ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

Volume 27 (3), 2018

B. Venkatraja[1]

DYNAMICS OF AGGREGATE DEMAND FACTORS IN MACRO GROWTH: AN EUROPEAN PERSPECTIVE

The present study examines whether demand factors cause volatility in the economic growth of European Union (EU) with 28 member countries for the data from 1995 to 2016. The relative significance of household final consumption spending, investment, government spending and net exports has been tested by estimating linear regression model, running variance decomposition and applying impulse response function. Results indicate that all the four demand factors seem to be significant in the economic growth of EU. The consumption spending of the households influences the economic growth in the short run to medium run. While, investment and net exports are very significant to sustain growth in the medium to long run. It also appears from the result that too much interventions of national governments in Europe will de-stabilise the economic growth. It could be inferred that the sharp decline in the consumption spending of the households in Europe was the immediate cause of prolonged economic slowdown since 2008 which trickles down the investment, affects net exports and derails economic growth. Thus, the revival of marginal propensity to consume is the key factor for revival of European economy.
JEL: E12; E21; E22

Introduction

The fundamental economic theories conceptualise the balanced economy as a state of immense equality among the forces of demand and supply. The demand-side economics is held in opposition to supply-side economics of classical economists which argues that economic growth can be attributed to lowering tax rates and decreasing regulation. According to demand-side economics, output is determined by effective demand (Harvey, 2012). High consumer spending leads to business expansion resulting in greater employment opportunities. Higher levels of employment create a multiplier effect that further stimulates aggregate demand leading to greater economic growth (Liu & Nick, 2011). Keynes saw his theories successfully demonstrated in the 1930s when they helped to end the Great Depression and into the 1950s and 60s (Palley,1996). Since 2008 global economic crisis triggered by subprime crisis of USA, Europe is passing through deep

[1] *Dr.B. Venkatraja is Assistant Professor in Economics in Shri Dharmasthala Manjunatheshwara Institute for Management Development (SDMIMD), Mysore, India, e-mail : venkatraja@sdmimd.ac.in.*

contraction of the economy. The macro fundamentals of the region showing speedy and continuous downfall. Stagnancy in the GDP growth, low inflation, high unemployment and continued pessimism across the industries dampen Europe, though, there are signs of mild recovery in the recent past. Thinkers, economists and policymakers theorise demand as key factor in the business cycle of Europe. At this backdrop, the present study examines whether demand factors have impact on economic growth in European Union.

Review of Literature

Dreger & Hans (2011) investigated the long run relationship between private consumption, disposable income and wealth approximated by equity and house price indices for a panel of 15 industrialized countries. The study establishes a long-run equilibrium between consumption and income. The presence of wealth effects in consumption equations has been explored and it was also found that this arises from the global integration of asset markets and the relevance of risk sharing activities of agents.

Another study on the dynamics of relationship between private consumption spending and economic growth was carried out by Bouyon (2015). The focus of this study was to investigate whether the household consumption spending is a significant component in driving the growth of 28 countries in European Union. The study finds that the prolonged stagnancy in the European recovery since economic crisis was due to poor household consumption. It is also observed in the paper that the gradual recovery in consumption spending by the households in the recent years is the prime factor associated with the signs of economic growth recovery.

Specific studies are made on the relationship between the trade openness and the economic growth. Tekin (2012) found that a rise in exports has a positive effect on growth. Simuţ and Meşter (2014) studied the link between trade and growth for 10 East European states and traced a direct correlation and causality between exports and economic growth. Even Sultan and Haque (2011) studied Indian scenario and found that there is a long-run relationship between exports and growth. While a study by AL- Raimony (2011) investigating the relationship between real export and real import growth and economic growth in Jordan, finds that real export growth positively affects growth, while real import growth negatively affects economic growth. Abu-Eideh (2014) analyzed the effect of real domestic exports and imports on real GDP in Palestine. The result shows that real domestic exports have a positive impact on growth.

Lupu & Asandului (2017) studied the relationship between government expenditure and economic growth rate of 8 Eastern-European countries with data for 1995–2014 using the ARDL model. The result reveals that the current share of public spending exceeds the optimal level for Bulgaria, Hungary and Romania which affects the growth. The study concludes that the weight to government spending should be decreased in these countries since the public sector is not able to efficiently cope with its resources and that affects the growth.

There are also studies with multivariate analysis linking to growth. One of prominent among such studies is by Kalaitzidakis & Kalyvitis (2005). The result of the study shows that the government expenditure on factors such as infrastructure and transport, utilities, education and defence can promote long-term economic growth. Colombier (2011) and Sineviciene & Vasiliauskaite (2012) also explored other categories of government expenditure such as spending for social order, social security and health that support indirectly the economic growth. Shelton (2007) synthesises both the approaches to infer that there is a series of public expenditure that, directly or indirectly, using the adequate measures and during right moments, positively contribute to the creation of the gross domestic product and national wealth, promoting economic growth. This implies that the structure of public spending may be more relevant than its level.

Further, Mazurek (2017) examined the economic growth of 32 European countries from 2005 to 2015. The growth was measured through six socio-economic factors which include initial level of the gross domestic product, economic openness, democracy index, human capital, physical capital, and foreign direct investments. The study reflected that the growth was directly proportional to human and physical capital, and indirectly proportional to the initial level of GDP and the democracy index. Policy of openness and FDI seems to be not significant in impacting the growth.

