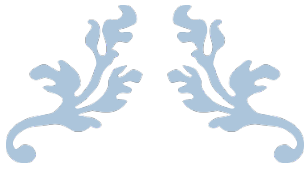

TO BE OR NOT TO BE

Examining the effects of membership of the European Union on growth and stability

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ABSTRACT

The objective of this project is to see if there is a link between being a member state in the European Union and a country's economic health. While economic trade theory tells that economic unions increase the overall welfare of a country, it is necessary to econometrically test its effects on the member's economic growth rate and price stability.

The dataset includes 19 countries, ten within the European Union and nine without, and spans for twenty years from 1997 to 2016. The method undertaken in this project is the differences-in-differences model that makes a common trends assumption to deal with unobserved differences between groups. It uses dummy variables for the treatment group, treatment period, and interaction between the two and does a simple linear regression. With the two equations, the outcome variables are GDP growth rate and price stability, expressed as a dummy variable.

The results show that there is no statistically significant relationship between being in the European Union and economic growth and stability. However, this does not necessarily mean that the European Union is not useful as growth rates and likelihood of stability are at a higher level than those not in the European Union.

INTROUCTION

Traditional economic theory tells that trade is beneficial to the welfare of a nation. David Ricardo's international trade theory is the basis of the support for the abolishment of trade restrictions and increasing trade. Ricardian trade theory is founded on comparative advantage and specialization. The main premise is trade allows a country to consume more than it would be able to produce itself. With trade barriers, commerce abroad becomes more expensive and decreases its benefits. By removing trade discrimination, profits should increase. Other trade theories, including the Heckscher-Ohlin Model and the Specific-Factors Model, postulate that countries will either be no worse off or better due to an increase in trade.

The formation of economic unions is important to trade theory as they eliminate trade restrictions between the member countries. By abolishing import tariffs and quotas, it should allow trade to flourish and should increase the prosperity of the union as a whole, based upon trade theory. This project proposes to study the causal relationship between being in an economic union and a country's economic health.

There are innumerable variables that affect economic health and development, such as technology, social and political factors, unemployment, and human and natural capital. In order to deal with the heterogeneity, they will be held as constant between countries, utilizing the differences-in-differences methodology. Two sets of countries will be analysed with the treatment being in an economic union. The focus will be primarily on the European Union (EU).

Created in 1993, with 12 member states, the European Union has become the largest regional integration system. While the organization has become increasing more political, one of its main goals is to promote the economic growth of its members. Due to its strength and longevity, it has become a model for other regional unions and the effects that it has could possibly reoccur in these newer unions.

With fewer barriers to trade, a single currency, and financial assistance from integration, the EU has many pros but with countries having to give up sole governance, political entanglement, and looser borders, many have debated whether the costs of joining are worth the benefits that come with the alliance. If joining does impact economic growth, other countries will continue to join. While five countries are awaiting the transition from candidate to member, the United Kingdom has decided to leave the union. As such, more countries have begun to decide if remaining is in their best interests.

Many other regions have also created economic unions using the European Union as a guide. If the EU is not as beneficial as hoped, it will cast a negative light for future integration around the world, decreasing membership, particularly from countries that can barely afford membership costs. It is these countries that have the most to gain or lose based on the performance of a union.

The hypothesis that is being tested is hence – being in the EU has an effect on the economic growth and stability of a country.

As there are costs to being in the EU, the hope is that the effect, if any, is positive. Countries with smaller economies will be looked at as their economies are more vulnerable. At this time there is no study that looks at the comprehensive effects of the European Union using multiple countries at once. Using multiple countries allows for the general trend to be seen instead of focusing on a country that could possibly be an outlier.

A common effect of economic integration is the sharing of risk. Poorer countries are able to take out bigger loans at the expense of richer ones (Castro & Koumtingué 2014, p116). Unions make consumption growth depend less on idiosyncratic income growth (Castro et. al, p133). Deep economic integration is rare and is normally between homogenous rich partners.

However, this risk sharing helps to why the EU was first created with the strongest countries and only recently began to open up to riskier areas. This risk sharing had lead to weaker countries taking out larger debts than they could afford, shown in the financial crisis of 2008.

Section two is a review of the existing literature and its limitations. Some of the existing literature review comes from the Topics in Applied Economics Project Proposal at the University of Manchester, while others come from the International Trade Theory and Policy course at Cornell University. The first part of the review will focus on traditional economic theory, while the second part will focus on closely related works.

In section three, there will be an explanation of the data. This will include descriptions of the variables and the descriptive analysis of each. It also includes the sources of data and the complications that can arise.

In section four, which is broken into two subsections, the Econometrics behind this research will be discussed. The first subsection will discuss the methodology to be used and the structural form, with the second giving the results, insights, and implications.

The last section concludes the dissertation.

LITERATURE REVIEW

Economic unions are still a controversial topic. Many question if being a part of a union is worth the costs that come with it. Scholars have debated the benefits of joining and participating in a coalition. Based on economic theory, all unions should have a positive effect, especially for the member countries with lower Gross Domestic Products. Some academics agree with this, however, others believe that this is not always the case. There is a final group that has mixed views on their worth.

ECONOMIC THEORY

In his book, the "The Theory of Economic Integration", Béla Balassa, a Hungarian economist and consultant with the World Bank, explains that economic integrations should create growth. Economic integrations suppress discrimination by removing trade barriers, therefore, growing international trade (Balassa 2011, p2). International trade then increases the exposure to different customers, creating a wider market. This lessens the uncertainty that can occur in intra-area trade. Multinational trade should alleviate cyclical variations of a country and increase the growth of the national income (Balassa, p6).

Economic theory also tells how restrictions affect the welfare of countries of different sizes. Imposed on a small country, tariffs will decrease the prosperity due to deadweight loss. As small countries will only import a small quantity of another's production, they have less of an ability to negotiate prices from the exporter. This leads to prices rising by the full amount of the tariff for the people (Feenstra, p273). A large country can turn a tariff into a net gain in welfare (Feenstra, p273). Discriminatory tariffs, those that do not affect all countries equally, are common and have a higher deadweight loss than an equal tariff (Feenstra, p273). Import quotas restrict the quantity of an import, raising the domestic price and production. Competition from imports eliminates monopoly power (Feenstra, p321).

In 1817, David Ricardo introduced his international trade theory of comparative advantage and specialization in his book "On the Principles of Political Economy and Taxation". According to Ricardo, foreign trade is "highly beneficial to a country, as it increases the amount and variety of the objects on which revenue may be expended, and affords, by

the abundance and cheapness of commodities, incentives to savings, and to the accumulation of capital" (Ricardo 1821, c7.8). Gains from trade occur as both countries will have a higher utility with free trade for its citizens than with no trade.

With an increase in trade between countries, there should be an increase in consumption, the overall standard of living, and wages of citizens. Countries with better technology will have higher wages than others but as countries continue to trade internationally, the Ricardian model predicts that all real wages will rise (Feenstra 2006, p45). This can be seen in both China and India. In 1978, before China opened up to international trade, the Chinese per capita income was $755 (based on 2005 dollars) and in 2010 it was $7,437 (Feenstra, p46). In India, the per capita income in 1978 was $1,040 but after trading, it rose to $3,477 in 2010 (Feenstra, p46). Many believe that the increase in welfare in these countries is in part due to the engagement in international trade.

