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Journal of Risk and Financial Management

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Suggested Citation: Herzog, Bodo (2022) : Do post-Corona European economic policies lift growth prospects? Exploring an ML-methodology, Journal of Risk and Financial Management, ISSN 1911-8074, MDPI, Basel, Vol. 15, Iss. 3, pp. 1-13,
<https://doi.org/10.3390/jrfm15030120>

This Version is available at:

<https://hdl.handle.net/10419/258843>

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Article

Do Post-Corona European Economic Policies Lift Growth Prospects? Exploring an ML-Methodology

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Abstract: This article explores the determinants of people's growth prospects in survey data as well as the impact of the European recovery fund to future growth. The focus is on the aftermath of the Corona pandemic, which is a natural limit to the sample size. We use Eurobarometer survey data and macroeconomic variables, such as GDP, unemployment, public deficit, inflation, bond yields, and fiscal spending data. We estimate a variety of panel regression models and develop a new simulation-regression methodology due to limitation of the sample size. We find the major determinant of people's growth prospect is domestic GDP per capita, while European fiscal aid does not significantly matter. In addition, we exhibit with the simulation-regression method novel scientific insights, significant outcomes, and a policy conclusion alike.

Keywords: European Union; growth theory; simulation-regression; AI; data science; Julia programming

JEL Classification: F43; F45; F47; O47



Citation: Herzog, Bodo. 2022. Do Post-Corona European Economic Policies Lift Growth Prospects? Exploring an ML-Methodology. *Journal of Risk and Financial Management* 15: 120. <https://doi.org/10.3390/jrfm15030120>

Academic Editor: Markus Brueckner

Received: 26 January 2022

Accepted: 1 March 2022

Published: 4 March 2022

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1. Introduction

The father of growth theory, Nobel laureate Robert Solow, concluded in a paper in year 2000: "Most of today's more heated macroeconomic controversies relate to the shorter time scale relevant for business cycle fluctuations" (Solow 2000). Indeed, short-term output fluctuations are mainly driven by monetary and fiscal policy (Sato 1963). Yet, in the long-term, monetary and fiscal policy are neutral to output. There is magical evidence that growth determinants matter in the long-term alone (Acemoglu et al. 2018; Barro 1990; Mankiw et al. 1992; Solow 2003).

In this paper, we explore the impact of the Corona pandemic to output and the people's prospects to economic growth. On the one hand, the output dynamic is determined by short-term policies, such as the domestic fiscal stimulus packages, particularly the EU recovery fund of 750bn Euro implemented by the European Union (EU) in 2020. On the other hand, the long-term growth trend is determined by slowly moving macroeconomic variables, such as R&D, investment in infrastructure and education as well as structural reforms (Twionburyo and Odhiambo 2018). In contrast to fiscal and monetary data, the data of long-term growth determinants is not available within a short time period. We intend to resolve this data mismatch by utilizing large household survey data across all EU Member States together with a simulation-regression methodology.

In the work mentioned above (Solow 2000, pp. 152f., 157f.), the authors argue that expectations in medium-run macro theory are key even if we do not understand it sufficiently well. We utilize Eurobarometer survey data where people are frequently asked about their expectations of the national and European economy today and in 12 months. We conjecture that, by responding to those survey questions, people implicitly relate short- and long-term economic policies in order to obtain a medium-term growth outlook. Indeed,

the heterogeneity of survey data reveal how agents adjust their post-Corona expectations on the economic growth prospects in the EU.

Our research question is: How do growth prospects in survey data change and what is the role of short-term stimulus policies to people's growth outlook in the EU. The Corona pandemic is an excellent study object, given the policy response in the aftermath of the Corona pandemic and the political willingness to enhance EU growth (Valaskova et al. 2021). We explore how the large-scale European fiscal stimulus, particularly the 750bn Euro recovery fund financed by EU debt, affect growth prospects. In addition, we explore how the growth prospects in the survey data vary across countries, particularly between beneficiary countries, which get more money out of the EU budget than paid-up.

We design a novel econometric approach and utilize the new computing software *Julia*. Indeed, *Julia* is faster than conventional alternatives, such as R, STATA, MATLAB or Python. We find that matching survey and macroeconomic data, the simulation regression methodology provides a new opportunity to resolve the issue of small samples. The regression reveals that the major positive determinant of people's growth prospects are the level of GDP per capita. The major negative determinants of people's growth assessment are the unemployment rate and the shock absorption capacities at home. Finally, we show that the role of EU institutions (e.g., stimulus policies), such as the new recovery fund have no significant impact to people's perception in regard to growth. On the contrary, we obtain the policy conclusion that national growth policies matter, while European growth policies do not matter as much in people's economic assessment.

The paper is structured as follows. In Section 2, we review the literature. The data and methodology is explained in Section 3. In Section 4, we discuss the stylized facts of the data and illustrate the major variable from the Eurobarometer survey. Thereafter, in Section 5 we estimate different models. In addition, we develop and discuss the simulation-regression methodology in Section 5.1. This method enables a robust econometric estimation of our empirical models. Section 6 discusses the policy implications and concludes.

2. Literature Review

Research in social sciences relies heavily on data. We distinguish two different data sources in our study. On the one hand, we utilize survey data and on the other, we work with macroeconomic data.

