	UNMP	11.48	1.89	8.30	12.80
	I-RATE	4.054	0.5586389	3.365	4.89
Finland	GDP	3.1	1.4747881	1.6	5.3
	CB	6.174	3.5858444	0.5	10.22
	INF	1.02	0.5932959	0.2	1.6
	UNMP	8.6064	0.5631628	7.717	9.08
	I-RATE	4.0716	0.5990036	3.35	4.98
France	GDP	1.82	0.4764452	1.1	2.3
	CB	-0.4522	1.0370796	-1.41	0.819
	INF	1.82	0.2683282	1.5	2.1
	UNMP	9.035	0.1269843	8.9	9.175
	I-RATE	4.0595	0.5336601	3.41	4.860
Germany	GDP	1.46	1.3164346	-0.2	2.9
	CB	4.314	1.4479744	1.9	5.69
	INF	1.7	0.3674235	1.1	2
	UNMP	10.341	1.1008541	9.2	11.68
	I-RATE	4.00	0.5227919	3.35	4.78
Greece	GDP	4.3	0.509902	3.7	4.9
	CB	-6.424	1.8531676	-9.62	-4.91
	INF	3.36	0.304959	2.9	3.6
	UNMP	9.872	0.6264743	8.9	10.5
	I-RATE	4.260	0.5558113	3.585	5.12
Ireland	GDP	5	0.7615773	4.3	5.9
	CB	-2.68	2.2603318	-5.13	0
	INF	3.34	1.0454664	2.2	4.7
	UNMP	4.448	0.1275539	4.3	4.65
	I-RATE	4.056	0.6091289	3.32	4.98
Italy	GDP	0.7	0.7582875	0.1	1.9
	CB	-1.416	0.7108657	-2.56	-0.77
	INF	2.3	0.2915476	2	2.7
	UNMP	7.925	0.7373941	6.775	8.6
	I-RATE	4.238	0.533942	3.55	5.03
Netherlands	GDP	1.88	1.0329569	0.3	3
	CB	7.592	1.2475857	5.49	8.57
	INF	1.58	0.4207137	1.1	2.1
	UNMP	3.5284	0.827475	2.267	4.325
	I-RATE	4.0526	0.557263	3.37	4.89
Portugal	GDP	0.64	0.8234076	-0.7	1.3
	CB	-8.206	1.4317577	-9.7	-6.13
	INF	2.94	0.5683309	2.3	3.6
	UNMP	6.646	1.063875	5.08	7.65
	I-RATE	4.136	0.5692919	3.43	5.00
Spain	GDP	3.44	0.3130495	3.1	3.9
	CB	-6.71	2.2928476	-8.8	-3.49
	INF	3.06	0.4335897	2.4	3.5
	UNMP	9.7396	1.2771377	8.5	11.38
	I-RATE	4.0716	0.5795121	3.38	4.95
Turkey	GDP	6.68	1.4788509	5.2	8.9
	CB	-5.972	1.7914017	-7.87	-3.35
	INF	13	6.9274815	8.5	25.3
	UNMP	10.235	0.2288558	9.875	10.5
	I-RATE	31.06	18.228357	15.6	59.5
Bulgaria	GDP	6.04	0.6107373	5	6.6
	CB	-8.084	7.7790186	-18.36	2.3
	INF	5.62	2.0992856	2.3	7.4
	UNMP	12.521	3.4538319	9	17.8
	I-RATE	4.84	1.3635065	3.34	6.75

