

# **Investigating the Effects of Euro on Loan Growth**

## **Research Methods Extension**

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## **INTRODUCTION**

It has been demonstrated that the loan growth has an effect on the country's growth. However, empirical results have found it difficult to provide conclusive evidence for this effect. Many Researchers have tried to find the effect of Euro on Inflation and other variables but were not able to find empirical results for the same. The motivation and aim of this paper is to estimate the effects of the adoption of the Euro on the loan growth of European countries. Using the most recently available data and a more appropriate private bank loan data, this research tries to assess whether EMU countries had a higher/lower loan growth than they would have if they had not adopted the Euro. In doing so an augmented 'Difference in Differences with Variation in Treatment period' approach is used. The results obtained show that the adoption of the Euro increased loan growth for the European countries that adopted Euro currency.

Thus, this paper checks the effect of introduction of Eurozone currency on the loan growth of countries in Europe. It compares the loan growth of European countries which adopted the Euro currency compared to those who did not adopt the Euro currency. There are many methods to calculate this effect, but the time varying difference in difference methods suits best for this research as it takes into account different countries adopting euro currency at different time periods.

## **REVIEW OF LITERATURE**

Economic theory suggests that there are many factors that need to be analyzed in order to understand how an intervention affects different groups of countries. In recent times there has been much research regarding investigation of effect of Euro on bilateral trades and many others.

Hence, Georgios Fotopoulos and Dionysios Psallidas performed a detailed review of study of difference in difference with respect to Eurozone countries in which they investigate the

effect of Euro on bilateral trade, suggesting that adoption of Euro increased trade significantly and that there is also no evidence of trade diversion effects. Andrew Goodman-Bacon performed a try to understand Difference in Differences with variation in treatment timing which shows how to decompose the difference between two specifications, and provide a new analysis of models that include time-varying treatments.

This paper totally relies on the work of John Snow, who was the first to introduce a Difference in Differences method. The result of this paper also relies on the work of Brantly Callaway and Pedro H.C. Sant 'Anna who introduced the extension in software to capture the effect of treatment when there is variation in treatment period. The difference in difference method tries to find the effect of a particular intervention on the affected group compared to the group which is unaffected given the fact that both the affected and unaffected group had similar movements before the intervention. The main motive of this estimation is to check how the affected group is affected (positive or negative) compared to that of the unaffected group.

### **ECONOMETRIC MODEL & DATA**

The variable included in this paper are private bank loans of all European countries ranging from years 1980 to 2020. The source of yearly data for private bank loans of European countries is from International Monetary Fund website. The dataset consists of panel data for each of 27 European country at each year ranging from 1980 to 2020.

The model used for this estimation is time varying difference in difference model since different countries adopted Euro currency at different time periods. There are 19 European countries that adopted Euro currency: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain & there are 9 European countries that did not adopt Euro

currency: Bulgaria, Croatia, Czech Republic, Denmark, United Kingdom, Poland, Romania, and Sweden. The Difference in Differences model used in this paper is given as:

$$loan\ growth_{it} = \alpha_i + \gamma_t + \beta_1 euro_i + \beta_2 post_t + \beta_3 euro_i * post_t + u_{it}$$

Where, loan growth is the dependent variable representing the aggregate loan growth of all countries,  $\alpha$  is the fixed effects intercept for the countries which is the intercept value for the specific country and 0 for all others,  $\gamma$  is the fixed effects intercept for the years which is the intercept value for the specific year and 0 for all others, euro is the dummy variable which is 1 if in the treatment group and 0 otherwise, post is the dummy variable which is 1 if after treatment and 0 otherwise. The coefficient on term  $\beta_1$  is the estimated mean difference in loan growth between the Eurozone and non-Eurozone European countries prior to the intervention. The coefficient on term  $\beta_2$  is the expected mean change in loan growth from before to after the Euro introduction among the non-Eurozone countries. The coefficient on interaction term  $\beta_3$  gives the difference in difference estimate of the treatment effect.

To derive the desired result, we use the difference in difference model to get the coefficient estimate of loan growth for the Eurozone and non-Eurozone countries.

The summary statistics for Loan Growth for European and Non-European countries are shown below with the difference:

	(1) Non-Euro	(2) Euro	(3) Difference
Loan Growth	0.0326	0.0282	0.0044
Observations	255	692	437