Firstly, there exists a long literature on survey research (Check and Schutt 2012). The goal of surveys are to describe and explore human behavior (Singleton and Straits 2009). This methodology is applied in almost all social and economic fields, even in political science (Coppock and McClellan 2019).

Recently Börsch-Supan (2020a)'s study in longitudinal health surveyed the role of aging and retirement in Europe (Börsch-Supan 2020b). Even experimental studies are combined with surveys in order to find certain behaviors and the rules of decision-making (Fitzimons and Moore 2008; Spangenberg et al. 2016; Wilding et al. 2016). In addition, surveys are combined with macro data by Crossely et al. (2017). They studied saving behavior from tax records and found that respondents actually save somewhat less under the monetary regime of interest rates at the zero-lower-bound.

Secondly, the macroeconomic growth literature is particularly broad. We focus on standard macroeconomic data and follow the literature (Durlauf et al. 2008; Sala-i-Martin 1997). Recent literature by the EU-Commission (2021) estimates the growth development in the aftermath of the Corona pandemic. They claim a significant positive impact of the EU stimulus on future growth, despite not having any long-run economic data.

The combination of survey data and macroeconomic data have various benefits and challenges. The benefit is resolving new puzzles that focus on medium- to long-term economic issues. The challenges are: First, microeconomic survey's have a large sample yet frequently a low frequency. Second, there is an ongoing debate about the accuracy of surveys of a large population (Cornesse et al. 2020). Third, the the data frequency of survey and time-series macroeconomic data do not match in general (Gelman et al. 2017). Fourth,

aggregation of survey data at the country level reduces the dimensionality advantage of large surveys.

In order to tackle the challenges above, we develop a unique methodology, defined as simulation-regression. This technique does solve the frequency, aggregation and dimensionality challenge when working with both survey and macroeconomic data in a single sample. We demonstrate this novel approach by utilizing Eurobarometer data. We study a research question, which requires survey and macroeconomic data: Do macroeconomic data determine people’s growth outlook in survey data?

3. Data and Methodology

On the one hand, we utilize survey data conducted on behalf of the European Commission, the European Parliament and other EU institutions denoted as Eurobarometer. The Standard Eurobarometer is conducted twice a year and monitors the state of public opinions. It collects micro data via random face-to-face or telephone interviews across all EU countries since the 1970s. The sample consists of at least 1000 persons from large and 500 from small EU Member States. In total the sample size is at least $N = 20,000$ observations.

On the other hand, we utilize macroeconomic data of 27 EU Member States from Eurostat. We integrate variables, such as GDP per capita, public deficit per GDP, unemployment and inflation rate. Moreover, we design a variable ‘Recovery Fund’, which represents country specific monetary aid in billion Euro provided by the EU in the aftermath of the SARS-CoV2 pandemic. The total envelope of the Next Generation EU Fund is 750bn Euro. Finally, we create a dummy variable of the beneficiary countries, defined by obtaining more money than paid-up in the general EU budget.

In order to match survey and macro data in our econometric modelling, we utilize aggregated data on the country level. In the end, we obtain a panel of 27 EU countries across time. The regression models are as follows

$$Y_{i,t} = \alpha + \beta_1 GDP_{i,t} + \beta_2 Deficit_{i,t} + \beta_3 Unemployment_{i,t} + \beta_4 Controls_{i,t} + \epsilon_{i,t}, \quad (1)$$

where i represents the country and t time. The dependent variable $Y_{i,t}$ denote two metrics about the economic situation measured by Eurobarometer survey data. Furthermore, we estimate a difference-in-difference model exploring the growth rates of each variable, such as

$$\Delta Y_{i,t} = \beta_1 \Delta GDP_{i,t} + \beta_2 \Delta Deficit_{i,t} + \beta_3 \Delta Unemployment_{i,t} + \beta_4 \Delta Controls_{i,t} + \epsilon_{i,t}. \quad (2)$$

Given the research question, we particularly compare the economic situation before the pandemic in year 2019 to the year 2020.¹ In order to increase validity and significance, we need to enhance the sample size of 27 countries and the two benchmark years. Thus, we develop a novel econometric methodology defined as ‘simulation regression’.

In step I, we estimate the models above. In step II, we use the standard errors and descriptive statistics of the respective variables to simulate data with the same characteristics. We generate an enlarged sample of $N = 10^6$, which is featuring our sample. The following simulation algorithm does the job:

$$\begin{aligned} x_{i,t}^{sim} &= [x_{i,t} + \sigma_x * \text{randn}(n, 1) \quad \text{for } n \text{ in } 10^6] \\ y_{i,t}^{sim} &= [y_{i,t} + \sigma_y * \text{randn}(n, 1) \quad \text{for } n \text{ in } 10^6], \end{aligned} \quad (3)$$

where σ_x and σ_y is computed from our data in step I. Finally, in step III, we estimate the generalized model:

$$Y_{i,t}^{sim} = \alpha + \beta X_{i,t}^{sim} + \epsilon_{i,t}, \quad (4)$$

where $X_{i,t}^{sim}$ is a matrix with all independent variables, including the controls. The β denotes the vector of all coefficients. The Julia code is available in Appendix A. This simulation regression methodology exhibit robust and significant outcomes.

4. Preliminary Insights

First, we compute the descriptive statistics of all variables in order to describe our sample (Table 1). The survey questions are summarized from Q1 to Q9 in Table 1. The numbers range between zero and one, where one denotes a 100 percent positive response of all agents. Thus, the mean of 0.688 demonstrates that almost 69 percent assess that the economic situation in 12 months is the same or better than today.

