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ABSTRACT: In this paper, we consider whether any further ties for the European Union

(EU) – leading to a federal state like the United States of America – are possible or if, in

the opposite direction, the EU should be disbanded. To do so, we collect data from all 27

EU countries plus the United Kingdom (UK) since 1980 on net national debt variation,

Introduction

European nations have a long common history, spanning peace times and terrible war periods. After what is still considered the largest conflict in modern history, World War II, European nations thought that changes were needed to prevent such events from happening again. As a general guide, they rested on the fundamental idea that you do not attack your business partner. Indeed, if all European nations shared common interests, the costs of war would outweigh the benefits. From this perspective, European states sought closer economic, political, and human ties in order to foster prosperity. Consequently, the Treaty of Paris of 1951, which followed the treaty of Brussels of 1948, created the first step toward

claimed a foreign country with an inflation rate too high or too low compared to the average of the countries within an existing monetary alliance would not be compatible for adopting the currency. Indeed, countries with higher inflation rates for instance are going to have faster increases in prices for goods and services compared to other countries with low inflation rates. Consequently, there is a possibility that the competitiveness of these countries is affected, since one country A with high inflation will have more expensive good and services relative to country B with low inflation. In other words, the exports of country A will become more expensive compared to other countries, leading to negative consequences for the country in terms of GDP and unemployment.

Furthermore, countries with different inflation rates might not react to external shocks in the same manner, which then makes it harder for the Central Bank to correctly adjust monetary policies since different countries have different inflation situations. Additionally, other factors are mentioned by Mundell (1961) but which are harder to measure, like labor mobility and financial integration. In fact, in the union, according to Mundell (1961), countries need a fluid labor mobility between the members to help mitigate economic shocks by allowing people to freely move to other regions to find better job opportunities. Then, financial integration between countries is a key factor as countries need to be able to exchange capital flows within the union.

Optimal Economic Unions

Currently, the EU has exclusive rights when it comes to regulating members of the Union, like the single market's competition rules, monetary policy for Eurozone, trade policy, and policies regarding marine plants and animals. In the United States of America (hereafter the U.S), by contrast, the federal government has power over fiscal, monetary, and foreign

policies, as well as internal and external security. That is, the U.S. provides an example of a more encompassing economic union. But would a more complete economic union (in the spirit of the U.S.'s) be desirable for European countries?

Firstly, economic growth should increase thanks to the benefits that stem from integrated markets with a common currency; benefits like economies of scale, market efficiency, and increased trade flows. On this point, the countries of the EU have modeled themselves after the U.S. with their one integrated market and the Euro. However, a fully integrated fiscal policy is part of what enabled the U.S. to have a business success story, and the EU currently lacks this. Adopting one comprehensive fiscal policy would foster a greater coordination of all member countries' policies, enabling the central government to react during economic downturns and to better allocate resources in regions that need it the most. This missing fiscal tool prevents the European nations from navigating economic downturns and shocks more effectively and preventing them from achieving more sustainable growth.

In this project, we are going to assess the credibility of creating a federal European Union, or "European Federation," where countries not only share a common currency, but also a common fiscal policy, common internal and external security systems, and a common political system. The member states would still keep much of their independence and the right to set their own internal rules, based on the American system known as the "Supremacy Clause," the concept that federal law supersedes state law. Article VI, Clause 2 of the United States Constitution, states that "this Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the

Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding."

Data and Description of Variables

A pairwise correlation analysis on 28 countries with four different indicators (inflation; GDP; unemployment; and net debt) is conducted. The 28 countries are all the members of the European Union plus the United Kingdom. These countries were selected for the purpose of this research to assess any possible unification of these countries, and we include the United Kingdom for their land proximity and common history with the European Union. All-time series variables are expressed in terms of percentage changes to avoid any non-stationarity concerns, and the analysis runs yearly data from 1980 to 2022.

financial crisis of 2008-2009 caused a huge decrease in demand in the housing

market.

- Policy shocks occur when there is an unexpected change in the monetary or fiscal

  policy of a country. A possible policy shock can happen when a central bank

  decides to increase interest rates for example, hence decreasing the confidence of

  investors in the economy, and directly affecting borrowing costs.

- Technology shocks occur when there is an unexpected innovation in technology

  that heavily affects supply or demand. The widespread use of the Internet in the

  1990's is a good example of such a shock, or the 2010's shift in consumer

  preferences in the music industry, switching from CDs to streaming.

- Financial shocks occur when there is an unexpected crash or bankruptcies in the

  financial services industry. Such shocks happened during the dot-com bubble

  burst in the early 2000's where the investment in technology crashed.

In general, shocks are anything that will impact key economic indicators in a country.

