Explaining Total Revenue in terms of CapEx, Current Expenditure and VAT; Albanian Case

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Abstract

Total Revenue is an important indicator of the economic well being of a particular country. As it is known government has revenue either by the taxes it collects from society or by the investments it undertakes. This paper is interested in studying the total revenue component for government and some of the factors that affect it. The factors chosen in this paper are capital expenditure, current expenditure and VAT (value added tax). The factors chosen here are a combination of investment from government (including capital and current expenditure) and tax collection (including VAT), which as stated before are the most important components for a governments total revenue.

This paper is especially interested in the Albanian case and the interrelation among the total revenue and the other three factors based on time series econometric model. As a consequence it will be based more on econometrics, but without leaving behind the economic interpretation of the results. It will be important to measure whether these factors have a positive or negative impact in the total revenue; whether their impact is statistically significant or not and whether they are sufficient indicators to determine the actual values of total revenue. After taking into consideration all these econometric factors, an economic analysis will be applied; by comparing the expectation the economic theory has and the actual results of the econometric model, and by this way will be determined the validity of the model.

Keywords: Total Revenue, CAPEX, Current Expenditure, VAT, Econometric model, Albania.

Introduction

In this paper we will analyze an econometric model, which consists of the total revenue component explained by capital expenditure, current expenditure and VAT. First of all here we aim to give a term explanation for all variables included in the estimation and make predictions of how do we expect them to affect the dependent variable, total revenue in our case. Then we will test for the significance of all the variables both individually and in group,

to see whether their effect on total revenue is significant and whether there exists multicollinearity problem between the variables. After testing for, it is known that econometric models suffer too much from trend and seasonality. Therefore, in this context we test also, for them; check whether they are significant and that being the case we try to remove them.

After removing trend and seasonality, we check for the serial correlation, which is also a problem seen in time series data. Again we see for its significance and remove it if necessary. The next test is about the heteroskedasticity of the model, which again is tested for its significance by White Test and that being the case we again try to remove it.

Next we test for the functional form misspecification and again look for its significance. That being the case, again we remove it.

From the above tests, conclusions are given on the model so that we compare them with our predictions before constructing the model, state whether they explain enough of total revenue etc.

1. Literature Review

In this section we try to emphasize some of the most important opinions regarding the topic taken into consideration by some of the most well known scholars and economists.

Mahdavi and Westerlund (2008) have shown that regarding the rising fiscal imbalance issue is complicated by at least two issues. Firstly, the division of the burden between the expenditure and revenue parts of the total budget during periods of fiscal problems requires an evaluation of initial levels of both taxes and expenditures, in order to determine if it will be worth changing them in the desired direction. Secondly, as for determining to which variable to give the temporal priority, one has to determine whether the changes that will be made in spending will occur, independently or simultaneously with the changes in taxes. According to Adesola (2000) value added tax is a consumer tax that is charged before selling the good. From his study, VAT is often defined as the sum of profit and wages. Gendron (2005) would define VAT as a consumption tax, taken as a tax base over income.

Friedman (1978), one of the first scholars dealing with this issue, suggested that while an increase in taxes leads always to an increase in government expenditures, reduction in revenue would consequently lead to government expenditure reduction. According to the study of

Wagner (1976) and Buchanan and Wagner (1978), they argued that due to fiscal corruption, an increase in revenue would lead to a lowering in expenditures. They further concluded that expenditures funded by other things than direct taxation leads the general public to believe that the value of government expenditures is lower than what it would be under direct taxation. In the study of (Eita & Mbazima, 2008), they said that the causal relationship between government revenue and expenditure has remained an empirically debatable issue in the field of public finance. Over the past three decades, many studies have tried to investigate the relationship between expenditure and total revenue; the most important ones are shown below.