Table 1. Descriptive Statistics 2019 and 2020.

Variable Names	Mean	std	min	max	q25	q75
Q1	0.688	0.081	0.480	0.850	0.640	0.745
Q2	0.724	0.068	0.600	0.889	0.669	0.780
Q3	0.685	0.079	0.430	0.840	0.640	0.737
Q4	0.494	0.253	0.080	0.930	0.292	0.690
Q5	0.565	0.124	0.290	0.800	0.492	0.650
Q6	0.447	0.454	0.000	1.000	0.000	0.910
Q7	0.648	0.115	0.350	0.860	0.572	0.750
Q8	0.686	0.204	0.230	0.920	0.570	0.830
Q9	0.651	0.083	0.420	0.850	0.602	0.707
GDP per capita	101.992	67.704	28.200	340.400	54.725	138.050
Deficit per GDP	−3.281	3.943	−11.000	4.100	−5.775	0.300
Inflation (in percent)	2.189	1.157	0.300	4.966	1.325	2.817
Unemployment (in percent)	6.420	3.227	2.000	17.300	4.400	7.400
Bond Yield (in percent)	0.625	1.052	−0.510	4.540	−0.055	1.022
Covid-Death/cases	0.787	0.997	0.000	4.130	0.000	1.431
Recovery Fund (in bn.)	6.275	14.600	0.000	69.500	0.000	5.975
EU-Budget (Dummy)	0.666	0.475	0.000	1.000	0.000	1.000

Q1: What are your expectations for the next twelve months: will the next twelve months be better, worse or the same, when it comes to economic situation in your country? Responses: Same+Better; Q2: What are your expectations for the next twelve months: will the next twelve months be better, worse or the same, when it comes to situation in general? Responses: Good; Q3: What are your expectations for the next twelve months: will the next twelve months be better, worse or the same, when it comes to economic situation in EU? Responses: Good; Q4: How would you judge the current situation in each of the following? The situation of the (NATIONALITY) economy. Responses: Good; Q5: How would you judge the current situation in each of the following? The situation of the European economy. Responses: Good; Q6: Thinking about the consequences of the coronavirus pandemic, to what extent do you agree or disagree with the following statements? The coronavirus pandemic has serious economic consequences for (OUR COUNTRY). Responses: totally agree; Q7: Could you please tell whether the term Globalization brings to mind something very positive, fairly positive, fairly negative or very negative? Responses: very+fairly positive; Q8: Please tell me whether you are for it or against it. A European economic and monetary union with one single currency, the euro. Response: for it; Q9: Would you say that you are very optimistic, fairly optimistic, fairly pessimistic or very pessimistic about the future of the EU? Responses: very+fairly optimistic. The EU-Budget dummy is 1 if the country gets more money out than paid-up.

The macroeconomic variables are GDP, deficit ratio, inflation, unemployment, bond yields, Covid-deaths per cases, recovery aid and the EU-budget dummy, which measures countries benefiting from the annual EU budget. Note, growth determinants, such as patents or R&D are slowly moving variables and do not significantly vary over two years, which makes those data unusable at the current edge. According to the descriptive statistics in Table 1, average inflation is 2.18 percent, with a standard deviation of 1.15 and a range of [0.30, 4.96]. The range shows that inflation rates are significantly different across countries, despite average inflation is almost following the European Central Banks (ECB) inflation target of 2.0 percent over the medium-term.

In Figure 1, we illustrate our two dependent variables in our models. Indeed, we show $Y_{i,t}$ across all i EU countries for Question 1 and Question 4. Some facts stand-out: (i) in the left- and right-panel of Figure 1 the economic assessment in 2020 is lower than in 2019 in general. Of course this is caused by the Corona pandemic in 2020. (ii) the median drops from $m = 0.55$ to $m = 0.44$ in the left-panel, which is more than in the right-panel. This implies that people downgrade the current economic situation far more than the economic expectations in 12 months. (iii) the range in the left panel between $[0.1, 0.9]$ is greater than in the right-panel of $[0.50, 0.85]$. That pattern is somewhat surprising. Yet, there exists psychological and evolutionary biological evidence that human beings form more optimistic and homogenous beliefs about the future (see literature review (Hecht 2013)). Consequently, the range of the future economic prospect is narrow and more positive than the current economic evaluation.

