A DECOMPOSITION OF THE DECREASED STABILITY OF GDP, CONSUMPTION, INVESTMENT, GOVERNMENT EXPENDITURE, AND EXPORTS AND IMPORTS GROWTH IN ALBANIA

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Abstract

In economics, the decrease or increase in economic growth is accompanied by the increase or decrease in GDP, Consumption, Investments, Government Expenditure, and Exports and Imports. By referring to the empirical data about GDP, Consumption, Investments, Government Expenditure, and Exports and Imports for the quarterly period from year 2000-2013, the main aim of this study is to explain how a shock to a variable is going to show the variability that can be expected during a period of time in the future. This article explores the impact of a shock in one variable to other variables and to itself. The evidence provided shows that most variability can be explained by the shock of two variables: consumption and investment. However, if the impact of a shock of GDP to GDP declines as time goes on, the impact of GDP shock on other variable is expected to increase. In conclusion, this article is based on the variance decomposition of variables included in other studies. However, even though changes is expected to be in other variables for all shocks of any variable, the investment and consumption components are responsible for most of the overall increase in volatility.

Keywords: Variance decomposition, Variance explanation, Consumption, Investment, Government Expenditure, Exports and Imports

Introduction

Since 2009, the Albanian economy has been growing at a slower rate. An analysis of this growing volatility shows that every major component of GDP has shown a slowdown. However, both the investment and consumption components are responsible for most of the overall increase in volatility. During the past decade, the Albanian economy has experienced a period of unstable economic growth. Indeed, in the period since 2009, the volatility of quarterly real GDP growth has been only half of the preceding 14 years. Therefore, this decline in aggregate volatility motivated us to take a closer look at volatility trends on certain important components. However, these components include real GDP, consumer spending, residential investment, government purchases, and international trade. Thus, to what extent has each of these sectors shared in decreasing economic stability?

In this present study, we address this question by comparing the volatility of Growth exhibited by each component before and after 2008. Furthermore, we also seek to identify those components which have contributed the most to the overall increase in growth variability. Our analysis shows that the growth rates of all major components of GDP have followed an unsustainable course, with the most marked reductions in volatility. Therefore, they occur in residential investment and trade. When we weight each component of GDP with its share in overall economic growth, however, investment and consumer spending appear as the main contributors to the decrease in economic stability since 2009. Thus, this was because investment share of GDP was too small.

The Decomposition of Variables

Consequently, we also examine the decomposition of each variable (GDP, C, I) caused by its own shock and the shock of other variables across the stages of the Business Cycle. We find that the growth of GDP and its components has been declining in both periods before and after year 2009. Consequently, the decrease in volatility cannot be attributed solely to a shock on one variable or component. So, we will show how a change in one variable occurs as a result of changes that occur in this variable. Furthermore, we will show how this change occurs due to shocks in other variables. It was found in the short run that most of the change which occurs in a variable is due to its shock. However, as a result of the autoregressive effect of the variable, the percentage of other shocks increases over time. Specifically, referring to the VAR in VMA (9a):

$$x_t = \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \underbrace{\frac{A^i}{1-b_{12}b_{21}} \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix}^i}_{\Phi_i} \begin{bmatrix} \varepsilon_{y,t-i} \\ \varepsilon_{z,t-i} \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} \Phi_{11}^{(i)} & \Phi_{12}^{(i)} \\ \Phi_{21}^{(i)} & \Phi_{22}^{(i)} \end{bmatrix}^i \begin{bmatrix} \varepsilon_{y,t-i} \\ \varepsilon_{z,t-i} \end{bmatrix} \text{ose}$$

$$x_t = \overline{X} + \sum_{i=0}^{\infty} \Phi_i \varepsilon_{t-i}$$

From the above equation, it is possible to forecast errors (x) for t-periods, which enables the prediction of changes in (y) measured for each period. Starting from period 1, we have: $x_{t+1} = \overline{X} + \Phi_0 \varepsilon_{t+1} + \Phi_1 \varepsilon_t + \Phi_2 \varepsilon_{t-1} + \ldots \text{dhe } E_t x_{t+1} = \overline{X} + \Phi_1 \varepsilon_t + \Phi_2 \varepsilon_{t-1} + \ldots .$ Specifically, for a period in the future, forecasting errors are expected to be: $x_{t+1} - Ex_{t+1} = \Phi_0 \varepsilon_{t+1}$. Thus, by proceeding in the same way for 2, 3, and (n) periods in the past, errors are expected to be:

i) For two periods: $x_{t+2} - Ex_{t+2} = \Phi_0 \varepsilon_{t+2} + \Phi_1 \varepsilon_{t+1}$

ii) For three periods: $x_{t+3} - Ex_{t+3} = \Phi_0 \varepsilon_{t+3} + \Phi_1 \varepsilon_{t+2} + \Phi_2 \varepsilon_{t+1}$ and

iii) For n-periods: $x_{t+n} - Ex_{t+n} = \Phi_0 \varepsilon_{t+n} + \Phi_1 \varepsilon_{t+n-1} + \Phi_2 \varepsilon_{t+n-2} + \ldots + \Phi_{n-1} \varepsilon_{t+1} = \sum_{i=0}^{n-1} \varepsilon_{t+n-i}$.

Considering (y), the first element of the matrix (x), the forecast error and the n-earlier periods is given as:

$$yt+n\text{-}Eyt+n = (\emptyset_{10,0}\varepsilon_{y,t+n} + \emptyset_{10,1}\varepsilon_{y,t+n-1} + .. \emptyset_{10,n-1}\varepsilon_{y,t+1}) + (\emptyset_{10,0}\varepsilon_{z,t+n} + \emptyset_{10,1}\varepsilon_{z,t+n-1} + . \emptyset_{10,n-1}\varepsilon_{z,t+1}).$$

Thus, the variance error that can be expected for n=10 periods ahead is given as:

$$\sigma_{y,n}^2 = \sigma_y^2(\emptyset_{10,0}^2 + \emptyset_{10,1}^2 \emptyset_{10,n-1}^2) + \sigma_z^2(\emptyset_{10,0}^2 + \emptyset_{10,1}^2 \emptyset_{10,n-1}^2).$$

The first part of this expression shows the variance explained by changes in (y), while the second part shows the variance of (y), which is explained by changes in (z). Referring to the above analysis for 10 quarters, starting from the first quarter of 2014, the variance which is caused by the fluctuations of each variable and other variables was evaluated.

Variance Decomposition of GDP

The Evaluation of GDP's variance and the variance of its components is achieved in Two Dimensions. These dimension include (i) the Evaluation of variance caused by one (1) standard deviation of fluctuations in GDP and ii) the Evaluation of variances caused again by one (1) standard deviation of fluctuations in other components of growth. In the table.1 below, starting from 2014 onwards, the expected results that explain the variance of GDP and its components were provided for the next 10 quarters. Therefore, these results are evaluated using the option (Variance decomposition in "EVIEWS 8"). From the review of data in table 23, the relative impacts of one (1)

standard deviations of GDP on itself and on other components of growth is expected to change as time progresses.

Table 23: Variance Decomposition of GDP, C, I, G, Exp & Imp:

Variance Decomposition of GDP:

Period	S.E.	GDP	C	I	G	Exp	Imp
1	132.0185	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	172.5733	98.76804	0.000267	0.049134	0.099571	6.75E-05	1.082922
3	204.1551	96.73614	0.000193	0.137254	1.002094	0.111823	2.012494
4	233.8997	94.96060	0.246881	0.106204	2.393802	0.316804	1.975712
5	262.3713	92.75003	0.999557	0.105437	3.958306	0.495966	1.690706
6	288.1477	90.20348	1.826522	0.124753	5.666673	0.703440	1.475132
7	311.3167	87.51330	2.543111	0.154246	7.438875	1.007782	1.342690
8	332.8391	84.83517	3.249602	0.203994	9.066070	1.397346	1.247818
9	353.2461	82.32800	4.035041	0.275821	10.38725	1.810087	1.163794
10	372.5589	80.07186	4.889885	0.358141	11.38256	2.207784	1.089773

Variance Decomposition of C:

Period	S.E.	GDP	C	I	G	Exp	Imp
1	129.1792	88.55238	11.44762	0.000000	0.000000	0.000000	0.000000
2	170.0107	86.74296	11.80921	0.013303	0.041378	0.002325	1.390825
3	199.6274	84.49224	11.66814	0.009722	0.823663	0.526876	2.479357
4	229.2732	81.08550	12.60725	0.199736	2.231269	1.566195	2.310046
5	258.6678	77.10089	14.10123	0.580146	3.774462	2.550611	1.892658
6	284.7274	73.56775	15.15823	0.874602	5.321103	3.476156	1.602162
7	307.1686	70.63454	15.68509	1.048152	6.770608	4.431478	1.430131
8	327.1030	68.24550	15.99549	1.149028	7.951725	5.338050	1.320211
9	345.1993	66.38513	16.31042	1.201103	8.782412	6.084221	1.236719
10	361.6346	64.97266	16.67862	1.212398	9.314323	6.650229	1.171766

Variance Decomposition of I:

Period	S.E.	GDP	C	I	G	Exp	Imp
1	65.85128	34.44359	48.53007	17.02634	0.000000	0.000000	0.000000
2	89.76141	30.70974	49.77718	19.21782	0.047450	0.139535	0.108275
3	107.5939	28.99123	47.28017	22.12894	0.282508	0.857159	0.459987
4	121.4468	29.15176	43.19352	24.34218	0.514306	2.064241	0.733996
5	131.8015	30.56493	38.88392	25.48891	0.799148	3.408849	0.854244
6	139.3972	32.32538	35.28577	25.71549	1.295221	4.474527	0.903611
7	144.9391	33.95106	32.66590	25.26667	2.167848	5.021679	0.926844
8	149.2449	35.25701	30.87843	24.36132	3.475344	5.100067	0.927824
9	153.0942	36.14233	29.70527	23.23375	5.094843	4.917398	0.906409
10	156.9529	36.58433	28.96774	22.11062	6.786942	4.679295	0.871072

Variance Decomposition of G:

Period	S.E.	GDP	C	I	G	Exp	Imp
1	15.61828	81.87254	7.838147	1.546920	8.742395	0.000000	0.000000
2	20.16745	81.47548	7.813354	1.143302	8.495532	0.008332	1.064000
3	23.71585	82.28008	8.348697	0.842611	6.506389	0.008345	2.013880
4	26.85280	84.59827	7.597867	0.685577	5.085815	0.009272	2.023198
5	29.70681	86.63684	6.467986	0.583187	4.510156	0.019330	1.782503

6	32.24681	87.50707	5.556634	0.526551	4.789239	0.022997	1.597513
7	34.53089	87.38402	4.858244	0.485971	5.765275	0.020788	1.485699
8	36.66596	86.68337	4.315151	0.438236	7.123896	0.038286	1.401063
9	38.71651	85.68818	3.961947	0.393402	8.555418	0.084058	1.316989
10	40.69820	84.51394	3.837852	0.368839	9.886164	0.157687	1.235520

Variance Decomposition of Exp:

Period	S.E.	GDP	C	I	G	Exp	Imp
1	50.96055	85.61095	3.804649	0.330724	1.712861	8.540816	0.000000
2	66.38534	84.00498	4.048940	0.195476	2.283174	9.181240	0.286190
3	78.24840	83.10457	3.949395	0.169742	4.347771	7.923774	0.504752
4	88.73684	82.17934	3.274605	0.411708	7.194325	6.452141	0.487878
5	98.71473	80.74499	2.646120	0.889519	10.05843	5.250303	0.410635
6	108.0959	79.01948	2.255507	1.402334	12.59425	4.379761	0.348669
7	116.8266	77.30714	2.039278	1.858233	14.69681	3.791482	0.307049
8	125.0164	75.79178	1.951377	2.247623	16.31335	3.416330	0.279544
9	132.7644	74.54770	1.975876	2.570320	17.45896	3.187251	0.259886
10	140.1073	73.56087	2.093217	2.822846	18.22191	3.055448	0.245713

Variance decomposition of Imp:

Period	S.E.	GDP	C	I	G	Exp	Imp
1	93.08676	87.09075	4.032566	6.240652	0.081592	2.485528	0.068912
2	123.9281	83.38873	4.501654	7.945507	0.136670	3.081477	0.945967
3	145.6857	81.85560	4.146409	8.437754	1.032826	2.821654	1.705758
4	163.5216	82.07314	3.315025	7.696638	2.717801	2.395368	1.802023
5	179.7526	81.94856	2.988531	6.606759	4.818934	2.005857	1.631355
6	194.7308	80.81966	3.237776	5.653371	7.117570	1.714342	1.457285
7	208.5986	78.94398	3.785459	4.933176	9.425029	1.587527	1.324832
8	221.7726	76.68427	4.521167	4.436108	11.48420	1.657499	1.216756
9	234.4776	74.35170	5.406690	4.131834	13.10399	1.885944	1.119850
10	246.6421	72.16155	6.367919	3.967836	14.25628	2.211607	1.034808

Cholesky Ordering: PBBAL CAL IAL GAL EKSPAL IMPAL

As can be seen from the table.1, the impacts of GDP shock on GDP are higher at the beginning. Thus, as time progresses, the impact declines; but for the other variables, the impact of a GDP shock increases as time goes on. This occurs especially when the impact of fluctuations in GDP is expected to be accompanied by a greater increase in volatility of government expenditure and consumption as time goes on. For example, the impact of GDP shock on GDP is expected to decline by 20% after ten quarters, while the consumption and government expenditure are expected to increase from 0 to 4.88% & 11.38%, respectively.

Variance Decomposition of Consumption

Following the same manner of evaluating a shock of consumption to consumption and to the other variables, it can be seen that a shock of

consumption to consumption is not expected to change to match in 10 quarters time in the future. Consequently, the variance explanation of a shock in consumption to consumption is expected to be the same for this period. Furthermore, the impact of a shock in consumption to GDP is expected to decline as time goes on. For example, the impact of consumption shock to GDP is expected to decline from 88.55% to 64.97%. Also, it can be seen relatively that a constant shock in consumption is accompanied by an increase in the variability of government expenditure and exports.

Variance Decomposition of Investments

From the results of an investment shock, it can be seen that all other variables except consumption, do not change to match over time. As a result, an increase in the impact of investments to other variables is not expected to occur in 10 quarter time in the future. The bad sign is that a shock in investment is not going to be followed by an increase in consumption. So, the impact of an investment shock to consumption is expected to decline in 10 quarter time in the future. Hence, the others which remain unchanged refer to the impact on the other variables. For example, the impact of investment shock to consumption is expected to decline from 48.53% to 28.96%.

Variance Decomposition of Government Expenditure

Referring to the shock in government expenditure, it can be seen that: i) its impact on government expenditure and exports is expected to remain constant; ii) its impact on imports is expected to increase slightly; iii) its impact on investment and consumption is expected to decline; and (iv) the impact on GDP is expected to change slightly. Therefore, no improvement is expected to occur from any shock in government expenditure in 10 quarters time in the future.

Variance Decomposition of Exports

The impact of a shock on exports to exports is expected to decline. Thus, a decline in the impact of GDP and consumption occurs. In addition, an increase in the impact of government expenditure, and a slight increase in the impact on investment and imports are expected to occur.

Variance Decomposition of Imports

From the results of a shock on imports, it can be seen that the impact of imports on GDP declines as time goes on. Thus, the same thing can be seen on investments. Subsequently, the impact of a shock on imports to consumption was not change to match, while the impact of a shock on imports to imports is expected to grow slightly. Also, it can be seen that the

impact of a shock on imports to government expenditures is expected to increase as time progresses.

Conclusion

-The weight of each component with its share shows that investment and consumer spending appears as the main contributors to the decrease or increase in economic stability since 2000. However, this is because the investment share of GDP is too small.

-The bad sign from these analyses is that the impact of a shock on investment is expected to decline as time goes to the next 10 quarters to come.

-The shock on government expenditure on economic stability is not expected to have any improvement in the near future.

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