Another model, integral to modern international trade theory is the Heckscher-Ohlin Model which builds upon the Ricardian model and assumes that trade occurs because countries have different resources. Countries will export goods that use the factor of production that it has in abundance; this factor will be used more efficiently and plentifully produced (Feenstra, p98). It predicts that factors used intensively in the exported good will have gains due to the increase in relative prices that occurs with the opening of trade; other factors will have losses (Feenstra, p119). While the gains are asymmetric, they will be higher than any losses that have occurred.

The Specific-Factors Model is a short-term model that looks at what happens if capital and land are fixed inputs and labour is variable. It finds that free trade does not make a country worse off and has the possibility of being better off. However, while the country is not worse, some factors of production lose while others gain (Feenstra, p82). Nevertheless, the gains made through the opening of trade will exceed the losses (Feenstra, p83). Therefore, the government can help increase everyone's betterment by taxing the winners and compensating the losers (Feenstra, p83). However, this is very hard to implement. While there are losses to some, the overall income, and therefore the overall economy, will be higher than without trade.

RELATED WORKS

According to some scholars, the European Union's influence on Europe's growth rates is undeniable. In 'Growth Effects of Economic Integration: Evidence from the EU Member States', Badinger acknowledges the fact that growth rates are obviously affected but questions whether the growth is affected temporarily or permanently (Badinger 2005, p51). The EU's single market fostered trade and economic growth after the Second World War. The fifteen European members that joined before its expansion in 2004 have reaped the benefits of the union. Without the incorporation that began in 1950, the EU-15 would have a GDP that would be a fifth lower (Badinger, p52). There is no doubt that integration had a significant impact on the post-war economies. His econometric results give evidence to the temporary effect of growth rates that are led by the investments given to countries, instead of by trade (Badinger, p74). The conclusion is while there has been growth, without the growth effect of trade, one cannot predict the EU's potential performance or the performance of other unions. However, his research did not include the 10 countries that were annexed into the EU in 2004 and does not include the financial crisis.

Multilateral trade rules provide a safer and more stable economic environment (Cedro & Melnyk 2014, p178). The formation of the EU has fostered growth and stimulated producers within the region (Cedro et. a,l p178). Having commitments with other members

within a union may generate benefits to regional unions. However, regional unions don't have absolute power to regulate and preserve its own internal market. Lowering external tariffs affect regional objectives and while fostering global integration, it erodes preferences (Cedro et. al, p184).

In his paper, Takahashi studies the effects of a tariff imposed by the government of an economic union. Like in classical theory, import tariffs redistribute income. This income comes from unprotected to protected industry workers (Takahashi 1999, p291). Tariffs increase trade within the union and raise the wage rate and price of goods in member countries (Takahashi, p293). They, unfortunately, enhance the price of goods from non-members. If the tariff revenue is given out based on wage rate, welfare remains the same. However, if it is given as a lump-sum, workers will be hurt if the population is small. In the long run, the population will redistribute so that no workers in the union are hurt, leading to welfare convergence (Takahashi, p307).

In a paper written two years after the formation of the European Union, Daniel Landau is critical of economic integration. He claims that the European Economic Committee, the precursor of the European Union, does not foster growth. While there could have been a positive influence at its initiation, the Common Market's impact decreased throughout the years, leading to a lower rate of growth by 1972 (Landau 1995, p774). The benefits of a union seem to be little as economic growth disappeared and unemployment rose in EEC countries (Landau, p774). Using econometric modeling, Landau does not find statistically significant effects of EEC membership on growth. There was no statistically significant difference between the growth of EEC and non-EEC countries (Landau, p780). However, this paper was written in 1995, in the early states of the European Union. Since then, there has been many financial cycles and a globalization movement, changing the way that countries have behaved economically.

The collapse of Lehman Brothers in September 2008 created an international financial crisis. The question becomes if economic unions helped to reduce the risk before, assist in absorbing the shock during, or recover after the event? Alliances are believed to be useful to small states as these are more vulnerable to global financial cycles as they have smaller economies. Two small countries that were hit badly by the events were Ireland and Iceland, requiring them to ask for outside financial aid (Thorhallsson & Kirby 2012, p801). While Ireland's membership in the European Union did not prevent the crisis, the EU assistance helped to absorb the shock and clean up afterward. Arguably, the rescue package's terms might have prolonged the crisis (Thorhallssoon et. al, p815). After a rough start, Iceland recovered more successfully due to its early change of government and restructuring of the banking sector through stricter domestic policy (Thorhallsson et. al, p815). Thorhallsson and Kirby basis their analysis of these countries on the fact that they have similarly small economies, however, there are many more variables that differ between them, including location to Europe. Therefore, it is possible that the unobserved differences may explain the results.

None of these papers look closely at the overall effects that exist in the European Union. Many of the scholars in this area of study use economic theory alone to explain what has happened and what should happen in the future, while others look at a small group of countries. By not using true data of many countries within and without the EU, there are observations that have been overlooked or overstated.

EXPLANATORY DATA ANALYSIS

DATA

All of the data necessary to partake in this econometric analysis is publicly available through innumerable international organizations. The database was created using information collected from the European Union (EU) website and the World Bank databases. The dataset consists of annual macroeconomic data of 19 European countries covering 1997 to 2016.

The EU website contains various data pertaining to the regional union. This includes the constituents, the entrance date for every member state and the names of countries that are in the process of integrating into the system (European Union 2017). This is important because it allows us to choose the treatment and counterfactual groups for regression purposes.

As the treatment is being a part of the European Union, it makes the most sense for the treatment group to have been in the EU for long enough to collect a sizable amount of post-entrance information. As such, the treatment group became the group of ten countries that were annexed into the EU on 1 May 2004 (EU 2017). Many of the previously added countries have large economies; as such, these were disallowed as unions are supposed to be particularly useful to smaller markets. The control group is nine non-EU countries that are geographically and culturally similar to the countries that are in the treatment group. However, some of these countries are candidates and potential members of the EU.

The essential source for data collection is the World Bank World Development Indicators website that collects and tracks numerous economic and social indicators for countries around the world. Gross Domestic Production (GDP) per capita annual growth rate and inflation annual rate based on the consumer price index (CPI) were collected to test the economic health of countries.

The indicator GDP measures the total value of goods and services produced in a country. The growth rate is based on the constant local currency that they receive from the World Bank and the OECD national accounts data files (World Bank 2017[a]). Using the per capita annual growth rates will make it easier to see the economic growth that occurs per person, the increase in welfare for each individual.

Due to the free movement in the European Union, Gross National Income (GNI), another indicator, would not be a good measurement to use. GNI measures the income of all residents of a country, including those that live abroad, and excluding immigrants that live in a country. Within the European Union, citizens can move freely to other countries that have more jobs or higher pay. After integrating into the EU, citizens moving abroad could lead to a higher GNI, however, this is not an effect of trade.

The World Bank also tracks annual inflation from countries all over the world, with its sources as the International Monetary Fund and the International Financial Statistics data files (World Bank 2017[b]). Inflation based on the consumer price index is the annual percentage change for a specific basket of goods and services that may be fixed or changed at specified intervals (U.S. Department of Labor 2017). The Laspeyres formula is generally used in order to create the inflation percentage. Using the cost to consumers shows the change in purchasing power of consumers, how much they can buy in their country with their currency. A stable economy is often defined as one that has a low and steady rate of inflation. A low

level of inflation disallows prices from skyrocketing while also reducing the severity of economic recessions. Therefore, it makes sense to use this as an indicator of economic health.