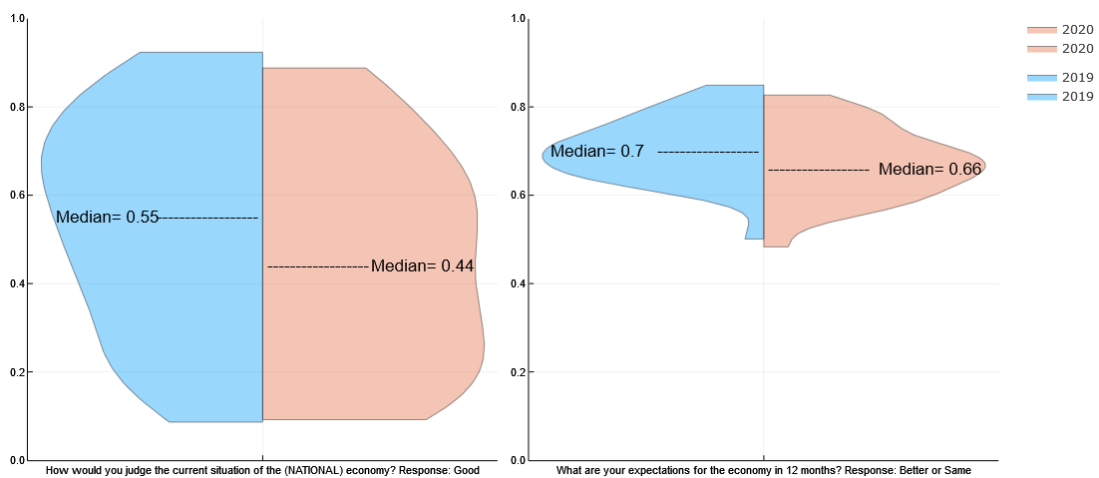


Figure 1. Peoples assessment of the economy in 2019 and 2020: In the left-hand panel, how would you judge the current economic situation. In the right-hand panel, what are your expectations for the economy in 12 months. Both panels list always the positive responses, i.e., all people responding with good, better or the same. Source: Eurobarometer-Standard 2021.

Finally, we illustrate the histograms and kernel density estimates of our macroeconomic data in Figure A1 in Appendix B. In line with Reis (2021), we find that the kernel density of inflation in 2021 is shifting to the right and this implies the onset of a new inflationary regime. Indeed, a t -test of the ECB’s inflation target of 2.0 percent fails to reject the H_0 -hypothesis in 2019, while the same t -test rejects the H_0 -hypothesis in 2020/2021. This indicates that mean inflation of EU Member States is significantly above the ECB’s inflation target for the Eurozone of 2.0 percent—evaluated at a 5% significance level.²

5. Results

We estimate a variety of regression models with macroeconomic variables in order to determine the factors of people’s economic assessment in Eurobarometer data. Table 2 represents three models on the basis of 2019 and four models on the basis of 2020 data.

Firstly, there is robust evidence that the people’s economic assessment of Q4 is significant positively correlated with GDP per capita. The significance level is above 1% in all models. Secondly except of unemployment the other macroeconomic variables are insignificant. Surprisingly, the significant negative relation between unemployment and Q4 is weaker in the pandemic year of 2020. This indicates a relative robust labor market during the Corona pandemic; likely due to labor market programmes, such as short-time allowance. Hence, despite slightly higher unemployment in 2020, the people’s confidence in the economic situation was still good in 2020.

Table 2. Regression Table of Basic Models with 2019 and 2020 data.

Dep. Question 4 Models	2019				2020		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
(Intercept)	0.609 *** (0.068)	0.652 *** (0.095)	0.613 *** (0.070)	0.496 ** (0.134)	0.669 *** (0.154)	0.609 ** (0.173)	0.679 *** (0.168)
GDP	0.002 *** (0.000)	0.002 ** (0.000)	0.002 *** (0.000)	0.002 *** (0.001)	0.002 ** (0.001)	0.002 ** (0.001)	0.002 * (0.001)
Deficit	0.026 (0.015)	0.027 (0.015)	0.025 (0.016)	0.011 (0.015)	0.006 (0.015)	0.002 (0.016)	0.006 (0.015)
Unemployment	−0.044 *** (0.008)	−0.044 *** (0.008)	−0.044 *** (0.008)	−0.028 * (0.011)	−0.031 ** (0.011)	−0.027 * (0.012)	−0.031 * (0.011)
EU–Budget D.		−0.040 (0.062)					−0.013 (0.077)
Deficit–square			−0.002 (0.005)				
Covid–Ratio					−0.085 (0.043)	−0.073 (0.046)	−0.084 (0.044)
Recovery Fund						−0.002 (0.002)	
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS
N	27	27	27	27	27	27	27
R ²	0.769	0.773	0.770	0.606	0.665	0.675	0.665
adj.R ²	0.739	0.732	0.728	0.554	0.604	0.597	0.586
p(F – sig.)	0.000	0.000	0.000	0.000	0.000	0.000	0.00

Note: significance of 5% = *, 1% = **, and 0.1% = ***. Source: author.

All F-tests of models 1 to 7 are statistically significant above 0.1%. Yet, somewhat unexpected to us is the insignificance of the Recovery Fund and Covid-Ratio variables as well as the EU-Budget dummy. This might imply that people’s economic assessment is weakly determined by EU institutions and European fiscal policies. What matters most when assessing the economic situation are GDP per capita and unemployment in the domestic economy.

Focusing on the major determinant, we re-estimate a bi-variate regression between GDP per capita and people’s economic assessment measured by Q4 in the Eurobarometer survey. Figure 2 represents a scatter and regression outcome of 2019 and 2020, including the 95% confidence intervals. Yet, the overlapping confidence intervals do not give a conclusive answer about the difference before and after the pandemic.

We exhibit that the Corona pandemic has shifted the people’s assessment of the economic situation downward (red) in general. Yet, the slope of the regression line might be the same in 2019 and 2020. Of course, a major limitation of the regression model is the sample size due to aggregation of survey and macroeconomic data. However, studying the impact on growth in the aftermath of the Corona pandemic together with the EU recovery fund, which for the first time is financed by EU debt, is automatically limiting the sample size. In order to fix this flaw, we develop a new method of a simulation-regression next.