According to the empirical study of Barro and Grilli (1994), government spending (or government expenditure) includes every kind of government consumption and investment; expect the transfer payments made by a state. Government expenditure can be split into the acquisition of goods and services for current use to directly yield profit or satisfy individual and collective necessities of the society; and the acquisition of goods and services for the purpose of creating future benefits such as infrastructure investment. Therefore, Government expenditure is categorized into either current expenditure or capital expenditure. Current expenditure is short- term spending or, differently stated, spending on items that are consumed and only last a limited period of time. They are items that are consumed in the process of providing a good or service. Contrary to current expenditure, capital expenditure is spending on long-term assets. It is the acquisition of items that will last and will be used time and time again so that they will provide good and services in the long term future. The best example of government expenditure would be the building of a new hospital, the purchase of new computer equipment or networks, building new roads and so on. The splitting point between these two types of spending is very important. While capital expenditure has a lasting impact on the economy and helps provide a more efficient and productive economy, current expenditure, on the other hand, doesn't have such a long-term impact. At the time money is spent, it is gone and the effect on the economic growth is simply a short-term one.

The impact of the government expenditure is not yet conclusive and while some authors indicated that the impact of government expenditure on economic growth is negative or non significant (Akpan, 2005), others believed that the impact is positive and significant (Korman and Brahmasrene, 2007).

According to Barro (1990), it was indicated that expenditure on investment and productive activities is expected to have a positive contribution to economic growth, while government consumption spending is expected to have a long term growth.

Other empirical studies have shown the interrelationship between the VAT revenue of a country and its level of economic growth. The revenue received from VAT is likely to be higher in an economy with higher level of individual income (Ebrill, et al. 2001). The primary expectation is that value added tax will impact positively on economic growth of a particular country. His study found that a positive and significant relationship exist between VAT and government revenue. The results of the finding showed that; the past values of value added tax could be used to predict the future behavior of the revenue.

Empirical studies show that there are mixed findings on the nature of the relationship or direction of movement between government expenditure and government revenue.

Granger (1969) concluded the revenues may be explained by past revenues and expenditures. Given that the past values of expenditure explain current revenues, then there exists causality of expenditure to revenue. The opposite being the case, then the flow of causation is from revenue to expenditure.

2. Model Specification and Estimation

Model Specification

Our data were taken from the Ministry of Finance. The data included are:

- Total Revenue
- Capital Expenditure
- Current Expenditure
- VAT

Total Revenue: In business, *revenue* is the income that any company or government unit receives from its normal business activities, either from the expenditure the government undertakes or from the sale of goods and services to customers. Companies and government units receive revenue also from interest, taxes or other fees.

Capital Expenditure: Capital expenditures (CAPEX) are expenditures that are made to create long term future benefits. A capital expenditure is undertaken when a business or government unit spends money either to buy fixed assets or to add to the value of an existing fixed asset, which will provide long term future profits.

Current Expenditure: Current expenditure, different from CAPEX, is expenditure on goods and services consumed within the current year, which needs to be made on a frequent basis to maintain the short term activities of the government. Current expenditure includes final consumption expenditure, property income paid, subsidies etc.

VAT: A value-added tax (VAT) is a kind of consumption tax. Considering it from the perspective of the buyer, it is a tax on the price purchased. From the perspective of the seller, it is a tax on the value added to a product. The main purpose of VAT is to generate tax revenues to the government similar to the corporate income tax or the personal income tax.

Data were taken for the Albanian country from January 1999 to January 2014 on monthly basis, on Ministry of Finance website.

- Dependent Variable : Total Revenue
- Independent Variables : Capital Expenditure, Current Expenditure & VAT

The aim of this project is to show how the Total Revenue is explained by the Capital Expenditure, Current Expenditure & VAT on time series data.

Model Estimation

The general Equation:

$$TotRev_t = \beta_0 + \beta_1 * Capexp_t + \beta_2 * Currexp_t + \beta_3 * VAT_t + u_t$$

What we have to estimate here is the intercept (β_0) and the slope coefficients (β_1, β_2, β_3) of the respective variables.