EXAMINIATION

As there are two models, that have Country, Year, and European Union membership in common, GDP per capita annual rate and the annual inflation rate will be examined separately.

TIME

In this investigation, time is denoted as 2004 within the equations and expressed as a dummy variable. A dummy variable is a proxy for qualitative values. The value one will be given if the year of the data collected is within the treatment period, 2004 and later, and the value zero will be given for any years prior. The time range of the data is 20 years of the most recent data. As these countries were annexed in 2004, there is 13 years (65% of the years) within the treatment period and 7 years (35%) outside of it.

EUROPEAN UNION

A country's status as a member state in the European Union, indicated with by variable named EU, is also expressed as a dummy variable. The value one is set for those countries in the treatment group and zero otherwise. The treatment group is those countries that are currently in the European Union. There are ten countries in the treatment group: Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic, and Slovenia. The nine control countries are Albania, Belarus, Kosovo, Liechtenstein, Macedonia (FYR), Montenegro, Norway, Serbia, and Switzerland. There is almost an even breakdown of the two groups, with the treatment group being 53% of the data.

GDP GROWTH RATE

In the economic growth model, GDP per capita annual rate (abbreviated in the model as GDP) is the dependent variable with time, membership in the European Union, and an interaction between the two as the independent variables. There are 368 observations in the sample as there is missing data explained in the below Problems section. By using the rate of growth, we are able to normalize the data, making it easier to work with. The mean is 3.234 and the median is 3.187. Skewness is a measure of asymmetry in the data with a normal distribution having a skew of zero. While there is some negative skewness, it is small as the mean and median are quite close together. The skewness is -0.209 gives no reason to transform the data as it is fairly symmetrical. This can also be seen in the GDP histogram in figure 1. Kurtosis is a measure of the heaviness of the tails, describing the abundance or lack of outliers. As a normal distribution has a kurtosis of three, the GDP data has a fatter tail with a value of 7.694.

In the histogram of GDP rates (figure 1), the distribution of the variable is fairly symmetric with an outlier in the 30% range. Figure 2 shows the time trend of the growth rate. Prior to 2004, there seems to be a slight increase in the growth rate before slowly beginning to fall. Although the rate of growth decreased, it is not much lower than where it started in 1997. However, we can see that the time trend is overall negative. A majority of these plots are above zero, meaning that while growth slowed, it was still occurring. When plotted against EU Status (figure 2), the GDP growth rates appear to be similar, if not slightly higher for the European Union. There is one high outlier in the control group and many smaller outliers for those in the treatment group but most of the points for those within the EU are clustered higher than those without.

STABILITY

In the economic stability model, a dummy stability variable (signified with Stab) is used as a way of expressing a good economic health. The European Central Bank's primary objective is to create price stability by maintaining inflation rates around two percent based on the Harmonized Index of Consumer Prices (European Central Bank 2017). By keeping inflation at this level, there is a safety margin to keep the economy from going into deflation, which is considered as a weak economic condition. On the other hand, a higher inflation rate would raise prices and increase uncertainty about long-term economic and financial decisions. As such, stability will be defined in the model as an inflation rate between one percent and three percent, considered by many central banks, as the optimum level of inflation.

As a binary variable, stability will have a range of one with the minimum being zero signifying a country being unstable and the maximum being one indicating price stability. With 330 observations, the mean is 0.3212 and the median is 0 which signifies that there are more values to the left of the graph. Only a third of the inflation rates are stable causing the variable to have a moderate positive skew, unlike GDP. This is backed up by the 0.766 skewness reported in table 2. By using a dummy variable instead of the full inflation rate, we are able to reduce the skew as given by the skewness coefficients in table two, stability, and table three, inflation. It also decreases the kurtosis by 111.695.

The histograms of the inflation rate and stability are both positively skewed with long right-hand tails. As stability is a binary variable, it is not surprising that the data is skewed in some way. However, by changing the variable from quantitative to qualitative, we are able to change from a high peak and a rather long right tail (figure 4) to a distribution with a shorter peak and brief but fat tail (figure 5). We can see the same trends in stability over time and membership in the European Union as with GDP growth rate. After around 2004, there is a drop in the likelihood of being stable but the possibility is higher in 2016 than it is in 1997. There is also a higher probability of being stable if in the treatment group than if not.

PROBLEMS

There are very few data problems that arise in this research. The two main problems that are likely to arise are measurement error and a lack of data. As this dissertation is focused on the recent economic history of European countries, these are less likely to occur.

There should be little to no data quality issues as most developed countries collect and give honest records. Measurement error can occur in the Growth Domestic Production growth rate and the annual inflation rate by consumer price index (CPI). The CPI is based on urban spending and goods within the basket can change over time. The limitations in measurement errors can be put into two groups, sampling and non-sampling (U.S. Department of Labor). Sampling error occurs as the price changes are based on a sample of items rather than all retail purchases which limits the accuracy of the index. Non-sampling errors cause persistent bias and are more challenging to rectify. Non-sampling errors hurt the accuracy of the index more so than sampling errors. With GDP there is a chance that growth might be based on nominal estimates and not reflect the real rate of growth. By using nominal estimates of GDP, inflation over time is not taken into account.

Lack of data, although an unlikely expectation for European countries, does occur in the database, making the panel data unbalanced. Three countries are missing various years in both indicators. Kosovo is missing 1997 – 2000 GDP growth data and all inflation data but the lack of GDP data might be due to the Kosovo war that lasted from 1998 to 1999. Liechtenstein is missing 2010 – 2014 GDP data and all inflation data. Montenegro is missing

1997 GDP data and 1997 – 2005 and 2016 inflation data but as Montenegro has only been an independent country since 2006 the lack of inflation data can be excused.

There is nothing to rectify for this as a simple linear regression model will delete the missing observations.

ECONOMETRICS

METHODOLOGY

What effect does membership in the European Union have on a country's economic growth and stability? In order to research this question, an analysis of two groups of countries, those within the European Union and those without, needs to be undertaken.

In an ideal world, a Randomized Control Trial would be the best technique to examine the benefits or disadvantages of being in a regional union. A sample of countries would be selected from Europe. These countries would then be randomly divided into two groups: the treatment group and the control group. Since the groups are randomly chosen there is no selection bias. The treatment group would be a regional economic union and have no import restrictions for its members while the control group would be allowed to have varying restrictions. Growth and stability would then be statistically analysed to check the significance of the union. The expectation of these groups of countries would only differ through their introduction to the treatment. The unbiased estimate of the impact of the treatment is internally valid which is important when trying to establish a causal relationship (Manderson 2017[b]). However, this type of experiment is not possible and another method should be used instead.

In the absence of a Randomized Control Trial, it would make the most sense to use the Differences-in-Differences (DiD) method. DiD assumes that there are unobservable differences between the treatment and control groups that result in selection bias. Selection bias is when the selection method creates endogeneity. This is an issue because it makes the explanatory term related to the error term. This violates the linear regression assumptions, therefore, causality can not be determined.