Before exploring our simulation-regression methodology, we represent the regression results of the difference-in-difference and panel regression (Table 3). We check heteroscedasticity by the Breusch-Pagan and White-Test. Both tests do reject heteroscedasticity at 1%. Furthermore, the Hausman test does indicate fixed effects in our panel data.

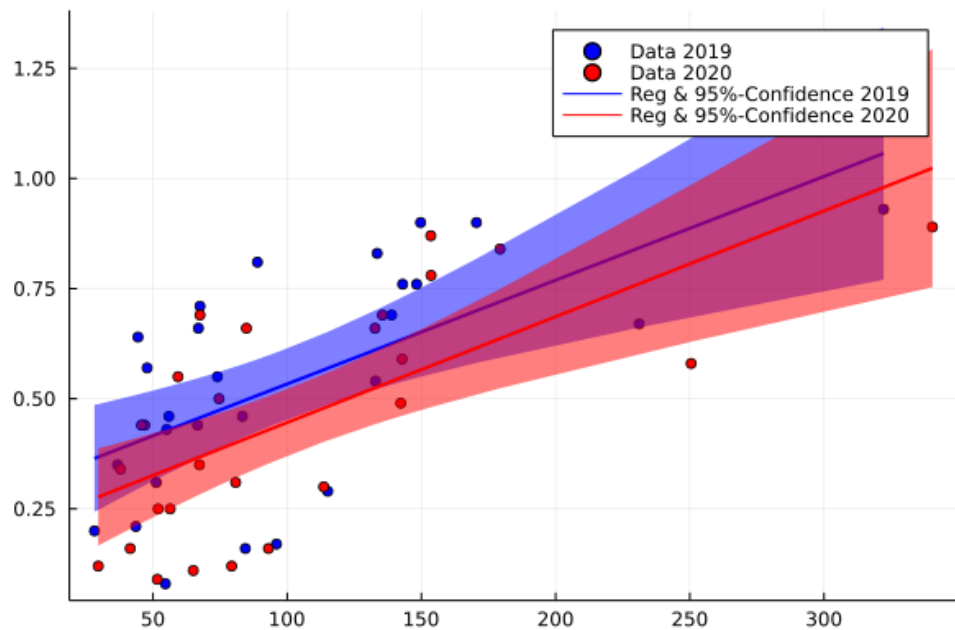


Figure 2. Regression Outcome. Source: author.

Table 3. Regression Table of Difference-In-Difference Regression and Fixed-Effect Panel Regression.

	Difference-Regression Q1				Panel Regression Q4		
	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
(Intercept)	0.083 (0.089)	0.027 (0.094)	0.027 (0.096)	0.552 *** (0.058)			
GDP	−0.005 (0.004)	0.000 (0.005)	0.000 (0.005)	0.002 *** (0.000)	0.002 *** (0.000)	0.002 *** (0.000)	0.002 *** (0.000)
Deficit	0.005 (0.011)	0.014 (0.013)	0.013 (0.014)	0.011 (0.005)	0.011 (0.010)	0.011 (0.010)	0.011 *** (0.000)
Covid-Ratio	0.024 (0.023)				−0.073 * (0.036)	−0.073 * (0.032)	−0.073 *** (0.014)
EU-Budget D.	−0.165 *** (0.042)						
Recovery		0.002 (0.001)	0.003 (0.002)				
Interaction			−0.001 (0.002)				
Unemployment				−0.037 *** (0.007)	−0.038 *** (0.007)	−0.038 *** (0.005)	−0.038 ** (0.011)
Year-fixed effect	-	-	-	No	Yes	Yes	Yes
Estimator Model-Type	OLS	OLS	OLS	OLS	FE	FE+robust	FE+Cluster
N	27	27	27	54	54	54	54
R ²	0.425	0.147	0.150	0.679	0.705	0.705	0.705
adj.R ²	0.320	0.036	0.004	0.659	0.674	0.674	0.681
p(F − sig.)	-	-	-	0.000	0.000	0.000	0.000

Note: significance of 5% = *, 1% = **, and 0.1% = ***. With robust and clustered Variance-Covariance matrix. Source: author.

The models of the difference-in-difference regression do not obtain significant results. Hence, explaining the change of the economic assessment within a survey is independent to the changes in the macroeconomic variables. Thus, people’s growth prospects in survey’s are mainly determined by stock and not by flow data. Somewhat unexpected is the

EU-Budget dummy. This coefficient is significant negatively correlated to growth expectations, which means that people in beneficiary EU Member States expect weaker growth in the next 12 months. This supports our finding above that EU institutions do not affect people's growth prospects positively, yet the impact of (democratic) institutions to growth is significant (Acemoglu et al. 2005, 2018, 2019; Evans and Ferguson 2013; Nyasha and Odhiambo 2019). What matters for people in survey's is the domestic economic situation.

The panel regression confirms the findings of the annual regression models. In all models the following three variables are significant: GDP per capita is robustly positive, the unemployment rate and the Covid death per cases are negatively correlated to the people's economic assessment in Question 4. All three macroeconomic variables follow the economic intuition. Of course, a higher Covid death count and unemployment rate reduce the economic outlook of the respondents. In general, the panel models are supported by high adjusted R-squared and significant F-tests.