From the above equation we expect all of the variables to have a positive impact on Total Revenue, expect Capital Expenditure, which will yield profit on long run terms and not at the same time as the revenue increases. Therefore in this case we could suffer from time trend problems, since the effect of the capital expenditure is not given immediately, but rather after a long time. Below we show the E-views estimation

Dependent Variable: TOTREV
Method: Least Squares
Date: 06/06/14 Time: 21:33
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2746.901	365.7227	7.510884	0.0000
CAPEXP	-0.022755	0.045648	-0.498490	0.6188
CURREXP	0.265929	0.044442	5.983716	0.0000
VAT	1.824548	0.090618	20.13445	0.0000

R-squared	0.945638	Mean dependent var	19442.29
Adjusted R-squared	0.944717	S.D. dependent var	6835.891
S.E. of regression	1607.282	Akaike info criterion	17.62433
Sum squared resid	4.57E+08	Schwarz criterion	17.69501
Log likelihood	-1591.002	F-statistic	1026.319
Durbin-Watson stat	2.069715	Prob(F-statistic)	0.000000

From the table we can construct the following equation with real numbers.

$TotRev_t = 2746.9 - 0.022 * Capexp_t + 0.265 * Currexp_t + 1.82 * VAT_t + u_t$

As expected both Current Expenditure and VAT have a positive impact on Total Revenue, since they yield profit in the short run, while the Capital Expenditure as was expected has a negative impact on Total Revenue, as it yields profit on long run, and time trends problem occur here.

The intercept explains that if all the independent variables are 0, total revenue would be equal to 2746.9

The coefficient of Capital Expenditure explains that if the capital expenditure rises by 100 % with time the total revenue falls by 2.2 %. The same logic is also applied also for the two other slope coefficients.

- **Individual Hypothesis:**

From the E-views table we can see that the intercept, current expenditure and VAT are significant because their p-values are equal to 0, while the capital expenditure is not significant since its p-value is very big (=0.6188).

- **Group Hypothesis:**

$H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = 0$

$H_1: H_0$ is not true

We use F-statistics in this case and from the Eviews table we can see that the p-value of the F-statistics which is equal to 0 therefore the variables are significant collectively.

LRP of Capital Expenditure

Since the Capital Expenditure is not significant we want to check for time lags of it, so that we can include also other values in other years of that variable and observe if it changes its significance. By this way we can find its LRP (Long Run Propensity).

Dependent Variable: TOTREV
Method: Least Squares
Date: 06/15/14 Time: 14:44
Sample(adjusted): 1999:03 2014:01
Included observations: 179 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2885.938	372.3215	7.751200	0.0000
CAPEXP	-0.019688	0.045406	-0.433597	0.6651
CAPEXP(-1)	0.029665	0.035848	0.827530	0.4091
CAPEXP(-2)	-0.097086	0.035052	-2.769777	0.0062
CURREXP	0.265682	0.043893	6.052997	0.0000
VAT	1.849127	0.093568	19.76239	0.0000

R-squared	0.947207	Mean dependent var	19569.63
Adjusted R-squared	0.945681	S.D. dependent var	6762.832
S.E. of regression	1576.175	Akaike info criterion	17.59633
Sum squared resid	4.30E+08	Schwarz criterion	17.70317
Log likelihood	-1568.872	F-statistic	620.7879
Durbin-Watson stat	1.991391	Prob(F-statistic)	0.000000

As observed by the table even when adding lags they are not significant, including the lag 0 and lag 1, while only lag 2 of Capital Expenditure is significant. We check again for their group significance by the Wald coefficient Restrictions.

Wald Test:
Equation: ESTIMATION

Null Hypothesis:	C(2)=0 C(3)=0 C(4)=0		
F-statistic	2.711303	Probability	0.046608
Chi-square	8.133909	Probability	0.043324

As seen from the Wald Coefficient restriction test, it is observed that the variables are significant in group, so that the method of including time lags for the Capital Expenditure will make it significant and what is more important is that it changes also its sign in some cases.

The LRP = -0.019 + 0.029 – 0.097 = -0.087

Still the LRP keeps being negative, which might lead us to the conclusion that the time trend is the main problem for this case with capital expenditure.

3. Multicollinearity

Since we know that one of the main problems that a regression faces is multicollinearity, we need to test for it before passing to the other tests. If there is a high correlation between the variables, then the results we might get will be misleading and we cannot proceed with our model without correcting for multicollinearity. We provide the correlation of each variable relative to the others in the following table.