The crucial assumption in DiD is common trends, "the change over time in the outcome variable in the absence of treatment is the same for the treatment and control groups" (Manderson 2017[a]). In order words, without treatment, each group would maintain its normal trends over time, the only thing that disrupts these trends is the presence of treatment. When this assumption holds, we can use the change over time in the control group as a counterfactual (Manderson 2017[a]). Differences in the level of the outcome across the groups do not invalidate the DiD approach as the assumption is about change over time. The major limitation of this model is if the common trends assumption does not hold. If this happens the treatment dummy will be correlated with the error term and we will not be able to see the true effect of treatment. In order to test the validity of this assumption, we look at data in periods prior to the one where treatment occurred.

In order to apply this model and check the common trends assumption, the treatment period and groups must be chosen. As the treatment will be membership in the European Union, it makes the most sense for the treatment group to be a large group of countries that were annexed into the EU at the same. They should be in the EU long enough to collect a sizable amount of post-entrance information. The treatment period will be 2004, the year

that the largest expansion of the European Union occurred (EU 2017[b]). The treatment group will be the ten countries that were added. The control group is nine countries that are geographically and culturally similar to those countries in the EU. The countries in both groups are listed in Table 4.

Self-selection bias exists as countries choose to join the European Union and this method works fine as the selection is based on variables that are fixed over time. Looking at figures eight and nine, we are able to see that the common trends assumption does, in fact, hold for these set of countries (treatment group is 1 and control group is 0), making the DiD model internally valid. While they are at different levels, they have similar trends over time in growth rates and stability levels.

As both economic growth and stability are being tested, two models will be used.

$$Growth: GDP_{it} = \alpha + \gamma EU_i + \lambda 2004_t + \delta_G(EU_i \cdot 2004_t) + \varepsilon_{it}$$
$$Stability: Stab_{it} = \alpha + \gamma EU_i + \lambda 2004_t + \delta_S(EU_i \cdot 2004_t) + \varepsilon_{it}$$

The first model uses Gross Domestic Production growth rates (GDP_{it}) as the dependent variable as a way of examining economic growth. This is a quantitative variable and will be regressed using a simple linear model. The second model analyses economic stability using inflation annual rates based on the Consumer Price Index. The stability ($Stab_{it}$) variable is a dummy variable that takes the value of 1 if inflation is between one and three percent and 0 otherwise. This model will require a probit regression as the predictor is qualitative.

In both models, alpha (α), gamma (γ), lambda (λ), and delta (δ) have the similar interpretations. Alpha is the intercept and represents the mean of the dependent variable when the country is not in the treatment group or in the treatment period. Gamma is the treatment group dummy that controls for the differences across the treatment and control group that are fixed over time. Lambda is the time dummy that controls for changes over time that are common across both groups. Delta is the dummy for the treatment group in the treatment period. It is the differences-in-differences coefficient and gives the estimate of treatment effect; it captures the change in the treatment period when the treatment occurs and is specific to the countries in the treatment group.

The hypothesis is that the being a member of the European Union has an effect growth and stability. Formally,

$$H_0: \hat{\delta}_{G,S} = 0$$
$$vs.$$
$$H_A: \hat{\delta}_{G,S} \neq 0.$$

EMPIRICAL ANALYSIS

GROWTH

$$Growth: GDP_{it} = \alpha + \gamma EU_i + \lambda 2004_t + \delta_G(EU_i \cdot 2004_t) + \varepsilon_{it}$$
$$H_0: \hat{\delta}_G = 0 \; vs. \; H_A: \hat{\delta}_G \neq 0$$

The first hypothesis test tests if membership in the European Union has an affect on a country's growth. Although the regression gives us the estimates for all four coefficients, the only one that is necessary for analysis is the delta ($\hat{\delta}_G$) in the equation. A linear regression of GDP growth rates per capita on EU status, time, and an interaction of the two dummy variables gives the following results.

Table 1: Estimates of Growth

	Dependent variable:
	Gross Domestic Product growth rates
$\hat{\gamma}$	1.092
	(0.742)
$\hat{\lambda}$	-0.506
	(0.678)
$\hat{\delta}_G$	-1.242
	(0.918)
$\hat{\alpha}$	3.410***
	(0.549)
Observations	368
R^2	0.024
Adjusted R^2	0.016
Residual Std. Error	4.178 (df = 364)
F Statistic	2.985** (df = 3; 364)

*Note: * signifies significance at the 10% level; ** signifies significance at the 5% level; *** signifies significance at the 1% level*

The model being used has an R-squared of 0.024, meaning that 2.4% of the dependent variable is explained by a linear model. This is not surprising as the model is based solely on three dummy variables. Despite this low fit value, the model's variables do affect the growth as is given by the f-statistic's significance at the 5% level. A Non-Constant Variance Score Test finds the model to be homoscedastic as the p-value given is 0.031, lower than the 0.05 needed to reject the homoscedasticity hypothesis. Therefore, the model does not need to be transformed to alter the variances.

The difference-in-differences estimate for the growth model ($\hat{\delta}_G$) has a negative coefficient (-1.242). To test its significance, a test statistic must be compared to the corresponding critical value; to find the test statistic we divide the coefficient (-1.242) by the standard error (0.918). The $\hat{\delta}_G$ t-value (-1.353) tells us that EU membership over time is not statistically significant at the 10% level as it is not larger than 1.645, the t-critical value for this significance level. Therefore, we fail to reject the null that $\hat{\delta}_G$ is zero. It can be concluded that membership in the European Union does not have an effect on growth rates.

STABILITY

$$Stability: Stab_{it} = \alpha + \gamma EU_i + \lambda 2004_t + \delta_S(EU_i \cdot 2004_t) + \varepsilon_{it}$$
$$H_0 : \hat{\delta}_S = 0 \; vs. H_A : \hat{\delta}_S \neq 0$$

The second hypothesis test tests if membership in the European Union has an affect on a country's stability in terms of price inflation. Once again, the only coefficient that is of importance is is the delta (δ) in the equation. This model requires a probit regression as the dependent variable, stability, can only take two values: stable and unstable.

Table 2: Estimates of Stability

	Dependent variable:
	Stability
$\hat{\gamma}$	0.267
	(0.268)
$\hat{\lambda}$	0.382
	(0.257)
$\hat{\delta}_G$	-0.232
	(0.322)
$\hat{\alpha}$	-0.792***
	(0.217)
Observations	330
Log Likelihood	-205.520
Akaike Inf. Crit.	419.040

*Note: * signifies significance at the 10% level; ** signifies significance at the 5% level; *** signifies significance at the 1% level*

In this instance, the goodness of fit will be determined based upon Craig & Uhler's Pseudo R-squared which is calculated to be 1.4%. This Pseudo R-squared allows the R-squared to reach as high as 1, unlike other Pseudo R-squared models. As this is a probit model, there is no simple R-squared interpretation like the R-squared of the linear regression model. The Chi-squared statistic for this model is 3.2942 which is lower than the 10% Chi-squared critical value of 6.251. Therefore, the independent variables might all be zero; price stability is not influenced by any of the included variables.

The difference-in-differences estimate for the stability model ($\hat{\delta}_S$) also has a negative coefficient (-0.232). Once again, the test value is calculated by dividing the coefficient (-0.232)

by the corresponding standard error (0.322), but in this case the z-statistic will be used. Using the $\hat{\delta}_S$ z-value of -0.720, we fail to reject our null hypothesis ($H_0 : \hat{\delta}_S = 0$). The estimate is, therefore, not statistically significant which is equivalent to the Chi-squared result. This is not surprising as the coefficient is rather close zero, making even the smallest standard error create smaller significance.