Maradana et al. (2017) studied the long-run relationship between innovation and per capita economic growth in the 19 European countries over the period 1989–2014. This study uses six different indicators of innovation: patents-residents, patents-non-residents, research and development expenditure, researchers in research and development activities, high-technology exports, and scientific and technical journal articles. The cointegration results find evidence of a long-run relationship between innovation and per capita economic growth in most of the cases. The study also finds the presence of both unidirectional and bidirectional causality between innovation and per capita economic growth. These results vary from country to country, depending upon the types of innovation indicators that are used in the empirical investigation process. On the whole, the study reflects that innovation indicators are considerably linked with per capita economic growth.

It could be extracted from the earlier literature that economic growth is affected by various macroeconomic factors. None of the studies focussed on much needed empirical study on the impact of aggregate demand factors on economic growth and relative significance of demand factors. The present study fills this vacuum in the European Union context. The study has significance as the Europe has been passing through a prolonged economic slowdown and of late shows the signs of recovery. It is pertinent to investigate whether demand factors were significant for the slowdown since 2008 economic crisis and also in the recovery of the Europe do the demand factors individually and collectively.

Theoretical Framework

The framework of the present study is extracted from J.M. Keynes' (1936) model of measuring growth through aggregate demand. According to Keynes, balanced growth of the

economy is an important requirement to achieve macroeconomic stability. Macroeconomic balance requires the aggregate income is balanced by aggregate demand.

According to Keynesian economics, GDP is generated from the aggregate impact of all demand factors. The demand factors may be domestic as well as foreign for national goods. Domestic demand is generated by household final consumption spending (C), domestic investment (I) and government spending (G). While, foreign demand for national goods emerges from foreign buyers and will be registered in exports account (E). Domestic demand envelopes not only national goods but also foreign goods and this forms imports (M). The Keynesian aggregate demand is the aggregation of components of C, I, G and net exports (X-M). These four components of GDP interact to determine the aggregate demand and effectively result in the GDP. The Keynesian GDP identity, could be presented as in the equation (1):

(1) $$GDP = C + I + G + (X - M)$$

According to Kira (2013) Keynesian models not only provide an analytical framework to link the market forces and the resource allocation process in an economy but also may help in reducing fluctuations and enhancing the economic growth which are two major aspects of any economy. The suitability and applicability of these models are empirically tested by either macro-econometric simulations models, applied multi-sectoral general equilibrium models or by stochastic dynamic general equilibrium models (Kydland & Prescott, 1977). Though the model has been tested for validity and suitability, the empirical literature on measuring growth has very little application. Hence the present study employs Keynes aggregate demand model for examining the growth trends and the role of demand factors in determining the growth.

Trend Analysis

The analysis of the growth trends in European Union justifies the need to carry out a research on the underlying issue. The trends in growth of Europe could be analysed at two stages. The economic crisis of 2008 is the landmark which bifurcates the study into two stages. The first stage thus covers 1995 to 2007, while the second stage includes from 2008 to 2016. The trends clearly indicate that before economic crisis the economic growth of Europe was formidable. During this period the average annual GDP growth rate was 1.71 percent while the same was 0.58 percent in the post-crisis period of 2008-2016. European Union could not bear the shocks of subprime crisis triggered at U.S.A. All the four growth factors seem to be affected by the global economic crisis. Prior to the crisis, household consumption spending was very high and it was growing annually at the rate of 5.71 percent. Owing to the crisis, consumption spending fell drastically and the annual growth reached to a meagre 1.4 percent annually during 2008-2016. Poor consumption and absence of optimism in the market on future growth, new investments in European Union dried out completely from the annual growth of 6.86 percent before recession. Absence of fiscal stimulus in European Union region was evident during post-recession. The annual growth of government consumption spending declined sharply from 5.87 percent during pre-

recession period to 1.70 percent during the post-recession period. Since several European economies are debt-ridden and have high fiscal deficit, the reduced private consumption was not compensated by equi-proportional rise in government spending. Fall in domestic consumption increased exports from EU and reduced imports to EU in the post-crisis period. Net exports widened phenomenally since 2008. From the trends, it could be presumed that household consumption, investment, government spending and net exports share strong positive correlation with the economic growth of EU. However, this hypothesis framed from this discussion has to be tested and validated with the advanced empirical research. Also refer Annexure-1.

Table 1

Trends in growth factors of European Union (in %)

Duration	GDP	Annual Growth	C	Annual Growth	I	Annual Growth	G	Annual Growth	X-M	Annual Growth
1995-2007	22.29	1.71	74.29	5.71	89.12	6.860	76.36	5.87	-38.01	-2.92
2008-2016	5.25	0.58	12.58	1.40	0.76	0.084	15.33	1.70	1840.50	204.5

Source: Author's analysis of data sourced from CEIC data portal.

Research Methodology

Functional Variables

In order to meet the objectives, the present paper studies the nexus between economic growth and aggregate demand factors. The economic growth is measured by Gross Domestic Product (GDP) at 2010 prices. Whereas, the aggregate demand has been measured by household final consumption expenditure (PC), gross fixed capital formation as proxy for investment (I), government consumption expenditure (G) and net exports (X-M). The study considers the absolute values measured in billions of Euro of the selected variables. While estimating the econometric models, the absolute values are converted to log values. The selection of variables is largely guided by Keynes' framework of aggregate demand.