Correlation Matrix				
	TOTREV	CURREXP	CAPEXPSA	CAPEXP
TOTREV	1.000000	0.898664	0.523841	0.505732
CURREXP	0.898664	1.000000	0.481495	0.660004
CAPEXPSA	0.523841	0.481495	1.000000	0.639315
CAPEXP	0.505732	0.660004	0.639315	1.000000

As seen from the table, there is no high correlation between the variables, which indicates that this model is not problematic with regard to multicollinearity and therefore we can proceed with the other tests.

4. Time Trend and Detrending

Defining and estimating trend problems

Trend Analysis is the practice of gathering information and trying to generate a pattern, or *trend*, in that information. Mainly trend analysis is used to predict future events, but it could also be used to estimate uncertain events in the past. Statistically speaking, trend analysis refers to methods for finding an underlying pattern of movements in a time series which would normally be partly or nearly completely hidden by the model. A simple description of these techniques is trend estimation, which can be undertaken within a formal regression analysis. In order to check for the trend we include a new variable @trend in the equation and check for its significance.

Dependent Variable: TOTREV
Method: Least Squares
Date: 05/23/14 Time: 21:46
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3854.218	488.2489	7.893962	0.0000
CAPEXP	0.079025	0.054008	1.463199	0.1452
CURREXP	0.171354	0.051818	3.306861	0.0011
VAT	1.469764	0.138735	10.59407	0.0000
@TREND	27.67123	8.354340	3.312198	0.0011

R-squared	0.948828	Mean dependent var	19442.29
Adjusted R-squared	0.947665	S.D. dependent var	6835.891
S.E. of regression	1563.839	Akaike info criterion	17.57491
Sum squared resid	4.30E+08	Schwarz criterion	17.66327
Log likelihood	-1585.529	F-statistic	815.8421
Durbin-Watson stat	2.136617	Prob(F-statistic)	0.000000

To test for the significance of the new term we can see that it is significant in all significance levels and therefore it shows that in this case trend is problematic.

We have to detrend the equation.

Detrending the equation

We generate a new variable t = @trend(1999:01). The logic underlying for this new variable is that it gives incremental values from the beginning date to the ending date.

We regress each of the variables on c and t and we save the residuals The new variables are:

- dtTotrev – residuals saved from the regression of total revenue with c and t
- dtCapexp– residuals saved from the regression of capital expenditure with c and t
- dtCurrexp– residuals saved from the regression of current expenditure with c and t
- dtVAT– residuals saved from the regression of VAT with c and t

Now that we created the new detrended variables we can estimate them again to check whether the trend has been removed. Intercept is not included since it will be not significant.

Dependent Variable: DTTOTREV
Method: Least Squares
Date: 06/06/14 Time: 22:08
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DTCAPEXP	0.079025	0.053704	1.471489	0.1429
DTCURREXP	0.171354	0.051526	3.325597	0.0011
DTVAT	1.469764	0.137953	10.65410	0.0000

R-squared	0.586979	Mean dependent var	-1.33E-12
Adjusted R-squared	0.582338	S.D. dependent var	2406.168
S.E. of regression	1555.029	Akaike info criterion	17.55281
Sum squared resid	4.30E+08	Schwarz criterion	17.60582
Log likelihood	-1585.529	Durbin-Watson stat	2.136617

Here we see that the coefficients of all the terms changed after detrending, and also that capital expenditure is now positive due to the removal of trend and therefore more significant. Still in order to be sure that the trend was removed we add again the variable @trend to the new equation and observe its significance. If it's not significant then trend is successfully removed, if it is significant trend was not removed.