REASONING

As this research is based solely on small economies, it is possible that the European Union does, in fact, have positive impacts for those countries with large economies. The results imply that the European Union, and possibly other regional unions, do not help weaker countries. The countries that require trade do not seem to see its benefits. The ability to share risk and take out larger loans backfired on these countries, possibly leading to the results seen. It is possible that being in a union prompts countries to make riskier decisions that have the ability to hurt them when a financial crisis occurs.

The financial crisis of 2008 caused pessimism, a crisis of sovereign debt, and competitiveness (Vilpišauskas 2013, p362). It also exposed serious problems that plagued the European Union. With public finance problems, a lack of structural reforms, and excessive borrowing, people's belief in economic convergence in the EU decreased (Vilpišauskas, p362). People wanted a monetary union that had the power to absorb shock.

Since the crisis, there has been an increase in transfers between member states rather than loans (Vilpišauskas, p363). This redistribution policy had previously been used but was limited and only used for specific sectors. This has led to integration issues within the union as richer countries disapprove of transfers and poorer countries hate austerity measures (Vilpišauskas, p363). While it is easy to say that integration did not work, it is important to not look at integration alone, but at domestic policy as well. While Germany has dominance, all of the members have different national preferences. Reaction to a crisis is slow as each leader has to cater to its home country as well as the EU as a whole. Differing plans pushed forward by different groups of countries has complicated the process and application of centralized solutions (Vilpišauskas, p372).

CONCLUSION

Economic trade theory explains that the elimination of trade restrictions will increase trade between countries. Therefore, economic unions will have higher trading within member countries. A rise in trade should lead to growth in the Gross Domestic Production of a country, as well as keep price inflation within a secure range of rates for long term stability. As the world's largest regional economic conglomeration, the effect that the European Union can be tested to draw implications for other regional unions throughout the world.

While trade theory tells that economic unions should increase the welfare of countries due to increased trade, this is still debated. Despite the fact that the EU has existed for over 20 years, the benefits and costs of such a coalition are still disputed by scholars. The traditional economic trade theories have been shown to hold true in the past in individual countries but have not been tested on such a regional union. Some scholars believe that while there has been growth in the European Union, it is led not by trade, but by investments from richer countries to poorer ones. Others believe that the union does not lead to growth and that its collective economic powers do not prevent or help in times of crisis, in fact, they might make matters worse. However, many of the scholars that haven spoken about the European Union do not have updated data that includes the expansion of the European Union from 15 prior to 2000 to 28 member states in 2013. Some also lack the data from the financial crisis of 2008 to 2009 which struck the global economy.

Using econometric techniques, an analysis of countries within the European Union and those without was undertaken to determine the effects of membership on growth and stability. The most appropriate econometric technique for this type of analysis is the differences-in-differences method. It assumes that there are heterogeneous differences between countries within the EU and those without and only the presence of treatment effects their normal change over time, the common trends assumption. Economic growth was tested in a simple regression model that regress over dummy variables that represent the European Union membership, the treatment period, and EU membership during the treatment period. Stability was also tested in the same model, however, a probit regression expressed stability as one and unstable as zero.

Through this analysis, we find that while not statistically significant, European Union membership leads to a slight decrease in growth and has almost no effect on price stability. The biggest factor in the decrease is most likely the financial crisis. As Thorhallsson and Kirby pointed the European Union might have made the crisis worse for smaller countries that could not depreciate their currency as a way of fixing the markets. Having an interconnected economy and currency as well as a central bank might seem to have lead to worsening the financial crisis. However, with this knowledge, the European Union has the possibility of rectifying this in the future.

With many countries in six continents attempting or proposing to have an economic community or common market, the European Union is seen as an icon. As the world's largest economic union, the effect that the European Union has on its member states could likely be replicated to a smaller extent in other regional unions.

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APPENDIX

GDP per capita annual rate

Minimum	1st Quarter	Median	Mean	3rd Quarter	Maximum
-14.560	1.404	3.187	3.234	5.258	26.890
Range	**Std Error**	**Variance**	**Std deviation**	**Skewness**	**Kurtosis**
41.448	0.220	17.742	4.212	-0.209	7.694

Table 1 – based on 368 observations

Stability

Minimum	1st Quarter	Median	Mean	3rd Quarter	Maximum
0	0	0	.3212	1	1
Range	**Std Error**	**Variance**	**Std deviation**	**Skewness**	**Kurtosis**
1	0.026	0.219	0.468	0.766	1.586

Table 2 – based on 330 observations

Inflation annual rate, based on CPI

Minimum	1st Quarter	Median	Mean	3rd Quarter	Maximum
-2.097	1.174	2.715	7.026	5.986	293.700
Range	**Std Error**	**Variance**	**Std deviation**	**Skewness**	**Kurtosis**
295.679	1.169	451.219	21.242	9.430762	113.2814

Table 3

Treatment Group – European Union	Control Group – Non-EU
Cyprus	Albania
Czech Republic	Belarus
Estonia	Kosovo
Hungary	Liechtenstein
Latvia	Macedonia
Lithuania	Montenegro
Malta	Norway
Poland	Serbia
Slovakia	Switzerland
Slovenia	