5.1. Simulation Regression

Next, we explain the robust simulation regression methodology. We scientifically study the growth prospects of people's in the aftermath of the Corona pandemic and the impact of the EU recovery fund financed by EU debt (Herzog 2020). This question requires an urgent assessment, yet we are in the second year of the pandemic and thus the sample size is limited.

Estimating the model with a small sample gives us basic data characteristics at first. We are going to utilize this information in the simulation regression in order to enlarge the sample. According to Equation (3) we simulate the sample and re-estimate the models by using Equation (4) (cf. Appendix A).

Let us explain the benefits by studying the bi-variate regression in Figure 2. First, we simulate the data with a new sample size of now $N = 27,000$. Second, we re-estimate the regression models of the annual relationship between Question4 and GDP per capita in 2019 and 2020. The results are illustrated in Figure 3.

The scatter plots represent the large sample of $N = 27,000$ for each year. This sample represents a situation where we have annual survey and macroeconomic data of the same size. The regression lines display the same shape as in Figure 2, yet the regressions are now strongly significant, particularly the difference across time. The 99% confidence bands are narrow and demonstrate the overwhelming regression output. We find that the people's assessment of the growth prospects declined significantly in 2020 in comparison to 2019. Indeed, the regression line of 2020 shifted parallel downward in Figure 3. The slope of 0.002 remains significant positive at a 0.1%-level (Table 4). Yet, the intercept declined from 0.307 in 2019 to 0.214 in 2020 (Table 4). This implies that people's prospects declined by almost 1/10 or 70 percent, while the economic situation measured by growth did not decline with the same degree. Thus, the people's survey assessment of the economy is highly volatile in relation to the macroeconomic variables. Nonetheless, the macroeconomic variables, particularly GDP per capita, determine the survey outcome.

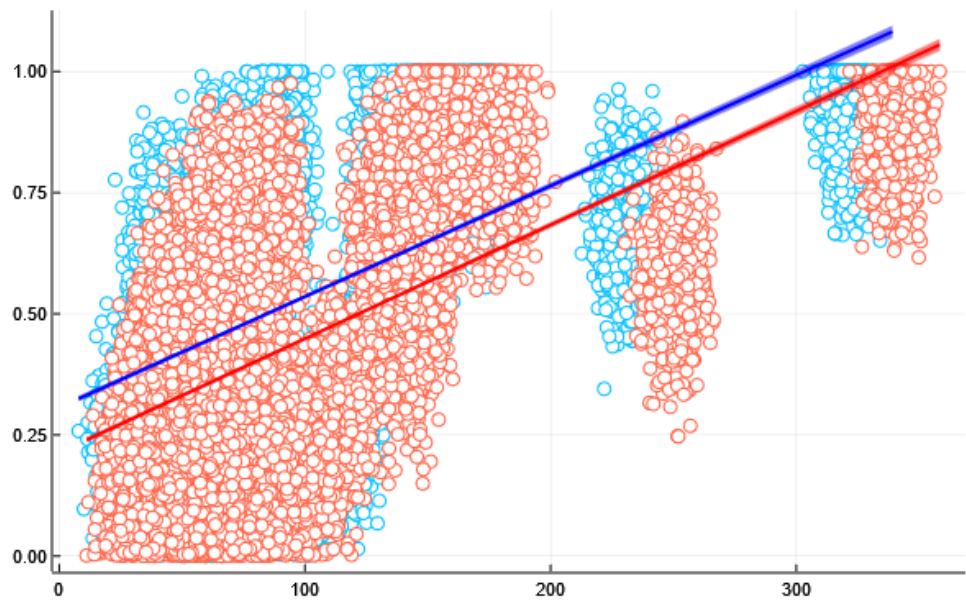


Figure 3. Simulation Regression: The blue color represents the simulation of the scatter and regression line with 99% confidence interval of the 2019 data. The red color represents the simulation of the scatter and regression line with 99% confidence interval of the 2020 data. Source: author.

Table 4. Simulation Regression Models.

	Bi-Variate		Multi-Variate	
	Model 2019	Model 2020	Panel 1	Panel 2
(Intercept)	0.307 *** (0.002)	0.214 *** (0.002)	0.260 *** (0.002)	0.319 *** (0.002)
GDP	0.002 *** (0.000)	0.002 *** (0.000)	0.002 *** (0.000)	0.002 *** (0.000)
Unemployment				−0.008 *** (0.000)
Covid				−0.001 *** (0.000)
Estimator	OLS	OLS	OLS	OLS
N	27,000	27,000	54,000	54,000
R ²	0.321	0.388	0.345	0.392
adj.R ²	0.321	0.388	0.345	0.392
p(F − sig.)	0.000	0.000	0.000	0.000

Note: significance of 0.1% = ***. Source: author.

Citizens of Member States with greater GDP per capita have a higher positive response in regard to the economic prospects in general (Table 4). This is robust in all regressions and highly significant at 0.1%. Moreover, the relationship to unemployment of -0.008 and the Covid death per cases ratio of -0.001 are strongly significant with the people’s growth assessment. We find that neither the recovery fund nor the EU-budget aid to beneficiary EU Member States affect the people’s assessment of the future economy. What matters most for people are the state of the national economy, the national unemployment rate and the national Covid performance. Consequently, people’s happiness which is highly correlated to the growth prospects would be better enhanced by structural (growth) policies at home. European growth policies are nice to have, yet do not resolve weak national growth policies in Member States.