Dependent Variable: DTTOTREV
Method: Least Squares
Date: 06/06/14 Time: 22:10
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DTCAPEXP	0.079025	0.053856	1.467349	0.1441
DTCURREXP	0.171354	0.051671	3.316243	0.0011
DTVAT	1.469764	0.138342	10.62413	0.0000
@TREND	1.95E-14	1.113803	1.76E-14	1.0000

R-squared	0.586979	Mean dependent var	-1.33E-12
Adjusted R-squared	0.579978	S.D. dependent var	2406.168
S.E. of regression	1559.415	Akaike info criterion	17.56386
Sum squared resid	4.30E+08	Schwarz criterion	17.63455
Log likelihood	-1585.529	Durbin-Watson stat	2.136617

As it can clearly be seen from the regression the p-value of the @trend variable is 1 meaning that it is not significant anymore. So the trend was successfully removed.

Now that we have removed trend, we want to check also for seasonality, see if it's significant and that being the case, and remove also it. We will cover it in the next section.

5. Seasonality

Definition and Estimation of Seasonality

Seasonality is a special characteristic of time series data, in which the data experiences regular and predictable changes which recur every calendar year.

Seasonality is seen in many time series data, and it's more present than one might think. For example, if you live in a climate with cold winters and warm summers, your home's heating costs probably rise in the winter and fall in the summer. Due to this reason, one would expect the seasonality of the heating costs to recur every year.

In order to check for seasonality problems, we include 11 new variables, known as @SEAS 2 up to @SEAS12 each representing a month. January is left as base year therefore it is not included. The following table gives the estimation:

Dependent Variable: TOTREV
Method: Least Squares
Date: 05/27/14 Time: 20:17
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3240.934	451.2284	7.182469	0.0000
CAPEXP	-0.052389	0.046189	-1.134226	0.2583
CURREXP	0.213337	0.046861	4.552534	0.0000
VAT	1.964296	0.098903	19.86081	0.0000
@SEAS(2)	-790.7100	520.4755	-1.519207	0.1306
@SEAS(3)	1476.236	522.8753	2.823305	0.0053
@SEAS(4)	809.3312	525.8045	1.539225	0.1257
@SEAS(5)	-1313.732	529.0605	-2.483140	0.0140
@SEAS(6)	-418.1700	536.3531	-0.779654	0.4367
@SEAS(7)	-779.8034	530.0483	-1.471193	0.1431
@SEAS(8)	-1138.207	518.9124	-2.193448	0.0297
@SEAS(9)	-504.7460	519.5967	-0.971419	0.3328
@SEAS(10)	-850.4230	522.9621	-1.626166	0.1058
@SEAS(11)	-948.4454	533.8590	-1.776584	0.0775
@SEAS(12)	845.4567	729.8665	1.158372	0.2484

R-squared	0.959995	Mean dependent var	19442.29
Adjusted R-squared	0.956621	S.D. dependent var	6835.891
S.E. of regression	1423.752	Akaike info criterion	17.43922
Sum squared resid	3.36E+08	Schwarz criterion	17.70428
Log likelihood	-1563.249	F-statistic	284.5346
Durbin-Watson stat	2.139627	Prob(F-statistic)	0.000000

To check if the seasonality is significant we test the seasonality coefficients with a Wald Coefficient Restriction test.

Wald Test:
Equation: Untitled

Null Hypothesis:	C(5)=0 C(6)=0 C(7)=0 C(8)=0 C(9)=0 C(10)=0 C(11)=0 C(12)=0 C(13)=0 C(14)=0 C(15)=0		
F-statistic	6.055574	Probability	0.000000
Chi-square	66.61132	Probability	0.000000

Since the p-value is 0 we fail to reject H_0 therefore the seasonality is significant and problematic in this case.

Seasonal Adjustment

In order to remove the seasonality we have to create new adjusted variables for both the dependent and independent variables.