**TABLE 2A: Correlations (pair-wise) of GDP Growth by Countries.**

	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	Turkey	Bulgaria
Austria	1.00	0.88	0.98	0.17	0.68	0.03	0.55	0.87	0.50	0.67	0.36	-0.44	0.44
Belgium	0.88	1.00	0.89	-0.23	0.25	0.17	0.44	0.93	0.05	0.84	0.05	-0.42	0.19
Finland	0.98	0.89	1.00	0.13	0.63	0.10	0.40	0.93	0.44	0.64	0.19	-0.44	0.44
France	0.17	-0.23	0.13	1.00	0.65	0.31	0.23	-0.17	0.89	-0.58	0.56	0.50	0.87
Germany	0.68	0.25	0.63	0.65	1.00	-0.25	0.39	0.36	0.92	0.09	0.61	-0.32	0.57
Greece	0.03	0.17	0.10	0.31	-0.25	1.00	-0.13	0.14	0.00	-0.31	-0.25	0.77	0.63
Ireland	0.55	0.44	0.40	0.23	0.39	-0.13	1.00	0.16	0.39	0.47	0.87	-0.09	0.25
Italy	0.87	0.93	0.93	-0.17	0.36	0.14	0.16	1.00	0.12	0.72	-0.14	-0.50	0.22
Netherlands	0.50	0.05	0.44	0.89	0.92	0.00	0.39	0.12	1.00	-0.22	0.68	0.07	0.78
Portugal	0.67	0.84	0.64	-0.58	0.09	-0.31	0.47	0.72	-0.22	1.00	0.08	-0.73	-0.32
Spain	0.36	0.05	0.19	0.56	0.61	-0.25	0.87	-0.14	0.68	0.08	1.00	0.02	0.38
Turkey	-0.44	-0.42	-0.44	0.50	-0.32	0.77	-0.09	-0.50	0.07	-0.73	0.02	1.00	0.51
Bulgaria	0.44	0.19	0.44	0.87	0.57	0.63	0.25	0.22	0.78	-0.32	0.38	0.51	1.00

**TABLE 2B: Correlations (pair-wise) of Current Account Balance by Countries.**

	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	Turkey	Bulgaria
Austria	1.00	-0.88	-0.33	-0.79	0.56	-0.85	-0.84	-0.80	0.06	-0.86	-0.73	-0.63	0.33
Belgium	-0.88	1.00	0.67	0.94	-0.87	0.75	0.96	0.86	-0.53	0.76	0.95	0.92	-0.06
Finland	-0.33	0.67	1.00	0.64	-0.67	0.23	0.59	0.46	-0.77	0.53	0.73	0.84	0.54
France	-0.79	0.94	0.64	1.00	-0.86	0.52	0.99	0.65	-0.54	0.73	0.98	0.94	0.16
Germany	0.56	-0.87	-0.67	-0.86	1.00	-0.53	-0.86	-0.75	0.83	-0.37	-0.93	-0.93	-0.04
Greece	-0.85	0.75	0.23	0.52	-0.53	1.00	0.60	0.95	-0.12	0.58	0.53	0.46	-0.65
Ireland	-0.84	0.96	0.59	0.99	-0.86	0.60	1.00	0.72	-0.50	0.73	0.97	0.92	0.05
Italy	-0.80	0.86	0.46	0.65	-0.75	0.95	0.72	1.00	-0.43	0.54	0.71	0.67	-0.47
Netherlands	0.06	-0.53	-0.77	-0.54	0.83	-0.12	-0.50	-0.43	1.00	-0.01	-0.67	-0.76	-0.36
Portugal	-0.86	0.76	0.53	0.73	-0.37	0.58	0.73	0.54	-0.01	1.00	0.66	0.62	0.09
Spain	-0.73	0.95	0.73	0.98	-0.93	0.53	0.97	0.71	-0.67	0.66	1.00	0.98	0.17
Turkey	-0.63	0.92	0.84	0.94	-0.93	0.46	0.92	0.67	-0.76	0.62	0.98	1.00	0.29
Bulgaria	0.33	-0.06	0.54	0.16	-0.04	-0.65	0.05	-0.47	-0.36	0.09	0.17	0.29	1.00

**TABLE 2C: Correlations (pair-wise) of Inflation Rate by Countries.**

	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	Turkey	Bulgaria
Austria	1.00	0.84	-0.50	-0.16	-0.10	-0.11	0.00	-0.55	-0.23	-0.72	0.85	0.09	-0.06
Belgium	0.84	1.00	-0.47	-0.50	0.28	-0.15	0.23	-0.77	-0.56	-0.88	0.65	-0.38	0.49
Finland	-0.50	-0.47	1.00	0.11	-0.48	0.50	0.67	0.14	0.48	0.75	-0.76	0.47	-0.16
France	-0.16	-0.50	0.11	1.00	-0.76	0.68	-0.59	0.89	0.03	0.62	0.18	0.65	-0.66
Germany	-0.10	0.28	-0.48	-0.76	1.00	-0.74	0.02	-0.49	-0.34	-0.61	-0.09	-0.94	0.76
Greece	-0.11	-0.15	0.50	0.68	-0.74	1.00	0.05	0.51	-0.24	0.55	-0.03	0.48	-0.17
Ireland	0.00	0.23	0.67	-0.59	0.02	0.05	1.00	-0.63	0.25	0.03	-0.50	0.00	0.33
Italy	-0.55	-0.77	0.14	0.89	-0.49	0.51	-0.63	1.00	0.08	0.74	-0.14	0.43	-0.52
Netherlands	-0.23	-0.56	0.48	0.03	-0.34	-0.24	0.25	0.08	1.00	0.51	-0.44	0.62	-0.68
Portugal	-0.72	-0.88	0.75	0.62	-0.61	0.55	0.03	0.74	0.51	1.00	-0.64	0.62	-0.52
Spain	0.85	0.65	-0.76	0.18	-0.09	-0.03	-0.50	-0.14	-0.44	-0.64	1.00	0.02	-0.13
Turkey	0.09	-0.38	0.47	0.65	-0.94	0.48	0.00	0.43	0.62	0.62	0.02	1.00	-0.90
Bulgaria	-0.06	0.49	-0.16	-0.66	0.76	-0.17	0.33	-0.52	-0.68	-0.52	-0.13	-0.90	1.00

