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Business Analytics Programme

Influence of people's values on the GDP growth

Econometrics Course Project

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1 Introduction

The aim of this project is to check whether people's values have impact on the economic growth of the country. In my opinion, people's values play important role in economic prosperity, even though this is not always obvious and visible. The values considered in this work are the gender equality, tolerance to immigrants, involvement in the political life of the country and importance of religion and God in life. In my opinion, less religious societies with better attitude towards women and immigrants and higher involvement in political life must have more developed economy. To test this, the model suggested by Robert Barro for GDP growth is constructed for the data of 2015-2019 years. Then the variables corresponding to people's values are added to the model and their impact is observed.

2 Literature overview

Robert Barro in his work developed the model for GDP growth [1]. Model estimates growth rate of GDP per capita over period of 5 or 10 years and includes such independent variables, as initial GDP per capita, growth rate of inflation rate over this period, life expectancy, fertility rate, share of government consumption in GDP, rule-of-law index, years of studying at secondary and higher levels for male population and terms-of-trade, which is the growth rate of the ratio of export to import prices. It was shown, that the factors enhancing GDP growth are lower initial GDP per capita, higher life expectancy and schooling, lower fertility, lower government consumption, higher rule-of-law index, lower inflation, and higher growth rate of terms of trade.

3 Data description

The data for initial GDP model was collected for 93 countries for 2015-2019 years. The data on GDP per capita, CPI, government consumption, fertility rate, life expectancy and terms of trade were taken from World Bank [2]. The data on rule-of-law index was taken from World Justice Project [3]. There are variables, their names in the code and their expected effect on the dependent variable provided in table below.

Variable name	Description	Expected effect
GDP2015	GDP per capita in 2015	-
AVG_life	average life time expectancy	+
rule_law	rule of law index for 2019	+
cpi_growth_rate_15_19	growth rate of CPI	-
AVG_FERT	average fertility index	-
terms_trade_growth_rate	growth rate of terms of trade	+
AVG_GOVT_CONS	average share of government consumption in GDP	-

First variable is GDP per capita in 2015 year and it reflects the size of the economy. The theory of convergence states that larger economies tend to grow slower, therefore the expected effect of this variable is negative.

Second variable is average life time expectancy for 2014-2018 years. Higher life expectancy means better health-care system and life conditions, and therefore better labor force, which is a plus for GDP growth. The expected effect is positive.

Third variable is the rule of law index, which shows how strongly country adhere to the rule of law in practice. The higher index corresponds to better judicial system of country, which means better business climate and higher attractiveness to investors. The expected effect is positive.

Fourth variable is growth rate of CPI over 2015-2019 years. The higher inflation leads to lower purchasing power, and therefore lower growth of GDP. The expected effect is negative.

Fifth variable is average fertility rate for 2015-2019 years. The higher the fertility rate is, the more investments are spent on new workers, rather than investments per worker. Moreover, the more resources must be devoted to child-rearing, rather than to production of goods, therefore expected effect is negative.

Sixth variable is growth rate of terms of trade over 2015-2019 years. The higher the growth rate of the ratio of exports to imports is, the more goods country produces and the higher growth rate of GDP must be. The expected effect of the coefficient is positive.

Seventh variable is the average share of government consumption in GDP of the country (measured in %) for 2015-2019 years. Barro suggests to exclude military and education expenditures, so measurement could better reflect non-productive government spending. The expected effect is negative.

The model does not consider schooling and democracy index, as it is in original Barro model, due to lack of data.

The data for people's values was taken from World Values Survey in 2017-2019 years [4]. The values of interest are importance of God in life, tolerance towards immigrants, gender equality and political involvement.

In my opinion, importance of God can be estimated by answers on the question *"How important is God in your life?"*. Answers lie on the scale from 1 to 10, where 1 is *"Not at all important"* and 10 is *"Very important"*. The average estimation per country is considered and the larger it is, the more religious is the society.

Tolerance towards immigrants can be estimated by answers on the question *"On this list are various groups of people. Could you please mention any that you would not like to have as neighbors?"*. The value of 0 corresponds to not mentioning and value of 1 corresponds to mentioning immigrants as unwelcome neighbors. The average estimation per country is considered and the lower it is, the more tolerant society is.

Level of gender equality in society can be estimated by level of agree with statement *"When jobs are scarce, men should have more right to a job than women"*. Answer lies on the scale from 1 to 5, where 1 is *"Agree strongly"* and 5 is *"Disagree strongly"*. The average estimation per country is considered and the larger it is, the higher level of gender equality is in society.

Political involvement can be estimated by answers on the question *"How interested would you say you are in politics?"*. Answers lie on the scale from 1 to 4, where 1 is *"Very interested"* and 4 is *"Not at all interested"*. The average estimation per country is considered and the lower it is, the more society is interested in politics and involved in political life

Variables corresponding to values are provided in the table below.