The new generated values after the seasonal adjustment are:

- TOTREVSA – the adjusted total revenue
- CAPEXPSA – the adjusted capital expenditure
- CURREXPSA – the adjusted current expenditure
- VATSA – the adjusted VAT

We regress again all these new variables in order to check whether their coefficients have changed and whether seasonality has been removed. When we regress them, we get the following E-views estimation:

Dependent Variable: TOTREVSA
Method: Least Squares
Date: 06/06/14 Time: 22:53
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2599.549	354.8326	7.326127	0.0000
CAPEXPSA	0.013035	0.047960	0.271790	0.7861
CURREXPSA	0.265860	0.045047	5.901800	0.0000
VATSA	1.827919	0.098844	18.49303	0.0000

R-squared	0.955488	Mean dependent var	19382.20
Adjusted R-squared	0.954734	S.D. dependent var	6627.992
S.E. of regression	1410.161	Akaike info criterion	17.36265
Sum squared resid	3.52E+08	Schwarz criterion	17.43333
Log likelihood	-1567.320	F-statistic	1266.494
Durbin-Watson stat	2.177736	Prob(F-statistic)	0.000000

Looking to the table, we see that coefficients have changed (Capital Expenditure is positive) and other variables have changes slightly. Still we want to prove that we have removed seasonality, therefore we add again all the 11 dummy variables to check if they are significant and to check if we removed seasonality.

Dependent Variable: TOTREVSA
Method: Least Squares
Date: 06/06/14 Time: 22:58
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2908.660	507.5765	5.730486	0.0000
CAPEXPSA	0.014408	0.049266	0.292444	0.7703
CURREXPSA	0.263649	0.046415	5.680199	0.0000
VATSA	1.831657	0.101964	17.96385	0.0000
@SEAS(2)	-537.2398	517.6509	-1.037842	0.3009
@SEAS(3)	-134.4152	517.7983	-0.259590	0.7955
@SEAS(4)	-540.0834	517.7910	-1.043053	0.2984
@SEAS(5)	-492.4753	517.5301	-0.951588	0.3427
@SEAS(6)	-260.4059	517.6293	-0.503074	0.6156
@SEAS(7)	-132.5880	518.3261	-0.255800	0.7984
@SEAS(8)	-547.7739	518.1290	-1.057215	0.2919
@SEAS(9)	-102.7578	518.1530	-0.198316	0.8430
@SEAS(10)	-27.95339	518.4625	-0.053916	0.9571
@SEAS(11)	-313.7525	517.9258	-0.605787	0.5455
@SEAS(12)	-513.7490	520.6567	-0.986733	0.3252

R-squared	0.956482	Mean dependent var	19382.20
Adjusted R-squared	0.952812	S.D. dependent var	6627.992
S.E. of regression	1439.791	Akaike info criterion	17.46162
Sum squared resid	3.44E+08	Schwarz criterion	17.72669
Log likelihood	-1565.277	F-statistic	260.6071
Durbin-Watson stat	2.156718	Prob(F-statistic)	0.000000

From the above table all of them look not significant individually, but we use again Wald Test to check for their group significance.

Wald Test:
Equation: Untitled

Null Hypothesis:	C(5)=0 C(6)=0 C(7)=0 C(8)=0 C(9)=0 C(10)=0 C(11)=0 C(12)=0 C(13)=0 C(14)=0 C(15)=0		
F-statistic	0.344537	Probability	0.974153
Chi-square	3.789911	Probability	0.975664

Seen from the table the probability of them being equal to 0 is = 97%.

Therefore this is a strong evidence to accept the null hypothesis that the coefficients of all the seasonal dummy variables are equal to 0

6. Autocorrelation

Defining Autocorrelation

Autocorrelation, known also as serial correlation, is the cross-correlation of a particular variable with itself. Informally speaking, it is the similarity between observations as a function of the time lag between them. It is a mathematical tool for finding repeating patterns, such as the presence of a periodic signal obscured by noise, or identifying the missing fundamental frequency in a signal implied by its harmonic frequencies.