Data Source and Study Period

The data required for the current study are collected from the CEIC data portal. The study employs time series data on quarterly basis from January 1995 to September 2017. It covers data of last 23 years with 91 observations. The criteria approached to select the duration of data was the availability of the data.

Estimation Techniques

The present study has applied some econometric tools and techniques using E-views package to analyse the nature, direction and size of relationship between factors of aggregate demand and economic growth in European Union. Since the study adopts time

series data analysis, the stationarity of the data sets has to be tested and for which Augmented Dickey Fuller (ADF) unit root test has been approached. Upon confirming the stationarity of data, Ordinary Least Square (OLS) regression model has been estimated to test the impact of household consumption, investment, government spending and net exports on economic growth of European Union. To learn the relationship between demand factors and economic growth beyond the size and nature of impact as ascertained from regression model, the impulse response function (IRF) has been estimated. The IRF ascertains the response of one endogenous variable to the shocks of other endogenous variable. The study also runs variance de-composition to measure the degree of variability in an endogenous variable because of changes in its own value and also because of changes in the other endogenous variable.

1. Stationarity Test: An empirical research using time series data begins by testing the stationarity of the data series. This in other words means the underlying time series data does not have unit root problem. A data series is said to be stationary when its mean and variance are constant overtime and the value of covariance between two time periods depends only on the distance or lag between the two time periods and not on the actual time at which the covariance is computed (Gujarati and Sangeetha, 2007). All the data series which are procured for the current study are tested for their stationarity.

Though there are many methods available to test the stationarity of time series, the Augmented Dickey Fuller (ADF) method is one among the most accepted methods. ADF test is the modified version of Dickey-Fuller (DF) test. The ADF makes a parametric correction in the original DF test for higher order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression. The ADF test, in the present study, consists of estimating the regression equation (2).

(2) $Yt = bo + \beta X Yt_{-1} + \mu_1 X Yt_{-1} + \mu_2 X Yt_{-2} + \sum_{i=1}^{n} \mu i X Yt_{-1} + et$

Y_t represents the series to be tested, bo is the intercept term, β is the coefficient of intercept in the unit root test, μ_1 is the parameter of the augmented lagged first difference of the dependent variable, Y_t represents the i^{th} order autoregressive process, it is the white noise error term. The number of lagged difference terms to include is determined empirically, the idea being to include enough terms so that the error term is serially uncorrelated (Gujarathi and Sangeetha, 2007).

The stationary condition under ADF test requires that: p-value is less than 1 (IpI <1). In other words, the computed t value should be more negative than the critical t value (t statistic < critical value). The computed t statistic will have a negative sign and large negative t value is generally an indication of stationarity (Gujarathi and Sangeetha, 2007).

One of the critical aspects in running the unit root test is determining the lag length. It is significant that the test results vary with the change in the lag length. The present study adopted Schwarz Info Criterion which is widely used by the researchers to decide the lag length.

2. Model Specification: In order to identify the size and nature of impact of different aggregate demand factors to the changes in economic growth, a linear multiple regression model has been estimated. Keynes' national accounting methodology provides appropriate theoretical framework in estimating regression model for the present study. The national income accounting methodology has three approaches such as product approach, income approach and expenditure. The expenditure method of estimating GDP as proposed by J.M.Keynes has been borrowed in the study. Adopting from Keynesian theory, the dynamics of different demand factors is tested in the study. For which a linear multiple regression model is estimated for equation (3). The estimated regression model has GDP as proxy variable to measure the economic growth of European Union. The components of economic growth or factors determining the economic growth which form the set of growth predictors are: household final consumption expenditure (PC), gross fixed capital formation (I) a proxy to investment spending, government consumption spending (G) and net exports (X-M). The regression equation estimated for the current study is as follows:

(3) $Y = ba+\beta_1X_1 + \beta_2X_2+ \beta_3X_3 +\beta_4X_4 + et$

Where, Y is GDP which is the dependent variable, X_1, X_2, X_3 and X_4 are the independent variables referring to household final consumption (PC), investment (I), government consumption spending (G) and net exports (X-M) respectively. β_1, β_2, β_3 and β_4 are coefficient values of independent variables and *et* is the error term. The ordinary Least Square (OLS) method of estimating the regression is applied using E-Views statistical package.

Theoretically, Keynesian framework advocates for positive relationship between dependent variable and the independent variables. Hence, the study expects positive sign preceding the estimated coefficient value of the predictor. The theory argues that increasing household final consumption, raising investment, expansionary government consumption spending and widening net exports contribute to faster growth of GDP and vice-versa.

3. Variance Decomposition: The regression model estimates only the impact of predictor on the dependent variable. It does not accurately measure how much variability in an endogenous variable is due to the changes or shocks in the other endogenous variable and how much is owing to its own shocks. Further, regression does not measure variability in an endogenous variable at different stages in a time horizon due to shocks in the other endogenous variable. Variance decomposition technique is applied in this study which measures accurately the proportion of variability in GDP caused by changes in household consumption, investment, government spending and net exports in the long run, and how much is owing to its own shocks. Further it also decomposes the variability in other endogenous variables used for the study. In the general linear model, the relationship between the two variables is captured by the linear equation:

(4) $Y = a + bX + c$

Y = dependent variable or response variable, and X = independent variable or explanatory factor.

