**DOES THE DECLINE IN THE WELFARE OF TURKISH CITIZENS CAUSE THE GOVERNMENT VOTES TO DIMINISH?**

**Analysis Using Python and Multivariate Linear Regression Model**

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**ADVANCED DATA ANALYSIS IN PYTHON**

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**Hypothesis**

*“Decline in the overall public austerity of Turkey results noticeable diminish impact on government votes (AKP) in the two major provinces of Turkey (Istanbul and Ankara).”*

It is observed that the steadiness of the government’s votes has come to an end in the last local elections. It has lost the municipality in both cities. Parallel to this, a recession has occurred in the last quarter before the elections. Moreover to this, the growth rate has been deteriorating and Turkish Lira was devaluating exponentially for the last two years. Those factors lead to a decline in the living standards of the citizens and some lost jobs due to shut down businesses. Eventually, we had a strong belief that the decline in the living standards of people (that is decline in the purchasing power and/or running unemployed) have led to a reaction against government.

**Data and Variables of Interest**

**Independent Variables**

Since look for measuring the aggregate welfare of the society, we have used to variables to indicate the purchasing power and unemployment.

GDP per Capita Divided by Consumer Price Index

“Consumer Price Index (CPI) is determined by taking the weighted average of prices of a basket of significant consumer goods and services.” (IMF) So, this measure is supposed to indicate how expensive is the life in Turkey on overall. The data is obtained from Turkey Statistics Institution (TÜİK). GDP per Capita is calculated by dividing the GDP of a country by its population for a particular period. “GDP refers to the total value of final (as opposed to interim, or work-in-progress) goods and services produced within a country’s borders during a specific calendar period such as quarterly or annually.” (Investopedia) So, this measure is supposed to measure the average income of the citizens of a country. The data of GDP is also obtained from TÜİK. *GDP per Capita / CPI* is one of our explanatory variables and is calculated by dividing the GDP per Capita by the CPI. It is supposed to measure how many of those baskets of goods (CPI) could be purchased with the average income of individuals (GDP per Capita) in Turkey in a simple way. That variable implies the purchasing power in Turkey. Purchasing power is one of the main elements that determine the prosperity in a country. It eliminates the relative amount of income difference in the world by comparing the income and the expenses of the citizens within the country. Therefore, it is highly correlated with the living standards within a country’s borders.

Unemployment Rate

“The unemployment rate is defined as the percentage of unemployed workers in the total labor force. Workers are considered unemployed if they currently do not work, despite the fact that they are able and willing to do so.” (Focus Economics) *Unemp,* is our other explanatory variable which is simply meant to measure what proportion of people that are looking for jobs are unemployed, thus depriving income at all. That is another main indicator of the prosperity of individuals, households within Turkey.

**Dependent Variable**

The Vote Percentage of AKP or its Alliance Front Acquired

The data of the vote percentage of AKP or its alliance force is obtained from Anadolu Agency (AA) which is the only source for elections in Turkey. We chose the AKP’s votes alone for the previous terms and the Cumhur Alliance’s votes (AKP + MHP) instead of AKP. That is *VoteGov* being our dependent variable. The reason for that is, we have looked for how content the citizens are with those levels of welfare and if the recession (consequentially the above-mentioned macroeconomic variables) did make a significant impact on consent for the ruling government.

The scope of the election data is the vote percentage changes of the government front in the two major cities Ankara and İstanbul in the sequential local and general elections and referendums. The vote percentage is the weighted average of the government’s vote percentage in those two cities according to their population size. The indicator we considered is “the percentage change from an election to the next one” is within a period of approximately a year. Because GDP per capita and CPI are announced annually and their impact on the society is expected to result in a year in macroeconomics. Therefore, we match an election’s vote percentage change with the previous year’s explanatory variables.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **election** | **government votes** | **unemployment** | **gdp per capita/cpi** | **ppp** | median age |
| 2004 local | 0,438682271 | 0,105419998 | 70,07 | 0,74 | 24,8 |
| 2007 general | 0,458660464 | 0,08718 | 88 | 0,84 | 28,3 |
| 2009 local | 0,431053744 | 0,09710 | 90,52760895 | 0,88 | 28,5 |
| 2010 referendum | 0,546388351 | 0,125520001 | 84,40847128 | 0,9 | 28,8 |
| 2011 general | 0,493434173 | 0,106599998 | 88,90134529 | 0,92 | 29,2 |
| 2014 local | 0,405515506 | 0,087320004 | 106,8951558 | 1,07 | 30,4 |
| 2015 general | 0,440503563 | 0,09880 | 109,4496323 | 1,1 | 30,7 |
| 2017 referendum | 0,487023467 | 0,108389998 | 117,1586256 | 1,25 | 31,4 |
| 2018 general | 0,516614572 | 0,108190002 | 123,9187544 | 1,37 | 31,7 |
| 2019 local | 0,481551009 | 0,108950005 | 125,1975876 | 1,56 | 32,0 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | *Column 1* | *Column 2* | *Column 3* | *Column 4* | *Column 5* |
| Column 1 | 1 |  |  |  |  |
| Column 2 | 0,835039489 | 1 |  |  |  |
| Column 3 | 0,133394193 | -0,004145421 | 1 |  |  |
| Column 4 | 0,254283057 | 0,184756161 | 0,951180398 | 1 |  |
| Column 5 | 0,250744625 | 0,063275666 | 0,949722558 | 0,878698968 | 1 |