**TABLE 2D: Correlations (pair-wise) of Unemployment Rate by Countries.**

	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	Turkey	Bulgaria
Austria	1.00	-0.05	-0.66	0.97	-0.80	-0.18	-0.68	-0.73	0.85	0.85	-0.26	-0.59	-0.85
Belgium	-0.05	1.00	0.72	-0.01	-0.41	0.79	0.13	0.69	0.35	-0.23	0.36	0.80	0.27
Finland	-0.66	0.72	1.00	-0.56	0.16	0.82	0.53	0.99	-0.33	-0.83	0.64	0.93	0.83
France	0.97	-0.01	-0.56	1.00	-0.82	-0.05	-0.60	-0.64	0.84	0.73	-0.10	-0.53	-0.76
Germany	-0.80	-0.41	0.16	-0.82	1.00	-0.40	0.73	0.23	-0.72	-0.43	-0.27	0.20	0.40
Greece	-0.18	0.79	0.82	-0.05	-0.40	1.00	0.04	0.77	0.00	-0.60	0.86	0.67	0.61
Ireland	-0.68	0.13	0.53	-0.60	0.73	0.04	1.00	0.53	-0.30	-0.47	-0.09	0.65	0.41
Italy	-0.73	0.69	0.99	-0.64	0.23	0.77	0.53	1.00	-0.40	-0.85	0.60	0.93	0.86
Netherlands	0.85	0.35	-0.33	0.84	-0.72	0.00	-0.30	-0.40	1.00	0.76	-0.32	-0.13	-0.77
Portugal	0.85	-0.23	-0.83	0.73	-0.43	-0.60	-0.47	-0.85	0.76	1.00	-0.73	-0.62	-0.99
Spain	-0.26	0.36	0.64	-0.10	-0.27	0.86	-0.09	0.60	-0.32	-0.73	1.00	0.34	0.72
Turkey	-0.59	0.80	0.93	-0.53	0.20	0.67	0.65	0.93	-0.13	-0.62	0.34	1.00	0.62
Bulgaria	-0.85	0.27	0.83	-0.76	0.40	0.61	0.41	0.86	-0.77	-0.99	0.72	0.62	1.00

**TABLE 2E: Correlations (pair-wise) of Interest Rate by Countries.**

	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	Turkey	Bulgaria
Austria	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.93	0.97
Belgium	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.97
Finland	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.97
France	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.94	0.97
Germany	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.97
Greece	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.93	0.94
Ireland	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.96
Italy	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.95
Netherlands	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.94	0.97
Portugal	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.96
Spain	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.97
Turkey	0.93	0.94	0.94	0.94	0.93	0.93	0.94	0.92	0.94	0.93	0.94	1.00	0.97
Bulgaria	0.97	0.97	0.97	0.97	0.97	0.94	0.96	0.95	0.97	0.96	0.97	0.97	1.00