Finally, we re-simulate the model with a sample size of $N = 100,000$. Figure 4 show all possible bi-variate regression models consisting of Question 4 and GDP per capita. Indeed, Figure 4 exhibits the histograms of the intercepts in the left-panel and the slopes in the right-panel. The median values reflect the estimation outcomes of Panel 1 in Table 4.

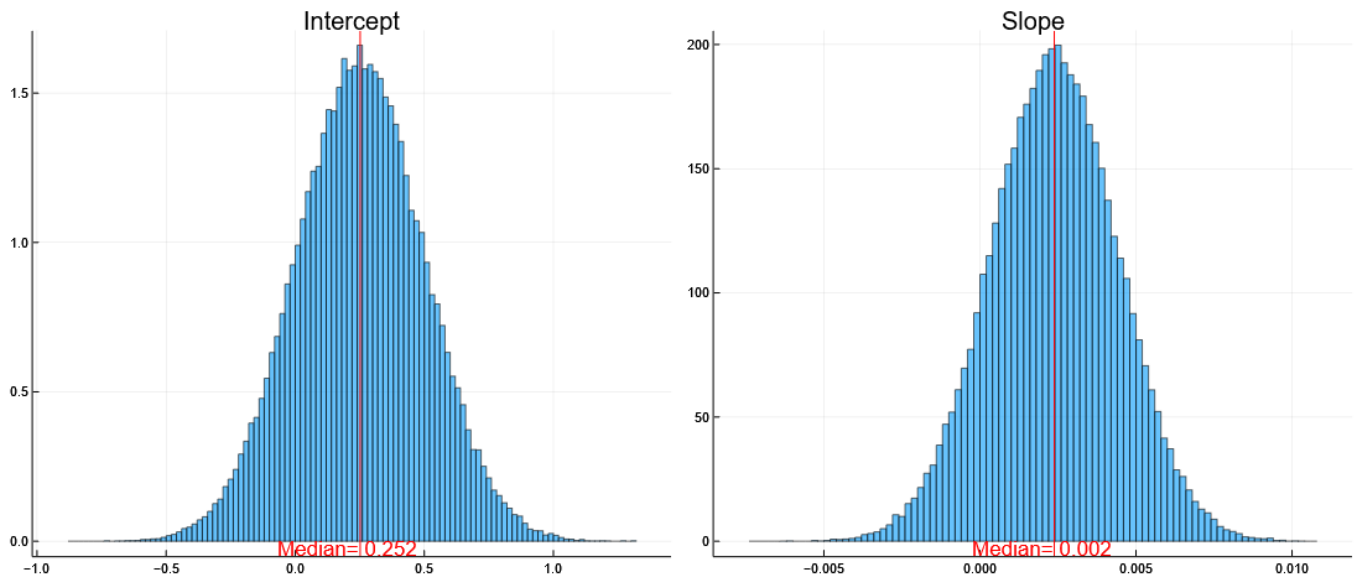


Figure 4. Simulation Regression: Left panel denotes the histogram of the intercept. Right panel denotes the histogram of the slope. Source: author.

Based on this simulation, we find the standard deviation of the intercept of $\sigma_{Intercept} = 0.248$. Thus, a one $\sigma_{Intercept}$ -variation keeps the intercept positive. Similarly the standard deviation of the slope is of $\sigma_{Slope} = 0.002$. Hence, a one σ_{Slope} -variation keeps the slope positive too. The likelihood that the estimated positive relationship reverses is low, given that volatility of macroeconomic variables are significantly lower than the variation in survey data.

Of course, one can argue that the simulation regression has no counterfactual analysis. Indeed, this might be a limitation. Yet, we tested the approach for a two-year window 2008 and 2009 of the global financial crisis and compared the simulation regression output with the existing long time-series of 1990 to 2020. Indeed, the simulation regression is reflecting the same properties than the long time-series pattern. In future research, we plan to validate the simulation regression methodology at different events across countries and time.

6. Conclusions

Our paper exhibits several conclusions. First, in order to match survey and macroeconomic data, the simulation regression methodology provides a novel opportunity. Indeed, this approach allows a real-time assessment of economic questions. Second, the major positive determinant of growth prospects are the level of GDP per capita, while the major negative aspects are the unemployment rate and the shock absorption capacities at home (here measured by the Covid death per cases ratio). Third, the role of EU institutions and EU policies, such as the recovery fund or the EU-budget has no significant impact on the people's perceptions in regard to growth. Thus, we obtain the policy conclusion that domestic growth policies matter, while European growth policies do not as much. Consequently, we suggest that Member States within a monetary union without a fiscal union, have to both implement and finance economic policies primarily at home (Herzog 2018; Herzog and Hengstermann 2013; Herzog and Choi 2017). The idea of a European-state or European growth policy is misguided economically and degrades the people's perceptions

still living in democratic Member States. European growth policies would be effective if policy-makers establish a political union (Herzog 2021). Yet, this is neither realistic nor feasible in the near future.