With every unit change or shocks in X, there is a corresponding variation in Y. The variance decomposition focuses on the 'response variable' i.e. Y which responds to the

variations in the independent variable i.e. X. Specifically, the variance of Y for the shocks of other endogenous variable in the model can be presented as follows.

(5) $Var(Y) = E(Var[Y|X]) + Var(E[Y|X])$

In this equation Var(Y) is variance of Y, E(Var[Y|X]) is explained variation of Y directly due to changes in X and Var(E[Y|X]) reflects unexplained variation comes from somewhere other than X. Thus, the variance decomposition brings out the variance of Y owing to: (1) the expected variance of Y with respect to X, and (2) the variance of the "expected variance of Y" with respect to X. In other words, the variance of Y is its expected value plus the "variance of this expected value."

4. Impulse Response Function: Impulse response function provides even more accuracy on the relationship between the variables in the system. This econometric technique explains the responsiveness of the endogenous variable in the system to shocks to each of the other endogenous variables. For each endogenous variable in the system, a unit shock is applied to the error, and the effects over time are noted. Impulse response function estimates accurately the percentage change in GDP for a given percentage change in the government spending in the long run. It also measures the percentage change in government expenditure in the long run for a given shock administered to GDP. The impulse response function helps in visualising better picture on the direction, nature and size of relationship in the long run. This provides a dynamic analysis to the relationship of the variables in the model, unlike regression approach which is static in nature.

Analysis of Empirical Results

The study uses time series data for the variables selected under the study for analysis and it is statistically essential to ensure the stationarity of the data series. The Augmented Dickey Fuller (ADF) method of testing the unit root has been employed in the study and the results are presented in Tables 1. The ADF results indicate that none of the data series was stationary at level (I(0)). While in the first order differencing (I(1)) all the five sets of time series data are found stationary. The ADF test develops following hypotheses.

H1: GDP has a unit root

H2: C has a unit root

H3: I has a unit root

H4: G has a unit rot

H5: X-M has a unit root

The results of unit root test reject all the hypotheses. The rejection of hypotheses could be made only when the t value is smaller (more negative) than the critical value. All the hypotheses are rejected at 1st order differencing. In case of GDP, I and X-M, the hypotheses are rejected at 1% level of significance, hypothesis on G is rejected at 5% level of significance and hypothesis relating to C is rejected at 10% level of significance. Rejection of hypotheses confirms that none of the time series data have any unit root problem and they are stationary and hence could be

deployed for further econometric analysis. And as required all the data series are integrated at the same order (i.e. at I(1)). The detailed results are presented in Tabel-2.

Upon confirming the stationarity of the data series used for the study, a regression model has been estimated using ordinary least square method. The objective of estimating the linear regression model is to identify the dynamics of relationship between the demand factors and GDP. The results of the same is presented in Table- 3.

Table 2

Augmented Dickey –Fuller Test of Stationarity

Variables	Order	t-statistic	Critical Value		P-value	Order of Integration	Level of Significance	Decision
GDP	I(0)	-1.030790	1%	-3.509281	0.7391	I(1)	1%	Reject H0
			5%	-2.895924				
			10%	-2.585172				
	I(1)	-5.352178	1%	-3.509281	0.0000			
			5%	-2.895924				
			10%	-2.585172				
C	I(0)	-1.508926	1%	-3.512290	0.5242	I(1)	10%	Reject H0
			5%	-2.897223				
			10%	-2.585861				
	I(1)	-2.727142	1%	-3.512290	0.0738			
			5%	-2.897223				
			10%	-2.585861				
I	I(0)	-1.101021	1%	-3.510259	0.7123	I(1)	1%	Reject H0
			5%	-2.896346				
			10%	-2.585396				
	I(1)	-3.918980	1%	-3.510259	0.0029			
			5%	-2.896346				
			10%	-2.585396				
G	I(0)	-1.566572	1%	-3.508326	0.4952	I(1)	5%	Reject H0
			5%	-2.895512				
			10%	-2.584952				
	I(1)	-2.938044	1%	-3.508326	0.0452			
			5%	-2.895512				
			10%	-2.584952				
X-M	I(0)	-1.924311	1%	-3.504727	0.3199	I(1)	1%	Reject H0
			5%	-2.893956				
			10%	-2.584126				
	I(1)	-9.557610	1%	-3.506484	0.0000			
			5%	-2.894716				
			10%	-2.584529				

Table 3

Results of Ordinary Least Square Regression Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PC	3.038014	0.449546	6.757956	0.0000
I	0.975174	0.915468	1.065220	0.2897
G	-4.260342	0.850456	-5.009477	0.0000
X_M	-2.555020	0.948616	-2.693419	0.0085

R-squared	0.412781	Mean dependent var	3040.916
Adjusted R-squared	0.392532	S.D. dependent var	319.4351
S.E. of regression	248.9685	Akaike info criterion	13.91549
Sum squared resid	5392722.	Schwarz criterion	14.02586
Log-likelihood	-629.1548	Hannan-Quinn criter.	13.96002
Durbin-Watson stat	0.793516		