**TABLE 3: Mahalanobis Squared Distance-  $D^2$  by Countries**

Country	AU	BE	BU	FI	FR	GE	GR	HO	IR	IT	PO	SP	TU
AU	0	21.7102	103.487	9.2474	7.3811	13.3610	36.8199	11.3329	14.9827	5.4568	14.8528	29.8315	100.827
BE	21.7102	0	56.7474	9.8043	5.6376	1.7652	20.2536	49.5519	36.5181	12.7225	30.8474	16.7459	78.4563
BU	103.487	56.7474	0	85.3258	66.0564	74.9720	18.3217	167.162	68.4014	85.5784	84.8484	26.0703	34.3426
FI	9.2474	9.8043	85.3258	0	8.3935	5.7100	32.7481	20.0536	21.1333	14.5779	35.8557	29.6107	91.7809
FR	7.3811	5.6376	66.0564	8.3935	0	3.7387	17.2863	33.4338	20.8280	2.4117	11.9103	11.8285	76.7619
GE	13.3610	1.7652	74.9720	5.7100	3.7387	0	27.6431	34.1753	33.4202	7.8805	26.7072	22.3799	91.2935
GR	36.8199	20.2536	18.3217	32.7481	17.2863	27.6431	0	82.4817	22.5316	27.4595	27.5347	1.0588	36.2526
HO	11.3329	49.5519	167.162	20.0536	33.4338	34.1753	82.4817	0	33.2406	29.0380	48.3843	74.4735	154.770
IR	14.9827	36.5181	68.4014	21.1333	20.8280	33.4202	22.5316	33.2406	0	25.5023	28.1113	22.3874	64.5393
IT	5.4568	12.7225	85.5784	14.5779	2.4117	7.8805	27.4595	29.0380	25.5023	0	6.5171	19.2577	92.8314
PO	14.8528	30.8474	84.8484	35.8557	11.9103	26.7072	27.5347	48.3843	28.1113	6.5171	0	18.5674	88.7940
SP	29.8315	16.7459	26.0703	29.6107	11.8285	22.3799	1.0588	74.4735	22.3874	19.2577	18.5674	0	43.1547
TU	100.827	78.4563	34.3426	91.7809	76.7619	91.2935	36.2526	154.770	64.5393	92.8314	88.7940	43.1547	0

AU=Austria, BE=Belgium, BU=Bulgaria, FI=Finland, FR=France, GE=Germany, GR=Greece  
 HO=Netherlands, IR=Ireland, IT=Italy, PO=Portugal, SP=Spain, TU=Turkey

**TABLE 4: Univariate and Multivariate Tests on Equality of Means**

Univariate Test Statistics							
Variable	Total Standard Deviation	Pooled Standard Deviation	Between Standard Deviation	R-Square	R-Square / (1-RSq)	F Value	Pr > F
GDP Growth Rate	2.0959	0.9454	1.9776	0.8347	5.0485	21.88	<.0001
Current Balance % of GDP	5.9136	2.7901	5.5278	0.8191	4.5292	19.63	<.0001
Inflation	3.5559	2.0628	3.1305	0.7266	2.6572	11.51	<.0001
Unemployment Rate	2.8827	1.3615	2.6939	0.8188	4.5175	19.58	<.0001
Interest Rate	8.5630	5.0963	7.4636	0.7122	2.4748	10.72	<.0001

Multivariate Test Statistics and F Approximations					
Statistic	Value	F Value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.00146708	11.53	60	228.54	<.0001
Pillai's Trace	3.12577191	7.23	60	260	<.0001
Hotelling-Lawley Trace	22.39551893	17.41	60	148.06	<.0001
Roy's Greatest Root	14.82589702	64.25	12	52	<.0001