Funding: I am grateful that the publication fee were financed by Albert-Ludwigs-Universität Freiburg, Universitätsbibliothek, Geschäftsstelle des Konsortiums Baden-Württemberg and Reutlingen University, Bibliothek, Reutlingen. I have not received further external funding for the research project.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Acknowledgments: I thank all IRM-seminar participants for valuable comments and a thorough discussion of my paper. Moreover, I thank the university Reutlingen for giving me the opportunity of a research leave in 2021. Most of this work was conducted during the research semester in winter 2021.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Julia Code

Listing A1. Simulation Regression Code.

```
// Create a variable of GDP data:
x2019 = real.(data2019.GDP)

// Simulate the data for i new sample size:
xSim19 = [x2019 .+  $\hat{\sigma}_{GDP}$  * randn(size(x2019)[1]) for i =1:100,000]

// Convert simulation data to DataFrame and Matrix:
dfx19 = DataFrame(xSim19, :auto);
Ax19 = Matrix(dfx19);

// Transform matrix to single-vector:
begin
vect19 = Float64[]
  for j in 1:size(Ax19,2)
    vect19 = vcat(vect19, Ax19[:,j])
  end
end
xSim19f = vect19

// Make Dataframe for regression:
dataSimReg19 = DataFrame([xSim19f ySim191 ySim192 ySim193 ], :auto);

// Compute the Simulation regression:
SimReg19 = reg(dataSimReg19, @formula(x1 ~ x2 + x3 + x4))
```

Appendix B. Histogram and Kernel Density

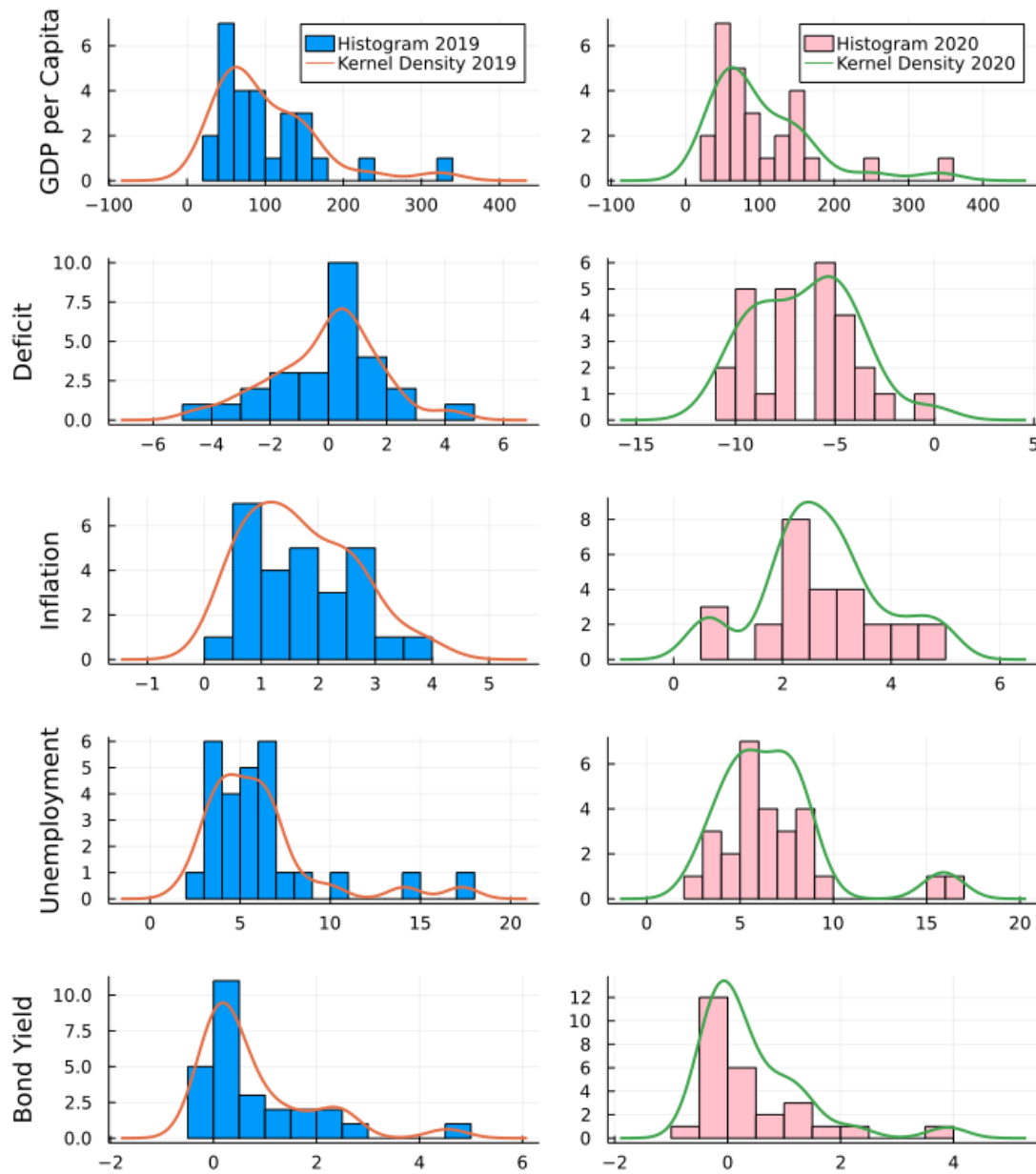


Figure A1. Histogram and Kernel densities: Left-hand panels represent the data of 2019 for each macroeconomic variable. Right-hand panels represent the data of 2020 for each macroeconomic variable. Source: Eurostat 2021.

Notes

- ¹ Note: the macroeconomic data for 2021 are not available-only forecasts.
- ² The evaluation of mean inflation of Eurozone countries alone is slightly above 2.0 percent.

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