Testing for Autocorrelation

Before checking for Heteroskedasticity we have to check for the serial correlation and if necessary correct for it, since if serial correlation exists, then heteroskedasticity test will be invalid

$$u_t = \alpha_0 + \alpha_1 * u_{t-1} + \alpha_2 * u_{t-2} + v_t$$

We include two lags in the regression to see whether the error terms are correlated within two time lags. We use LM serial correlation test

Our hypothesis is:

$$H_0: \alpha_1 = \alpha_2 = 0$$

$$H_1: H_0 \text{ is not true}$$

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.883154	Probability	0.415311
Obs*R-squared	1.808612	Probability	0.404823

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/06/14 Time: 23:56
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPEXP	-0.005365	0.046137	-0.116290	0.9076
CURREXP	0.007156	0.044943	0.159230	0.8737
VAT	-0.011977	0.091299	-0.131182	0.8958
C	-31.23590	366.7962	-0.085158	0.9322
RESID(-1)	-0.050766	0.076436	-0.664156	0.5075
RESID(-2)	-0.089704	0.075736	-1.184433	0.2378

R-squared	0.009992	Mean dependent var	-1.39E-12
Adjusted R-squared	-0.018294	S.D. dependent var	1593.832
S.E. of regression	1608.344	Akaike info criterion	17.63639
Sum squared resid	4.53E+08	Schwarz criterion	17.74241
Log likelihood	-1590.093	F-statistic	0.353262
Durbin-Watson stat	1.964901	Prob(F-statistic)	0.879648

From the table received by including two time lags of the serial correlation, we can see that their F-statistics p-value=0.415 is very high and therefore we fail to reject H_0

It concludes that there is no serial correlation between the error terms in different time intervals and therefore we can easily test for heteroskedasticity now.

7. Heteroskedasticity

Definition of Heteroskedasticity

In statistics, any random variable is heteroskedastic if there are samples that have different or non-constant variances from others. Thus heteroskedasticity is the absence of homoskedasticity.

The possible existence of heteroskedasticity complicates the application of regression analysis, mainly the analysis of variance, because the presence of heteroskedasticity can invalidate statistical tests of significance that assume that the modeling errors are uncorrelated and normally distributed and that their variances do not vary with the effects being modeled.

Testing for Heteroskedasticity

We use the white test to check whether heteroskedasticity is present, which adds 6 new variables to the equation, with interaction terms and squares.

We get the residuals from the estimated equation

We have $\hat{U}_t = totrev_t - totrev_t$

$\hat{U}_t^2 = \theta_0 + \theta_1 * Capexp_t + \theta_2 * Currexp_t + \theta_3 * VAT_t + \theta_4 * Capexp_t \wedge 2 + \theta_5 * Currexp_t \wedge 2 + \theta_6 * VAT_t \wedge 2 + \theta_7 * Capexp_t * Currexp_t + \theta_8 * Capexp_t * VAT_t + \theta_9 * Currexp_t * VAT_t + \varepsilon$

We want to test for:

$H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = \theta_7 = \theta_8 = \theta_9 = 0$

H_1: H_0 is not true

Significance level = 5%

From the following E-views table, we can see the results of heteroskedasticity.

White Heteroskedasticity Test:

F-statistic	1.698050	Probability	0.092777
Obs*R-squared	14.84908	Probability	0.095166

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/07/14 Time: 00:14
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4404129.	3168282.	-1.390068	0.1663
CAPEXP	-279.1733	499.5348	-0.558867	0.5770
CAPEXP^2	-0.030442	0.027204	-1.119011	0.2647
CAPEXP*CURREXP	0.048833	0.043486	1.122958	0.2630
CAPEXP*VAT	-0.018054	0.078411	-0.230252	0.8182
CURREXP	1217.921	578.5484	2.105132	0.0367
CURREXP^2	-0.059810	0.029061	-2.058081	0.0411
CURREXP*VAT	0.145245	0.110129	1.318862	0.1890
VAT	-1388.176	918.7436	-1.510951	0.1326
VAT^2	-0.104134	0.141720	-0.734788	0.4635

R-squared	0.082039	Mean dependent var	2526265.
Adjusted R-squared	0.033725	S.D. dependent var	3992446.
S.E. of regression	3924545.	Akaike info criterion	33.25706
Sum squared resid	2.63E+15	Schwarz criterion	33.43378
Log likelihood	-2999.764	F-statistic	1.698050
Durbin-Watson stat	2.219363	Prob(F-statistic)	0.092777

From the eviews result we can see that the p-value of the F-statistics is 0.092 and therefore we fail to reject it at 5% significance level, but not at 10% significance level. Therefore

heteroskedasticity is not problematic at 5 % significance level (the level at which we are interested).