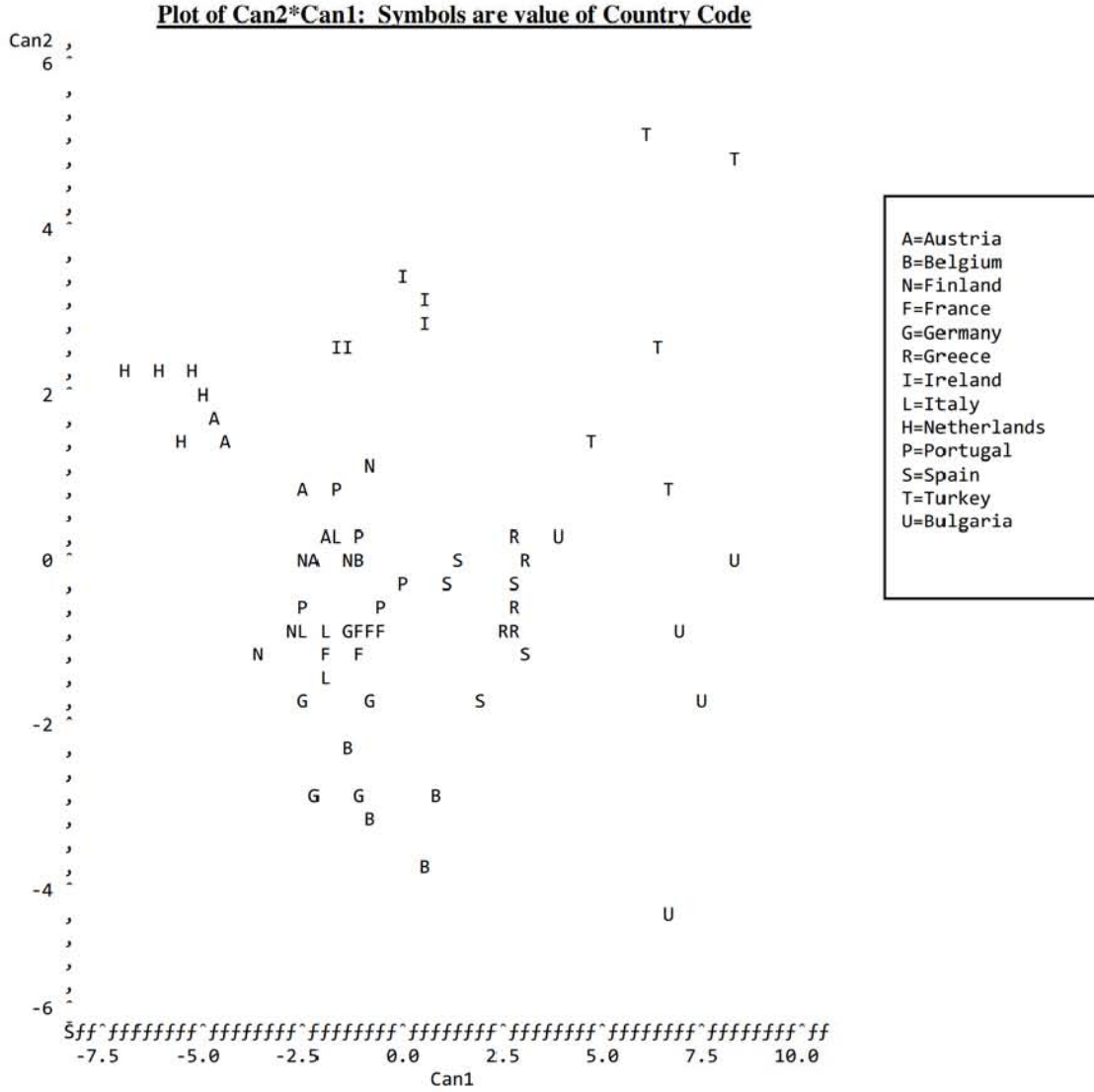
**TABLE 5: Canonical Discriminant Analysis**

	Canonical Correlation	Adjusted Canonical Correlation	Approximate Standard Error	Squared Canonical Correlation	Eigenvalues of $\text{Inv}(E) \cdot H = \text{CanRs}q/(1-\text{CanRs}q)$			
					Eigenvalue	Difference	Proportion	Cumulative
1	0.967891	0.960077	0.007898	0.936812	14.8259	11.3632	0.6620	0.6620
2	0.880862	0.843189	0.028010	0.775918	3.4627	0.8749	0.1546	0.8166
3	0.849279	0.832907	0.034841	0.721275	2.5878	1.1908	0.1155	0.9322
4	0.763411	0.743334	0.052150	0.582797	1.3969	1.2746	0.0624	0.9945
5	0.330106	0.192824	0.111379	0.108970	0.1223		0.0055	1.0000

Test of H0: The canonical correlations in the current row and all that follow are zero					
	Likelihood Ratio	Approximate F Value	Num DF	Den DF	Pr > F
1	0.00146708	11.53	60	228.54	<.0001
2	0.02321793	7.21	44	189.42	<.0001
3	0.10361355	5.72	30	147.44	<.0001
4	0.37174058	3.63	18	102	<.0001
5	0.89102977	0.79	8	52	0.6095

Raw Canonical Coefficients		
Variable	Can1	Can2
GDP Growth Rate	0.6513798162	0.4410642159
Current Balance % of GDP	-.1946843246	-.0238839067
Inflation	0.4562219832	-.1213042142
Unemployment Rate	0.5431012554	-.5711502141
Interest Rate	-.0931798933	0.1373904084

**GRAPH 1: Plot of Canonical Discriminant Functions.**



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