Massive shocks could be a war like WWII or a pandemic like Covid-19. Market

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general. For instance, a high inflation rate

The unemployment rate is also an

and that now are going to have to deal with highly indebted southern states like Spain,

Italy, or Greece. These issues are based on two main concerns:

- First, northern countries as the Netherlands or Germany with their lower debt
  have historically been able to borrow money at much lower costs than southern
  countries like Spain, Italy, or Greece, which are characterized by high state debt.
  This is due to the fact that when lending money to countries investors are
  expecting higher yields of return for riskier investment, and the more a state is
  indebted, the riskier it is considered, hence increasing its interest rate. So, a main
  reason for northern states to have concerns on a unification is that it will
  inevitably increase their borrowing costs.

- Second, the unification of debt resonates with risk sharing for northern states.
  Indeed, some weaker countries are more likely to be heavily impacted by shocks
  due to the weakened economy that they have, hence being a burden for more
  advanced countries that will have to give financial support to the state member in
  difficulty, like the Greece crisis of 2012-2014. Also, relying too much on
  financial support from other states can foster a situation where a country does not
  pass the necessary policies and reforms to mitigate risks in its economy, hence
  becoming a bigger burden of the future of the union.

Results

Methodology

The Pearson Correlation Coefficient provides a single number, between -1 and 1, that

measures the relationship between two or more variables. If the number is close to -1, it

means that there is a strong negative correlation between the two variables, in that when one variable increases the other is very likely to decrease. A strong negative relationship is considered to be any value below -.7 by convention, while a strong positive relationship is considered to be any number above .7 by convention as well.

Letting N denote the correlation coefficient,

$$N = \frac{n(\sum XY) - (\sum :)(\sum ;)}{\sqrt{n \sum 2 - (\sum :)^6 \ldots ;2 - (\sum ;)}}$$

since the economy of Greece is mainly driven by tourism while the Estonian one is mostly

driven by technology and innovation.

Empirical Results

Ticker	Countries	Ticker	Countries	Ticker	Countries
A	Austria	F	France	N	Netherlands
B	Belgium	FL	Finland	P	Portugal
BL	Bulgaria	G	Greece	PL	Poland
C	Croatia	H	Hungary	R	Romania
CY	Cyprus	I	Italy	S	Sweden
CZ	Czechia	IR	Ireland	SK	Slovakia
DK	Denmark	L	Luxembourg	SL	Slovenia
D	Germany	LA	Latvia	UK	United Kingdom
E	Spain	LT	Lithuania		
ES	Estonia	M	Malta		

Stars "*" refer to a p-value under 0.05, meaning there is strong evidence to reject the null

hypothesis that there is no correlation between two values. In other words, a p-value of

0.05 suggests that the observed results are unlikely to have occurred under the assumption

that the null hypothesis is true, with the null hypothesis being that there is no correlation.

As shown in Figure 1, certain countries especially since the late 2000's have shown pretty similar patterns in terms of GDP growth, which likely translates to an important Pearson Coefficient level. However, if we add a country like Greece to this graph, we can see by the eye that their GDP growth is not fluctuating in the same manner as this larger group:
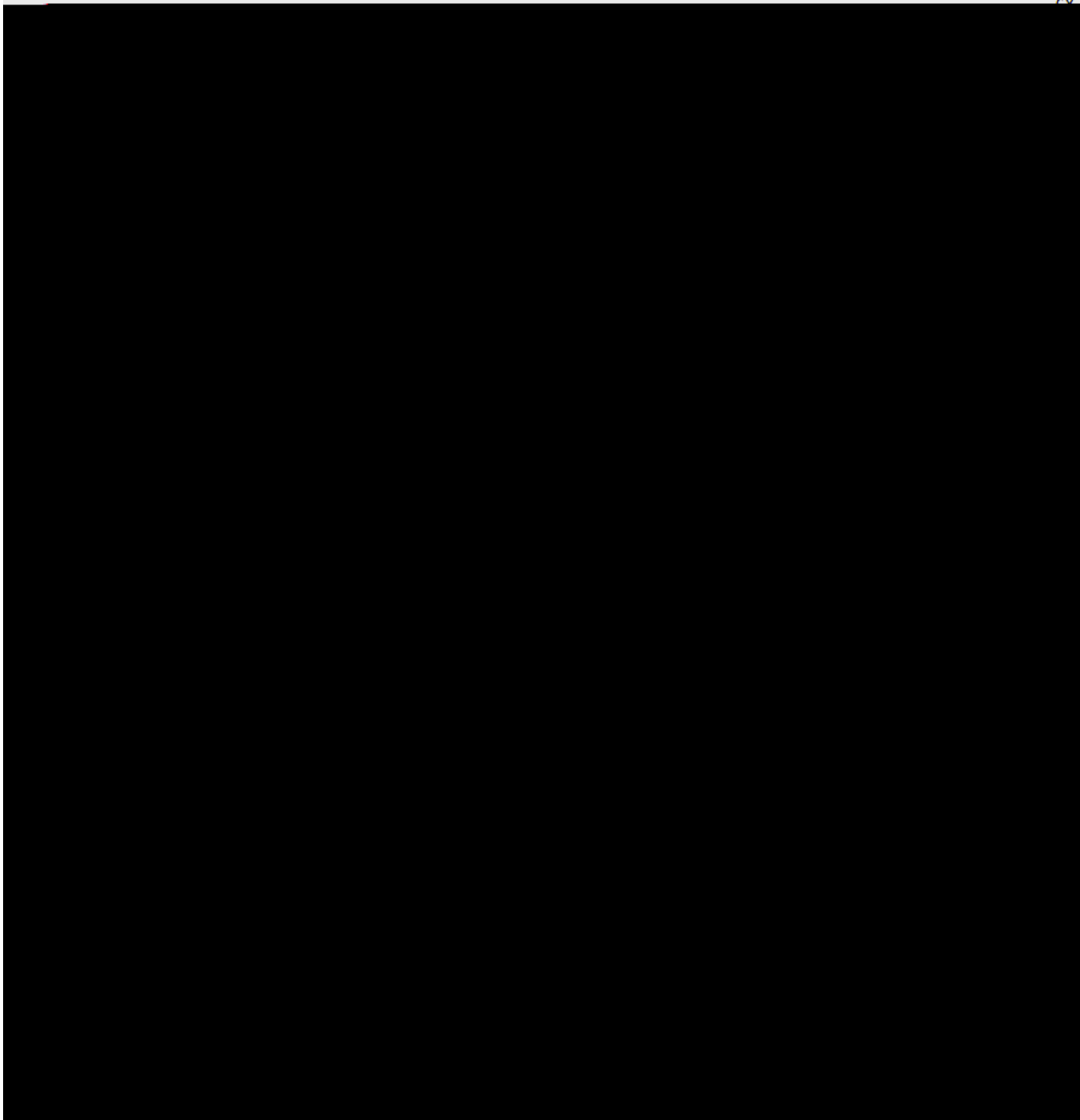
Figures 2 and 3 illustrate the difference between what we refer to as "Tier 1" countries, meaning those that correlate most closely with one another, and a country that does not. Here in Yellow, Greece has not been fluctuating the same way as other countries since the late 2000's and especially in the early 2010's where