Dependent Variable: GDP Included observations: 91 after adjustments

Based on the Durbin-Watson stat value, it could be interpreted that the estimated model has a good fit. As reflected by the Adj R^2, the aggregate demand collectively explains 39 percent of changes in the GDP of European Union (EU). This makes us to understand that 61 percent of variation in GDP of EU is caused by factors outside the model. This raises the debate on the relevance of Keynesian framework as growth model in the current uncertain and volatile globally integrated world. It is also noteworthy that two of the four predictors namely government consumption spending and net exports are found influencing the GDP significantly but negatively. This result is much against to the theoretical predictions. In the EU scenario, government consumption expenditure seems to be negatively related to economic growth. This trend may be owing to the crowd out factor. In a high mass consumption economy (developed economy) the consumption potential grows very slowly and increasing government consumption spending results in proportionate decline in household consumption. Also the size of impact in this case is the largest among the variables. A one percent decrease in government consumption spending increases the economic growth of EU by four percent. The argument of lesser fiscal intervention of the national governments gains support from the result.

The global integration via trade in goods and services and the consequent trade balance is another factor pronouncing the domestic demand for global products and thereby influencing the domestic growth. This theoretical prediction does not get supported by the empirical evidences in EU context. The widening trade surplus does not seem to be boosting up the growth. During the current prolonged economic slowdown, the exports are not appreciated, rather the domestic demand of the households are expected to be met. When the exports are minimised and are flooded in the domestic market, they raise the percapita consumption and economic growth accelerates.

Keynes strongly argues that investment has positive multiplier effect on the growth of the economy. In European case, investment seems to be positively influencing the GDP, though it is statistically not significant. From the results it appears that a one percent injection of additional investment in the economy has the potential to raise the GDP by nearly one percent.

Household final consumption has very high statistically significant positive impact on GDP of Europe. The magnitude of impact is such that when the domestic final consumption of the households varies by one percent the GDP of EU varies by about three percent. The prolonged economic slowdown of EU could be attributed primarily to the household consumption. The reduced purchasing power of households pushed the European economy to the crises in 2008-09 and the slow recovery owes to marginal rise in household consumption. Lack of optimism about the future of the economy and job insecurity induce people to spend less and save more to the uncertain future. The household consumption is the only demand factor in the given model which has high statistically significant impact with expected sign preceding to the coefficient value of the variable.

The regression model estimated the nature and size of impact of one variable on the other. The regression analysis is static in nature and it does not incorporate the dynamics of the flow of relationship among the endogenous variables with the time lag. This estimation does not factor how much variability in a variable is caused by its own shocks and how much variation is caused by shocks in the other endogenous variable. Variance decomposition technique decomposes such variability factors in the endogenous variables and provide such analysis for a longer period. The results are presented in Table-4.

An analysis of results of variance decomposition decomposes the factors attributing to the variation in the GDP and other endogenous variables over the period of time. From the results it appears that 17 percent of variability in GDP of EU is caused by the shocks of household final consumption in the time horizon and the remaining 83 percent variability in GDP is caused by its own shocks. Though the size of variability in GDP for the shocks in household consumption is not substantial, but still it has a significant impact. Looking from the feedback angle, a shock in GDP attributes only close to seven percent of variation in household consumption. While shocks in investment attributes 27 percent of variation in GDP. A shock to government consumption spending owes 23 percent of variability in GDP over the 10 quarters. Shocks of net exports seem to be causing less variation in GDP. A unit shock of net exports has the potential to vary GDP by 13 percent and the remaining 87 percent of variation in GDP is caused by its own shocks. Thus, the variance decomposition reflects that the variability in GDP over the long run is positively and statistically significantly contributed by household consumption, investment, government spending and net exports in European context. The results of variance decomposition, which takes into account the time lag effect of the shock of an endogenous variable, slightly contradict with the regression results. The variance decomposition provides more realistic picture of the nature of relationship with reference to time lag. This result provides evidences to support Keynesian theory.

Table 4

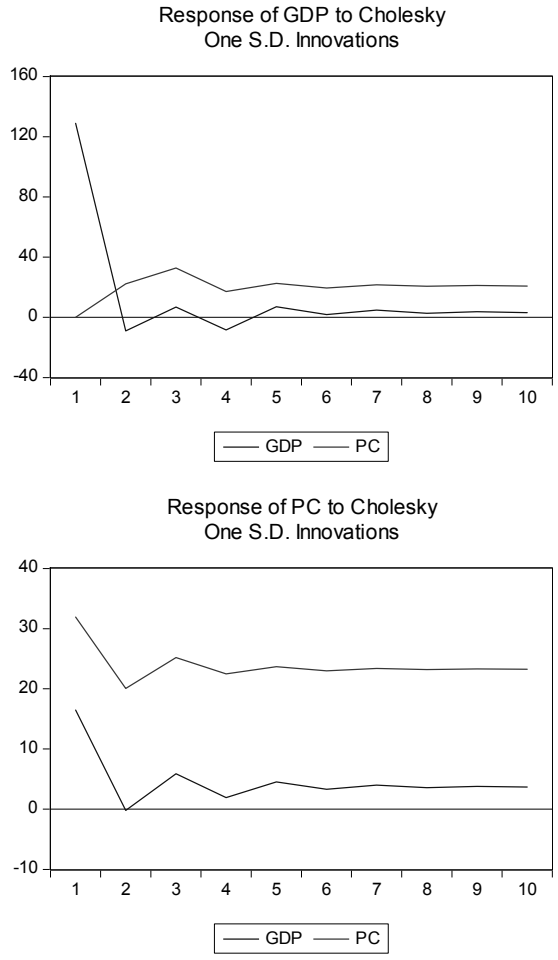
Results of Variance Decomposition of GDP