Table 4

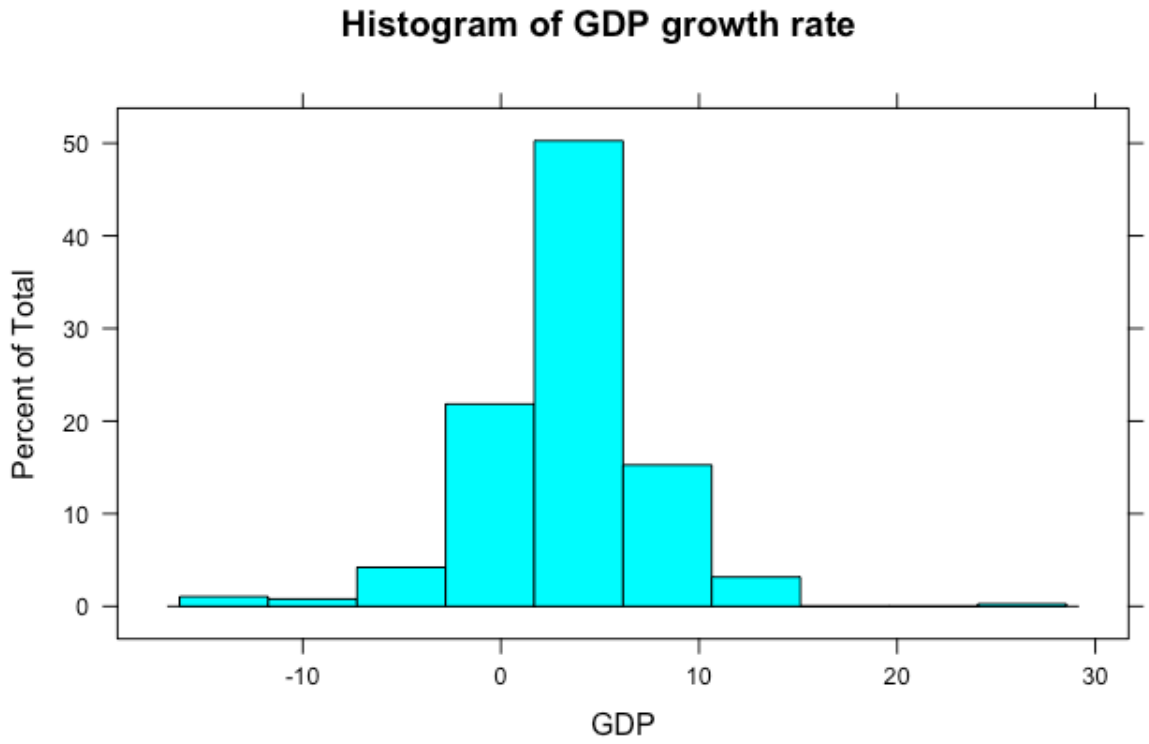
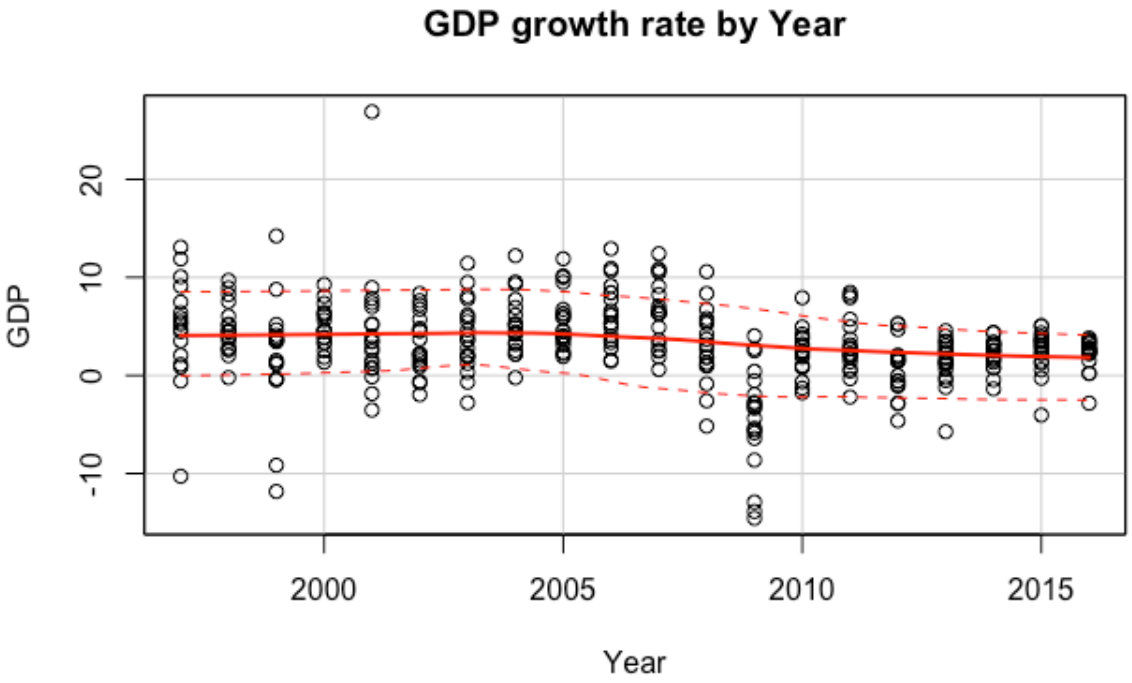


Figure 1



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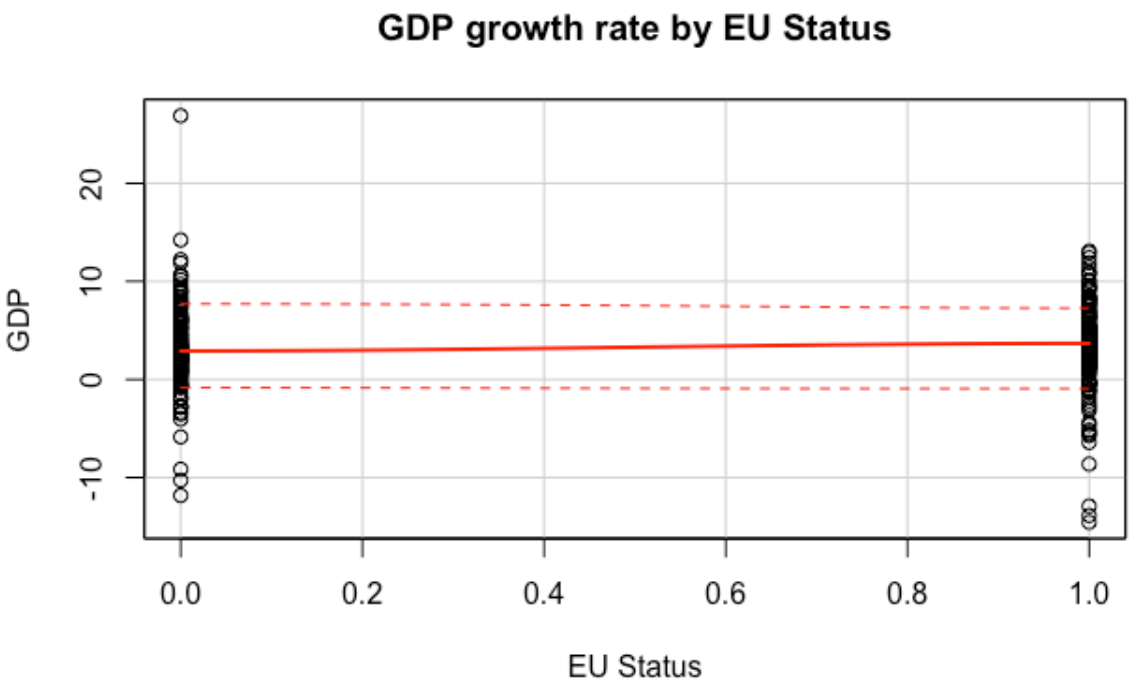

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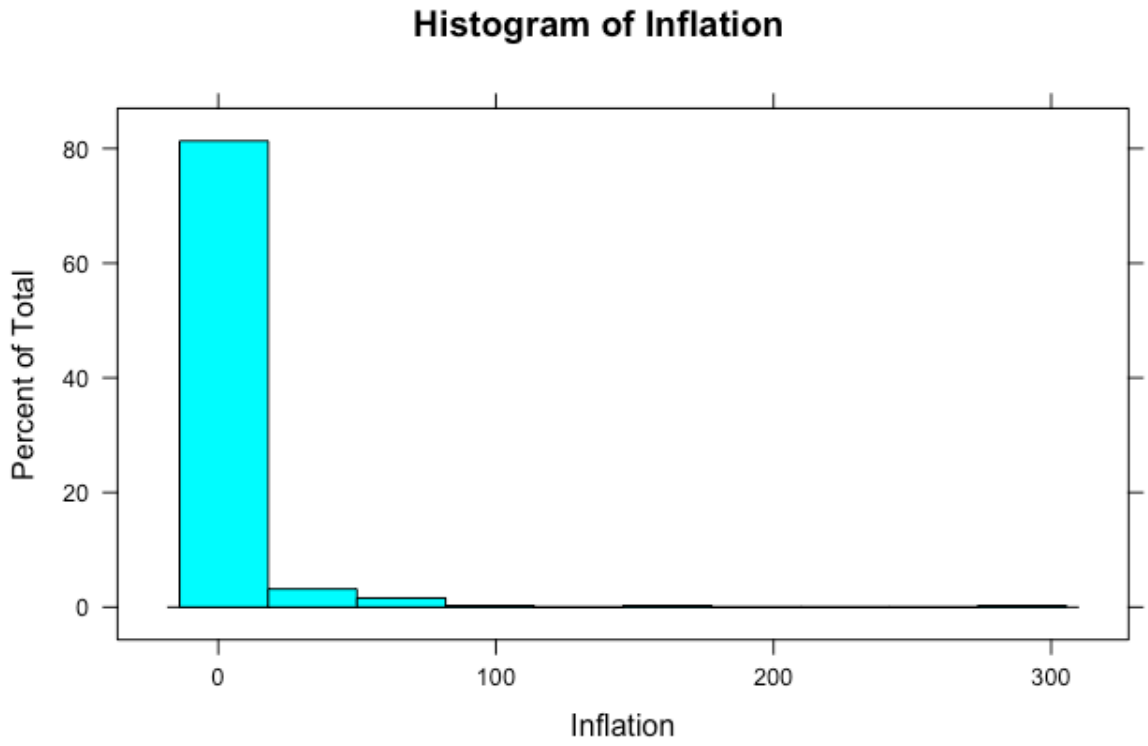