Variable name	Description	Scale
religion	*"How important is God in your life?"*	1-10
polit_inv	How interested would you say you are in politics?	1-4
women	When jobs are scarce, men should have more right to a job than women	1-5
immigrants	Could you please mention any that you would not like to have as neighbors?	0-1

4 Model and results

First, the modified version of linear regression suggested by Barro was run on collected data:

$$GDP\_growth\_rate\_15\_19 = f(log(GDP2015), log(AVG\_life), rule\_law,$$

$$cpi\_growth\_rate\_15\_19, log(AVG\_FERT), terms\_trade\_growth\_rate, AVG\_GOVT\_CONS)$$

The results of the linear regression are in the table below:

Variable	Coefficient	Std.Error	t-value	p-value	Significance
intercept	4.018180	1.196378	3.359	0.00117	**
log(GDP2015)	-0.097922	0.019920	-4.916	4.26e-06	***
log(AVG_life)	-0.652200	0.282598	-2.308	0.02344	*
rule_law	0.306598	0.156691	1.957	0.05367	.
cpi_growth_rate_15_19	-0.213844	0.076844	-2.783	0.00664	**
log(AVG_FERT)	-0.404695	0.057678	-7.016	5.15e-10	***
terms_trade_growth_rate	-0.122739	0.085826	-1.430	0.15636	
AVG_GOVT_CONS	-0.002318	0.003125	-0.742	0.46025	

R-squared: 0.5558
F-statistic: 15.19 on 7 and 85 DF, p-value: 9.977e-13
Observations: 93

As R-squared = 0.5558, the model explains about 55% of the causes of GDP growth in countries over 2015-2019 years. The estimated effect of initial GDP, rule of law index, growth rate of CPI and fertility rate is the same as it was expected. However, the effect of life time expectancy is negative, although positive effect was expected. The variables corresponding to average share of government consumption and the growth rate of terms of trade appear to be insignificant, however all variables are jointly significant together.

The model was then extended by adding variables corresponding to people's values.

$$GDP\_growth\_rate\_15\_19 = f(log(GDP2015), log(AVG\_life), rule\_law,$$

$$cpi\_growth\_rate\_15\_19, log(AVG\_FERT), terms\_trade\_growth\_rate,$$

$$AVG\_GOVT\_CONS, religion, polit\_inv, women, immigrants)$$

The number of observations is now 53, because there is data on values only for 53 countries from previous model. Results of linear regression are provided in table below :

Variable	Coefficient	Std.Error	t-value	p-value	Significance
intercept	2.686751	0.719113	3.736	0.00057	***
log(GDP2015)	-0.134208	0.041345	-3.246	0.00233	**
log(AVG_life)	-0.021859	0.010779	-2.028	0.04910	*
rule_law	0.652382	0.230663	2.828	0.00721	**
cpi_growth_rate_15_19	-0.199650	0.139093	-1.435	0.15877	
log(AVG_FERT)	-0.438639	0.088200	-4.973	1.22e-05	***
terms_trade_growth_rate	-0.234101	0.157321	-1.488	0.14439	
AVG_GOVT_CONS	-0.005003	0.004641	-1.078	0.28734	
women	0.080735	0.034043	2.372	0.02249	*
immigrants	0.254071	0.137763	1.844	0.07238	.
polit_inv	0.034608	0.074447	0.465	0.64448	
religion	-0.005669	0.014584	-0.389	0.69948	

R-squared: 0.7023
F-statistic: 8.793 on 11 and 41 DF, p-value: 9.737e-08
Observations: 53

The model now explains about 70% of the causes of GDP growth. However, not all proposed variables are statistically significant. Importance of God in life and political involvement appear to be insignificant. Let's now consider the model without these variables. The results are provided in table below :

Variable	Coefficient	Std.Error	t-value	p-value	Significance
intercept	2.641362	0.617377	4.278	0.000103	***
log(GDP2015)	-0.139169	0.038562	-3.609	0.000797	***
log(AVG_life)	-0.020014	0.009956	-2.010	0.050715	.
rule_law	0.634036	0.212291	2.987	0.004643	**
cpi_growth_rate_15_19	-0.202849	0.135373	-1.498	0.141325	
log(AVG_FERT)	-0.449463	0.082940	-5.419	2.54e-06	***
terms_trade_growth_rate	-0.253346	0.140522	-1.803	0.078416	.
AVG_GOVT_CONS	-0.004617	0.004444	-1.039	0.304564	
women	0.084755	0.031596	2.682	0.010329	*
immigrants	0.261468	0.119169	2.194	0.033680	*

R-squared: 0.7004
F-statistic: 11.17 on 9 and 43 DF, p-value: 9.598e-09
Observations: 53

The model still explains about 70% of causes of GDP growth and variables *women* and *immigrants* are significant. The effect of *women* variable is the same as it was expected - the higher level of gender equality leads to bigger GDP growth. However, the effect of *immigrants* variable is opposite to expected. The higher intolerance towards immigrants corresponds to bigger GDP growth. What is more, growth rate of CPI is not significant in this model.

5 Conclusion

To sum up, two models were evaluated in the project. First model is modified version of model suggested by Robert Barro for estimating GDP growth. The model on the data for years 2015-2019 showed results, that were different for some variables from Barro's observations. Average share of government consumption in GDP and growth rate of terms of trade appeared to be insignificant, and average life time expectancy has negative effect on GDP growth, whereas positive effect was expected. The second model is the extended version of the first one, but with added variables corresponding to people's values: importance of God in life, tolerance towards immigrants, gender equality and involvement in political life of country. The variables corresponding to religion and political involvement appeared to be insignificant. The variable corresponding to tolerance towards immigrants is significant, but result is opposite to what it was expected : model shows that the more intolerant society is, the higher is GDP growth rate. Only the variable corresponding to gender equality is significant and has expected result: the higher level of gender equality leads to higher GDP growth.

References

[1] *Determinants of Economic Growth: Cross-country Empirical Study, Robert J. Barro*

[2] `https://www.worldbank.org`

[3] `https://worldjusticeproject.org`

[4] *Factors Affecting Economic Growth in Developing Countries, Parash Upreti*

[5] `https://www.worldvaluessurvey.org`