Variance Decomposition of GDP:			
Period	*S.E.*	*GDP*	*PC*
1	128.6312	100.0000	0.000000
2	129.9966	98.53906	1.460935
3	132.4037	95.23196	4.768044
4	133.7544	93.34244	6.657560
5	135.4505	91.11867	8.881329
6	136.9007	89.25140	10.74860
7	138.3838	87.41656	12.58344
8	139.7786	85.73759	14.26241
9	141.1439	84.14500	15.85500
10	142.4562	82.65585	17.34415
Variance Decomposition of GDP:			
Period	*S.E.*	*GDP*	*I*
1	141.3022	100.0000	0.000000
2	144.3338	98.73730	1.262696
3	157.1453	91.24126	8.758738
4	160.9410	88.82741	11.17259
5	169.1276	83.94003	16.05997
6	173.2184	81.68230	18.31770
7	179.2901	78.61140	21.38860
8	183.2745	76.74445	23.25555
9	188.1028	74.64671	25.35329
10	191.8011	73.14018	26.85982
Variance Decomposition of GDP:			
Period	*S.E.*	*GDP*	*G*
1	135.4078	100.0000	0.000000
2	137.1298	98.23511	1.764888
3	143.2756	93.19223	6.807773
4	145.4019	91.50781	8.492192
5	149.9301	88.47159	11.52841
6	152.5047	86.32857	13.67143
7	156.2335	83.48917	16.51083
8	159.2071	81.28396	18.71604
9	162.5538	78.98234	21.01766
10	165.5556	76.98584	23.01416
Variance Decomposition of GDP:			
Period	*S.E.*	*GDP*	*X-M*
1	152.8545	100.0000	0.000000
2	163.4884	98.31824	1.681758
3	188.3552	97.79995	2.200046
4	199.6946	96.09427	3.905728
5	212.4726	94.72694	5.273064
6	221.8858	92.98295	7.017051
7	230.8491	91.35160	8.648401
8	238.5476	89.65708	10.34292
9	245.6613	88.04739	11.95261
10	252.0896	86.48588	13.51412

Later, impulse response function has been estimated. It explains the responsiveness of the endogenous variable in the system to shocks to each of the other endogenous variables. So, for each endogenous variable in the system, a unit shock is applied to the error, and the effects over time are noted. Figure-1 provides evidence that the future values of GDP respond significantly and positively to the shocks of household final consumption spending in short to the medium run. One standard deviation innovations or a unit shock administered to the household consumption causes a response of 32 percent in GDP during the third lagged quarter. The response of GDP to the shocks of household consumption will be equi-proportional in the successive quarters. This, again supports the findings of regression and variance decomposition. Thus the significance of positive trend in domestic household consumption is reaffirmed for EU scenario.

Figure 1

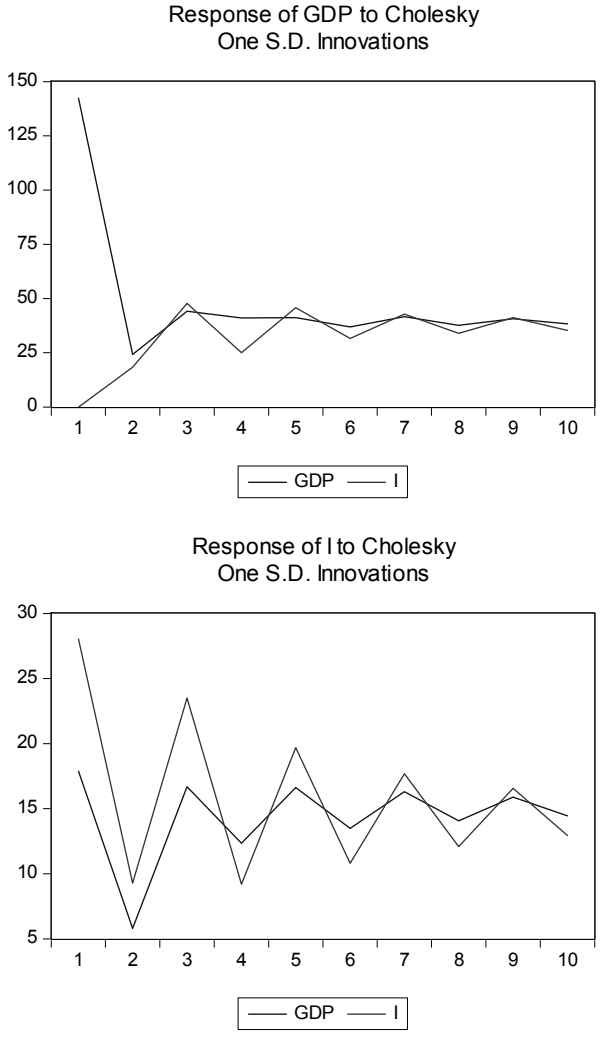
Impulse response of GDP to household consumption



The impulse response function reaffirms (Figure-2) the potential role being played by investment in Europe. A one standard deviation innovations in fixed capital formation in Europe at a given point of time creates a chain of impulse responses of economic growth from medium to the long run. For a shock in investment, the future values of GDP respond positively and it attributes 47 percent to the changes in GDP in the following third quarter. Even in the long run the positive impulse response of GDP for the given shock in investment sustains. This again, finds evidence in supporting regression result and also support to Keynesian theory of investment multiplier.