	var1	A_debt
var1	1.0000	
A_debt	-0.2826	1.0000

	DK_debt	ES_debt	FL_debt	F_debt	D_debt	G_debt	H_debt
DK_debt	1.0000						
IR_debt	0.6381*			0.3872*	0.3086*	0.4253*	0.3944*

	Inflat~n	A_infl~n	B_infl~n	BL_inf~n	C_infl~n	CY_inf~n	CZ_inf~n
Inflation	1.0000						

	years	A_unem~t	B_unem~t	BL_une~t	C_unem~t	CY_une~t	CZ_une~t
years	1.0000						

In this third analysis, we notice that unemployment fluctuations in terms of percentage change is closely related to geographical locations of countries. It seems like countries that share common borders tend to show similar patterns in terms of unemployment rates change. For example, Lithuania and Latvia shows a Pearson correlation of 0.96. Similarly, France and Belgium show a Pearson correlation of 0.71.

Gross Domestic Product

- x Gross Domestic Product change in percentage (%) since 1981 for the following countries:

B_GDP_Growth   0.7970*   1.0000

ro~h   −0.3846*   0.5862*   0.5978*   1.0000

DK_GDP_Gro~h   0.6379*   0.5770*   0.4539*   0.6355*

ES_GDP_Gro~h   0.5252*   0.5207*   0.5811*

H_GDP_Growth   0.3339*   0.4114*   0.5612*   0.3220*

LT_GDP_Gro~h

After this fourth analysis, we notice similar patterns in terms of change in percentage of

GDP growth and inflation. We can also find similarities between fluctuations in terms of

net debt issuance from government and unemployment rates as they do not show as much

Tier 1 Group

The first group that catches our attention is what we call the "Tier 1 Group", composed of the following countries: Spain, France, Belgium, Luxembourg, Italy, Denmark, the Netherlands, Germany, Austria, Sweden, Ireland, Malta, and the United Kingdom. This group stands out over the others because they present relatively high Pearson Correlation levels between them, making them a logical pick for a union. In particular, it was easier to find similar pattern in terms of inflation rates and GDP growth than unemployment and debt levels. But still, we are able to distinguish three distinct groups. As mentioned before, we are looking for countries that are correlated in order for them to fluctuate in the same direction, so that to ease the implementation of fiscal and monetary policies that will be the best and most efficient for the countries. Consequently, the Tier 1 Group is the first group of countries potentially compatible together according to the four coefficients calculated above. This means that the countries cited above are likely to ether a Tc 3e cihu B(ab)-4 (o)-4 (A.9d8g2 (he

Ti so 2 Group is a

central government. Subsequently, Tier 2 countries should stay in the EU system as it currently stands right now, though without the Tier 1 countries. Finally, Tier 3 countries like Bulgaria or Hungary are just not compatible for any type of alliance. According to our results, they should be removed of the EU and be treated as other countries like Ukraine or Turkey. It may be wise to maintain privileged commercial ties and (no-)tariff arrangements to maintain economic interactions, but nothing beyond that unless those countries exhibit major changes in terms of economic performance in the future.

References

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