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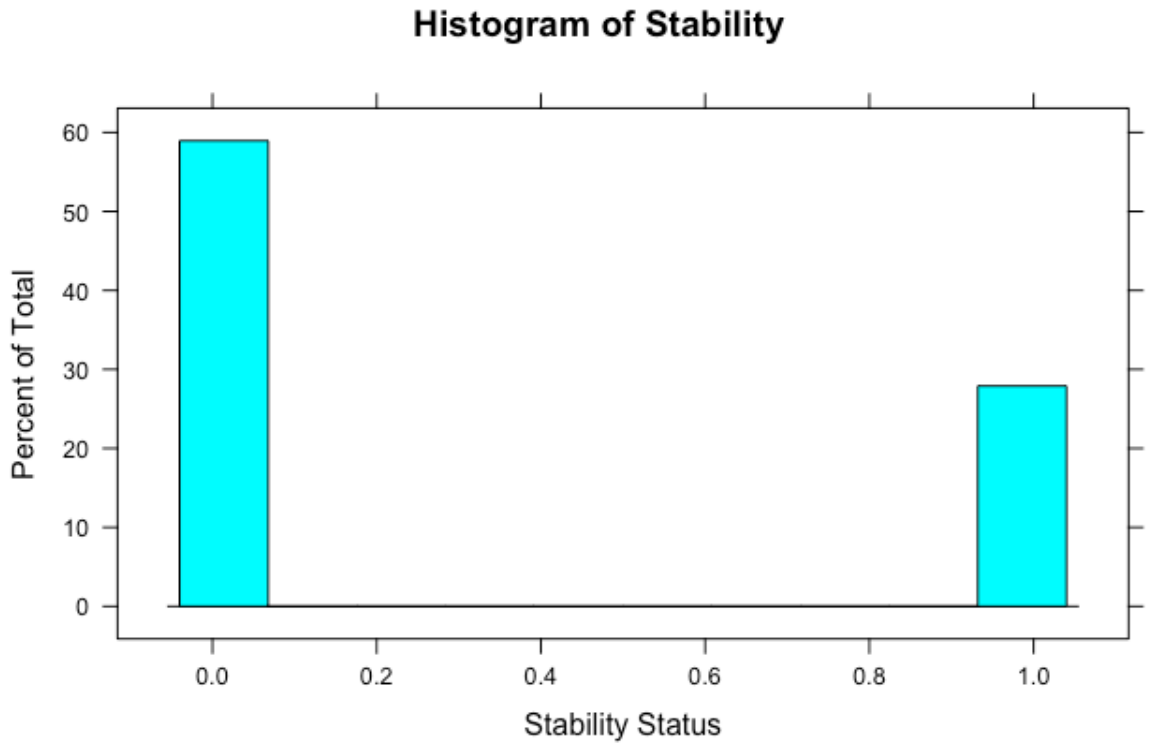

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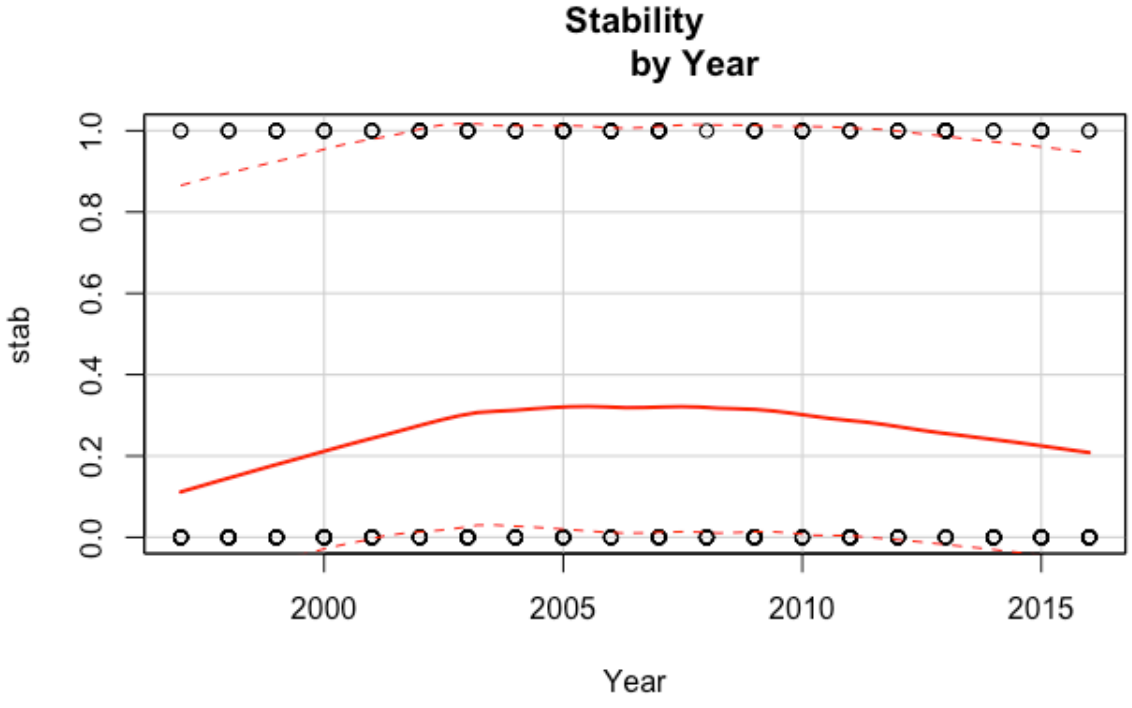