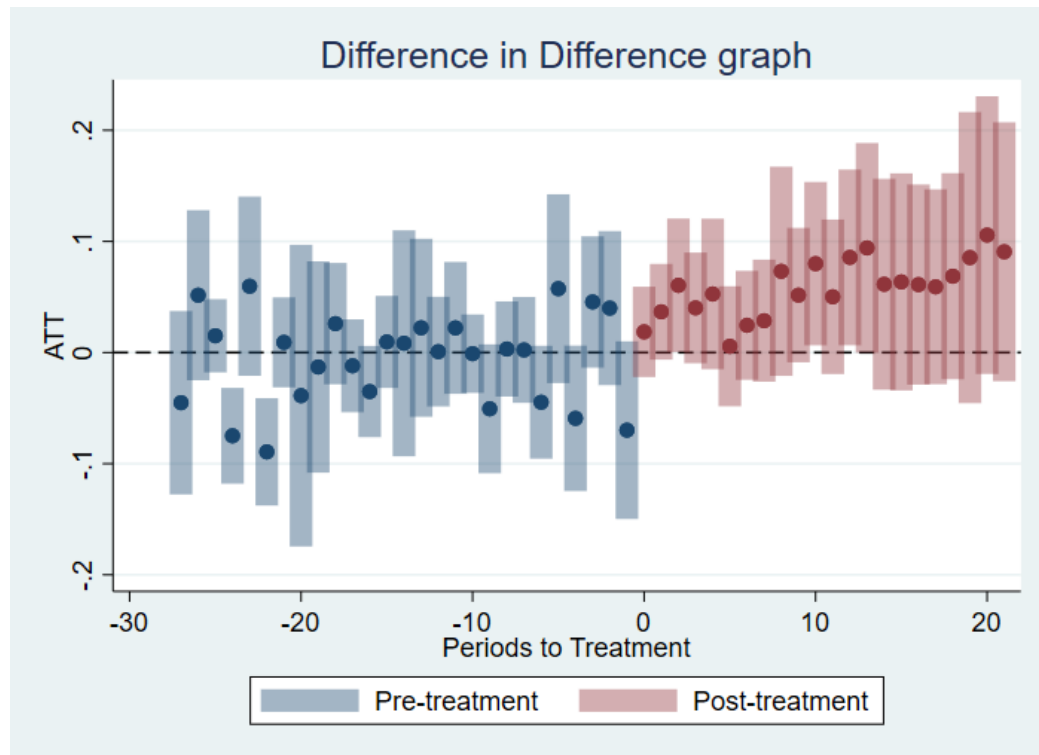
mean coefficients; t statistics in parentheses  
 \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

## RESULTS

To begin with we must verify the pre trends assumption that the trends have similar movement for both the treatment and control group before the intervention and that the estimates are statistically significant from 0. Here, the Null Hypothesis is that All Pre-treatment are equal to 0 and the Alternate Hypothesis is that All Pre-treatment are not equal to 0. From this test we derive that the chi-squared test value is 1823.6968 for 40 years data and p-value of 0.0000. Since the p-value is less than 0.01, we reject the Null Hypothesis for the pre trends test indicating that the pretreatment linear trends are statistically significant from 0. Now, we can proceed to see the effect of difference in difference estimator.

Additionally, from the results we get the average treatment effect on treated as +0.036 for 5 years after being treated, +0.042 for 10 years after being treated, +0.049 for 15 years after being treated and +0.053 for the whole sample after being treated. As we can see that the average treatment effect in treated is increased and we proceed further in time after being treated, indicating that loan growth among Euro adopted European countries increases further as we move further in time compared to the countries that did not adopt Euro currency.

The Difference in Differences plot for the Euro currency adoption as the treatment intervention shows the same results as are seen from the empirical results verifying that the Loan Growth for European countries adopting the Euro currency has a higher loan growth compared to countries that did not join.



## CONCLUSION

To conclude, this paper has tried to find the effect of Euro currency introduction on the European countries that joined and the countries that did not with the help of time varying difference in difference estimation. From the results we can say that the countries who joined the Eurozone had a higher/positive loan growth compared to the countries who did not join. It can also be concluded that in the pretreatment period the loan growths were similar for both the treatment and control groups whereas in the post treatment period the loan growths had a negative difference in difference estimate for the Eurozone countries compared to that of non-Eurozone countries. Thus, indicating that adoption of Eurozone currency had an inclining effect of loan growth for Euro adopted countries.

## APPENDIX

Appendix Table 1 gives the list of treatment year for European countries that adopted Euro currency. The source of data is Wikipedia

**Table 1**

<b>Treatment Year</b>	<b>Countries joined</b>
1999	Austria, Belgium, Germany, Luxembourg, and Netherlands
2002	Finland, France, Greece, Ireland, Italy, Portugal, and Spain
2007	Slovenia
2008	Cyprus and Malta
2009	Slovakia
2011	Estonia
2014	Latvia
2015	Lithuania

## **REFERENCES:**

Georgios Fotopoulos & Dionysios Psallidas “Investigating the Effects of Euro on Bilateral Trade: A Kernel Matching Approach”

Brantly Callaway & Pedro H. C. Sant ‘Anna “Difference-in-Differences with Multiple Time Periods”

Andrew Goodman-Bacon “Difference in differences with variation in treatment timing”

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