Figure 2

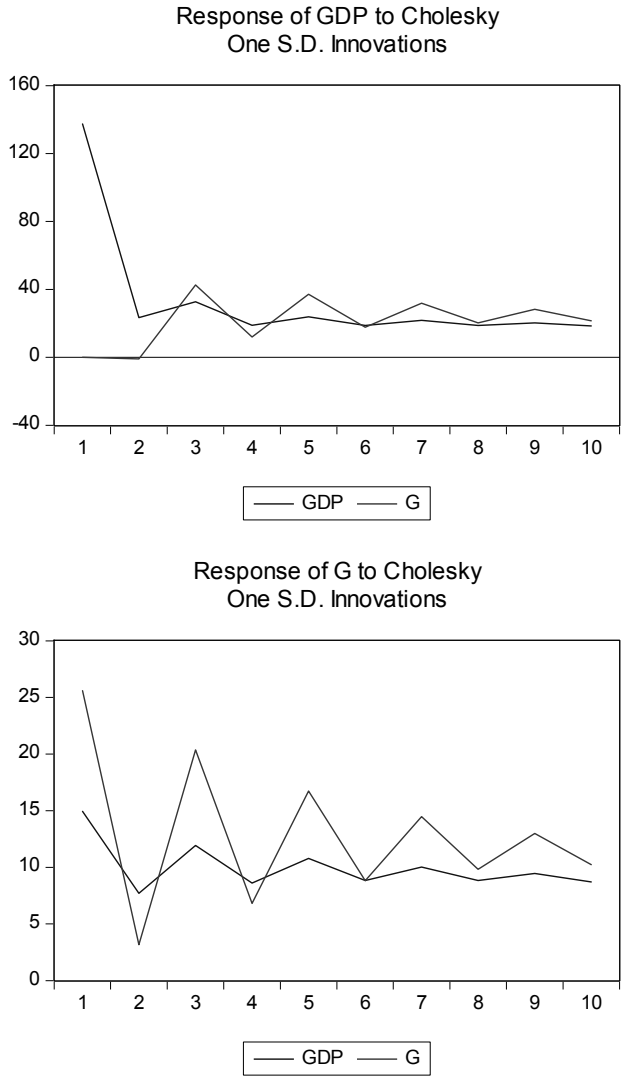
Impulse response of GDP to investment



The GDP responds negatively to the shocks of government spending initially (Figure-3). This supports regression. But impulse response function, unlike regression assesses the impulse response of GDP for the one standard deviation innovation in government spending and the result shows that the response turns positive in the medium term and highly volatile in the long run. In the free market economy, the role of the government seems to be restricted to be the regulator of market forces.

Figure 3

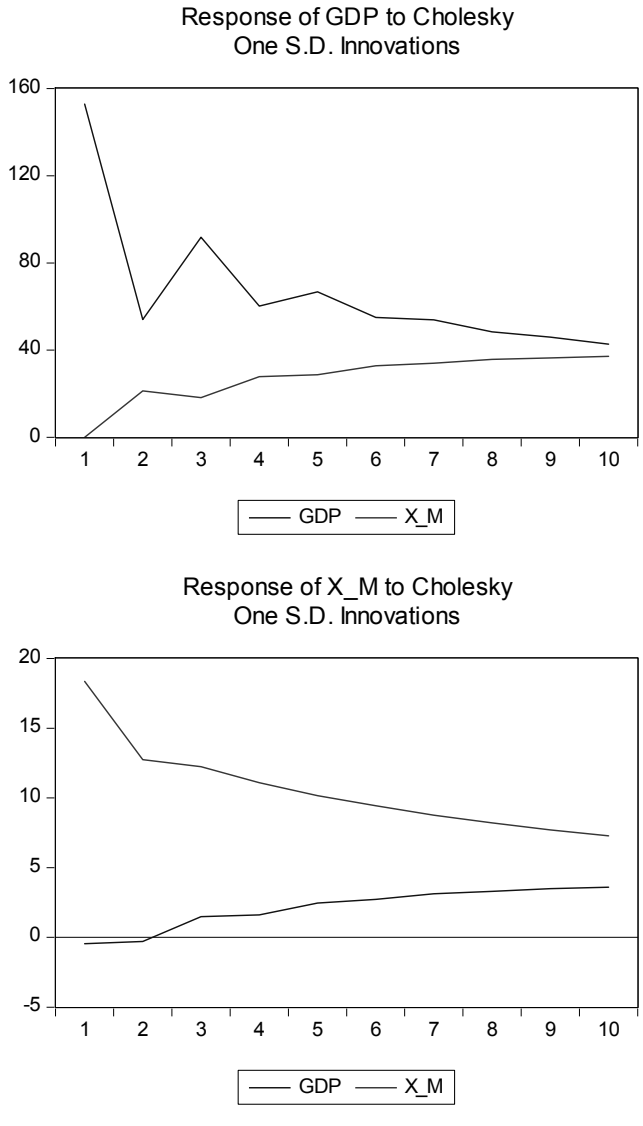
Impulse response of GDP to government consumption spending



For a given shock in the external sector i.e. net exports, the economic growth does not respond much initially (Figure-4). However, the response of economic growth is more visible in the medium to long run. For the sustained long-run growth, achieving positive net exports becomes significant in European Union.