8. Functional Form Misspecification

Definition of functional form Misspecification

In regression, functional form specification is the process of developing a regression model. This process consists of selecting an appropriate functional form for the model and choosing which variables to include. As a first step of regression analysis, a person specifies the model. If an estimated model is mispecified, it will be biased and inconsistent. Specification error occurs when an independent variable is correlated with the error term.

Testing for functional form misspecification

To test for functional form misspecification we transform the equation as follows:

$$TotRev_t = \beta_0 + \beta_1 * Capexp_t + \beta_2 * Currexp_t + \beta_3 * VAT_t + \theta_0 TotRev_t^2 + \theta_1 TotRev_t^3$$

We have included two fitted variables

We want to test for:

H_0: $\theta_0 = \theta_1 = 0$

H_1: H_0 is not true

Significance level =5%

From the e-views table we can observe the new estimated equation. The F- statistics and its p-value is given in order to test for the fitted values. Since the p-value is very large, it shows that the null hypothesis will not be rejected at any significance level. Therefore our model doesn't suffer from functional form misspecification.

The test used in this case is the Ramsey Reset Test and will be shown in the following table:

Ramsey RESET Test:

F-statistic	1.238935	Probability	0.292221
Log likelihood ratio	2.544852	Probability	0.280151

Test Equation:
Dependent Variable: TOTREV
Method: Least Squares
Date: 06/07/14 Time: 01:08
Sample: 1999:01 2014:01
Included observations: 181

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPEXP	-0.028484	0.046901	-0.607318	0.5444
CURREXP	0.338013	0.141939	2.381403	0.0183
VAT	2.243946	0.905954	2.476887	0.0142
C	1362.766	1813.697	0.751375	0.4534
FITTED^2	-7.05E-06	2.47E-05	-0.285574	0.7755
FITTED^3	3.21E-11	3.90E-10	0.082262	0.9345

R-squared	0.946397	Mean dependent var	19442.29
Adjusted R-squared	0.944866	S.D. dependent var	6835.891
S.E. of regression	1605.117	Akaike info criterion	17.63237
Sum squared resid	4.51E+08	Schwarz criterion	17.73840
Log likelihood	-1589.729	F-statistic	617.9493
Durbin-Watson stat	2.065477	Prob(F-statistic)	0.000000

9. Conclusion

This paper was based on the estimation of econometric equation including the variables: total revenue, capital expenditure, current expenditure and VAT. The primary reason of undertaking this study was to see how total revenue was affected by these variables. By considering also the economic theory, this would generate a kind of comparison between the econometric model, and the theory of economists. The main conclusion that we found on VAT and Current Expenditure, which is also reinforced by the economic theory, is that they positively affect the Total Revenue of the government, and furthermore they are significant. Economically speaking, as shown in the literature review, these two factors are expected to have a positive impact in the total revenue of any government. The next conclusion, that was found out is that CAPEX has a negative impact in the Total Revenue of the government, which is misleading since the variable is not significant. The economic interpretation of this issue is that CAPEX is a long term investment, which will yield profits in the distant future, and therefore it doesn't follow the same trend with the total revenue. This was further proved by the LRP of CAPEX, which changed the sign of the variable and reduced its non-significance. Furthermore, the positive effect of CAPEX on Total Revenue was proved by Trend and Seasonality test, which in both cases they showed that there exists trend and seasonality, and after removing them it could be observed that the CAPEX would become positive and significant. Furthermore, it was checked for heteroskedasticity, which was not present and therefore it wouldn't give any problem in applying the test in our model. All the other tests performed, in order to indicate whether this model was being used properly, showed that there was no problems in the model expect, the trend and seasonality issue; which were fixed by the help of E-views. As a general conclusion, it can be stated that the

economic theory, which is important to state that it was taken from the foreign literature, was moving in the same direction, with the model that was built for the Albanian case; meaning that the same findings on literature were further reinforced by the model taken into consideration.

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