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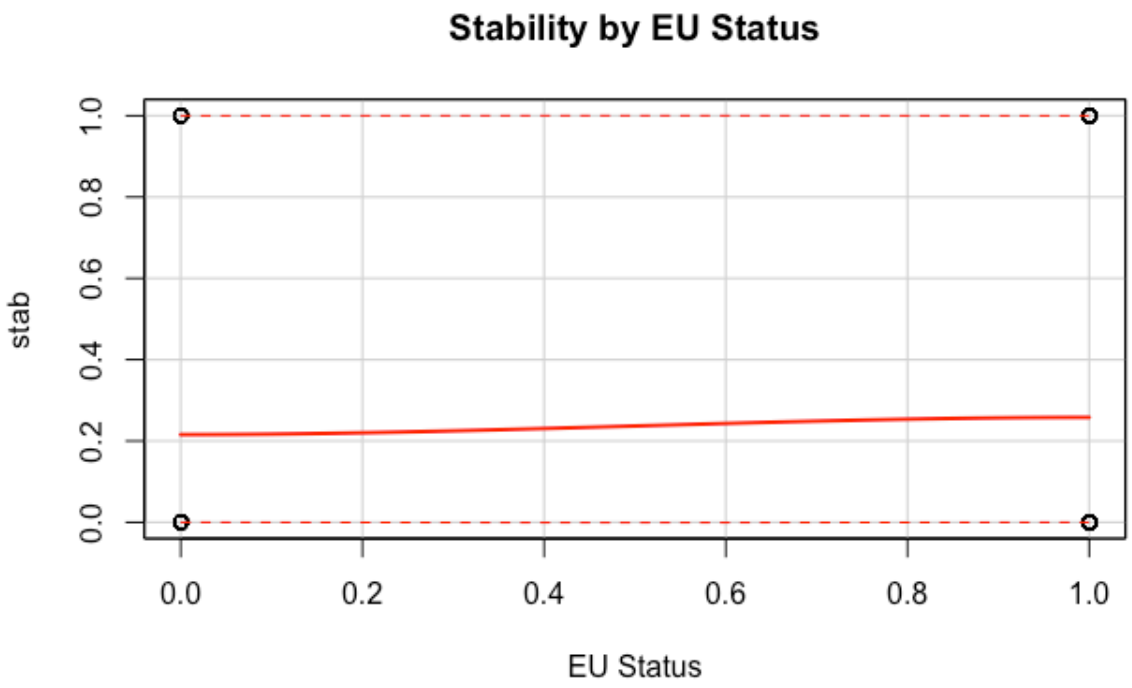

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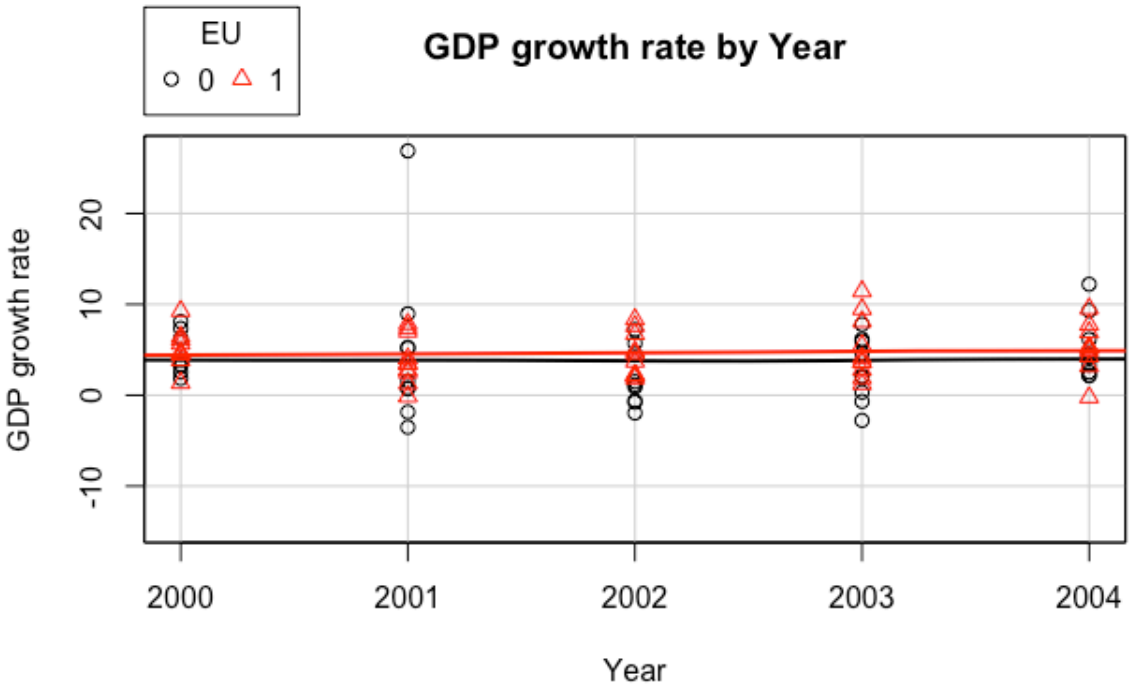

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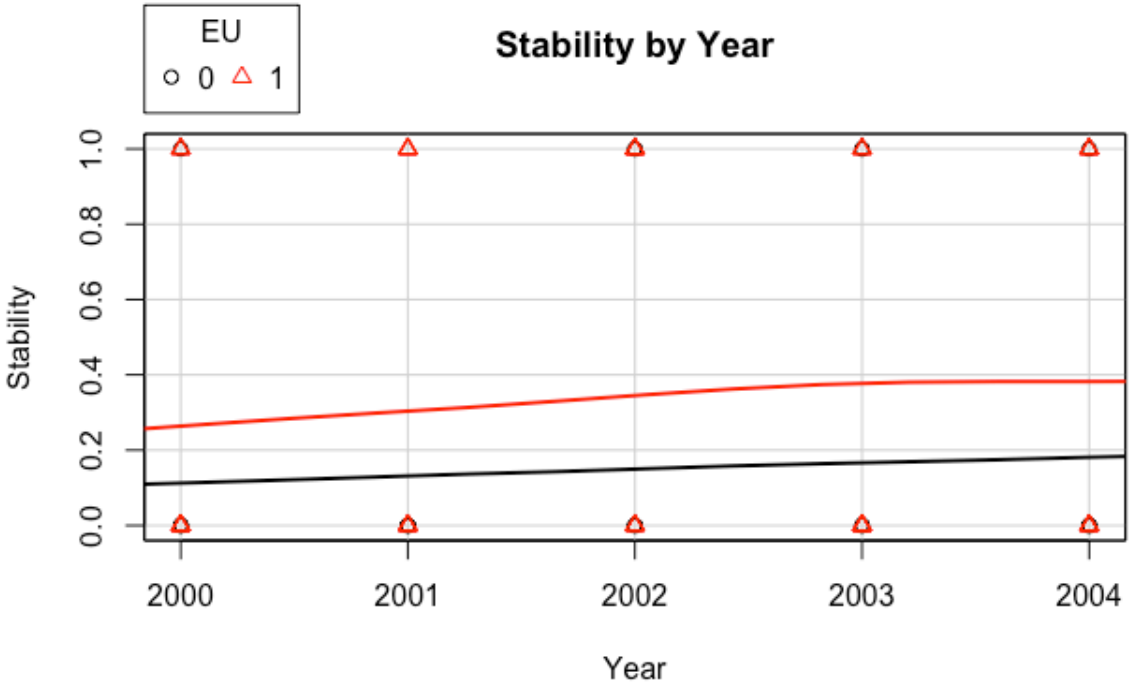
EU
0
1
Stability by Year
Stability
0.0
0.2
0.4
0.6
0.8
1.0
2000
2001
2002
2003
2004
Year

Figure 9