**Control Variables**

Purchasing Power Parity

The data of Purchasing Power Parity (PPP) of turkey is also obtained from TÜİK. “Purchasing power parity (PPP) is a way of measuring economic variables in different countries so that irrelevant exchange rate variations do not distort comparisons. Purchasing power exchange rates are such that it would cost exactly the same number of, for example, US dollars to buy euros and then buy a basket of goods in the market as it would cost to purchase the same goods directly with dollars. The purchasing power exchange rate used in this conversion equals the ratio of the currencies' respective purchasing powers (reciprocals of their price levels).” (Investopedia, The Economist) We have focused on the PPP of Turkey compared to the OECD countries as a control variable so that we could ensure the correlation of the change in the PPP, another forthcoming macroeconomic variable that measures relative purchasing power, and the vote percentages of the governments if the findings were parallel with *GDP per Capita/CPI*. In the recent quarter, Turkey has experienced an official recession and thus, its populations’ living standards are supposed to decline compared to the rest of the world.

On the other hand, there is other factors that make noticeable impact on government votes in Turkey other than economics. The social elements such as religious figures, the leader Erdoğan’s charisma and public opinion about his competence and authority are very significant on public’s decision making for voting. Another factor, correlated with those mentioned factors, is the feeling of security. Security and terrorism are somehow generally hot topic issues in Turkey compared to its peer countries. The roles they played in the politics were pretty obvious. The public generally has an incentive to appeal for the government in case of an instability.

Another factor that determines the poles of the government is right wing and left wing. The division of the society and polarization has become clearer along the time and especially by the new application of alliance system. It is not very easy for an electorate to switch from a wing to another in Turkey’s political ground.

Median Age

Moreover, in the period of 17 years of ruling, new generations have emerged as electorates. It is likely that the new generation electorates changing the demographical balances. In other words, the new generation might increase the number of the left-wing population or the right-wing population. Furthermore, since the government has been ruling for so long, some electorates did not experience any government change and that could be another factor that make the voters’ decision making stickier, that more risk averse for changing the government with a new party. Thus, *MedianAge* has been used as another control variable. That is the median age of the electorates is supposed to give inference about the age distribution of the electorate population and the skewedness of it.

Consequently, the above-mentioned social factors have the potential to affect the government’s vote percentage at least as much as the economic factors. Since we cannot have separate experiments for those, it is impossible to measure the sole effect of economic welfare on public consent for government. Also, it is not really easy to come up with all of those intangible factors that have a causal effect on government’s votes. In case of a significant altering in those social factors, our hypothesis might suffer from “Omitted Variable Bias (OVB)” problem.

**Empirical Method**

**Econometric Modelling**

We used *Multivariate Linear Regression Model* for expressing the causal effect of purchasing power and unemployment on the government’s votes. Although we have been considering using Gaussian Process as the model, we have switched to Multivariate Linear Regression Model. Because the data we obtained resulted a linear correlation with multiple independent variables rather than a skewed curve and we did not require any machine learning predictions.

In order to check whether the analysis is valid, we have run the regression using Python and the data we have obtained from the TÜİK. The figure below illustrates the Python output for regression values.A screenshot of text

Description automatically generated

So, the estimation we have got from data that Python provides is the following linear model:

*VoteGov: = + Unemp+*

= -0.15 (intercept)

= 2.97

= -0.0014

0.015

= 0.001

: Robust error that captures unobserved social determinants of voting

**Findings and Evaluation of the Hypothesis**

The only significant explanatory variable turns out to be *Unemp* with = 2.97, however its causal effect is in positive relation with government votes.

The only explanatory variable that is in positive relation with the dependent variable is *GDP per Capita /CPI* which is consistent with our hypothesis. However, it has = -0.0014 which is insignificant impact on government votes.

The control variable *PPP* is also in a positiverelation with the dependent variable, which also disproves our hypothesis. Its significance is very slight yet still noticeable.

The other control variable *MedianAge* also has a very insignificant impact and is in a positive relation with the votes. Therefore, the control variable does not really have a causal effect on the votes.

Consequently, we can say the hypothesis, “The decline in the government front’s vote percentage is due to the decline in the public prosperity” is neither consistent nor valid. The reason for the failure is very likely to be other social factors that we were able to or not predict rather than the economic factors.

**References for Definitions**

<http://data.imf.org/?sk=4FFB52B2-3653-409A-B471-D47B46D904B5>

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