Figure 4

Impulse response of GDP to net exports



Conclusion and Policy Implications

To summarise the findings of the study, variance decomposition and impulse response provide better insight to the dynamics of aggregate demand factors over the period of time than regression analysis. In the context of European Union, all the four demand factors seem to be significant in the economic growth. The consumption spending of the households influences the economic growth in the short run to medium run. This supports the findings of Lupu and Asandului (2017) who studied exclusive impact of public spending on economic growth of Eastern Europe. The present study also explores that investment and net exports are very significant to sustain growth in the medium to long run. It appears from the results that too much interventions of national governments in Europe will de-stabilise the economic growth. Even Bouyon (2015) identified that government spending negatively affects economic growth if exceeds the optimal level.

From the results it could be inferred that the sharp decline in the consumption spending of the households in Europe was the immediate cause of prolonged economic slowdown since 2008. During the period of growing uncertainties, households chose to save rather than spend, which in turn brought a halt in investment in the medium run. The absence of optimism on the future economy forced people to save more and spend less despite the monetary efforts of negative interest rate by the European Central Bank. For the quick recovery of Europe from the long-standing sluggish growth, boosting up consumption demand is the key as it has the potential to accelerate investment across several sectors, which in turn can create net exports. The marginal rise in consumption expenditure since 2014 has spurred up investment and net exports marginally. However, the rise in demand factors is very meagre and insufficient to trigger solid recovery from the slump. The negative interest rates are successful only to a limited extent to encourage spending and accelerate investment. With the understanding of interdependence of growth factors, the European national governments must pursue fiscal policies revising the income tax slabs and tax rates which releases more liquidity for spending. Rationalising the corporate tax will positively induce to revise investment with which even higher exports could also be achieved. In the market-driven economy, investment and export will have positive growth provided the consumption spending has healthy ratio. Thus, the revival of domestic consumption is the key factor for revival of European economy.

References

Abu-Eideh, O. M. (2014). Factors of economic growth in Palestine: an empirical Analysis during the period of (1994-2013). – International Journal of Business and Economic Development, Vol. 2(2), p. 70-84.

AL-Raimony, A. (2011). The Determinants of Economic Growth in Jordan. – Abhath Al-Yarmouk, Humanities and Social Sciences Series, Vol. 27(3), p. 2297-2305.

Bouyon, S. (2015). Household Final Consumption in the EU: The key driver for a sustainable recovery?. – ECRI Commentary, Vol.18, December.

CEIC data portal, https://www.ceicdata.com/en

Colombier, C. (2011). Does the Composition of public Expenditure Affect Economic Growth? Evidence from the Swiss Case. – Applied Economics Letters, Vol.18(16), p.1583-1589.

Dreger, C., Reimers, H.-E. (2011). The long-run relationship between private consumption and wealth: Common and idiosyncratic effects. – European University Viadrina Frankfurt (Oder), Department of Business Administration and Economics, Discussion Paper No. 295.

Gujrati, N. D. & Sangeetha. (2007). Basic Econometrics. Tata McGraw-Hill Publishing Company Limited, New Delhi, 4th ed.

Harvey, A. (2012). Demand Side Economics: Demand Side Minds. Create Space Independent Publishing Platform. pp. 12.

Kalaitzidakis, P., Kalyvitis, S. (2005). New Public Investment and/or Public Capital Maintenance for Growth? The Canadian Experience. – Economic Inquiry, Vol. 43(3), p. 586-600.

Keynes J. M. (1936). The General Theory of Employment, Interest and Money. MacMillan and Cambridge University Press.

Kira, A. R. (2013). The Factors Affecting Gross Domestic Product (GDP) in Developing Countries: The Case of Tanzania. – European Journal of Business and Management, Vol.5(4), p.148-158, retrieved from: www.iiste.org.

Kydland, F. E., Prescott, E. C. (1977). Rules Rather Than Discretion: The Inconsistency of Optimal Plans. – Journal of Political Economy, Vol. 85(3), p. 473-491.

Liu, E., Hanauer, N. (2011). The Gardens of Democracy. Seattle, WA: Sasquatch Books. p. 11.

Lupu, D., Asandului, M. (2017). The Nexus between Economic Growth and Public Spending in Eastern European Countries. – Engineering Economics, Vol. 28(2), p. 155-161.

Maradana, P. R., Rudra, P. P., Saurav Dash, Kunal Gaurav, Manju Jayakumar & Debaleena Chatterjee. (2017). Does innovation promote economic growth? Evidence from European countries. – Journal of Innovation and Entrepreneurship, Vol.1, p. 1-23.

Mazurek, J. (2017). On Determinants of the Economic Growth of European Countries During 2005-2015. – Comparative Economic Research, Vol.20(2), pp.21-33.

Palley, T. (1996). The Forces Making for an Economic Collapse. – The Atlantic Monthly (July). Retrieved from: https://www.theatlantic.com/magazine/archive/1996/07/the-forces-making-for-an-economic-collapse/376621/.

Shelton, C. A. (2007). The Size and Composition of Government Expenditure. – Journal of Public Economics, Vol.91(11), p. 2230-2260. Retrieved from: https://doi.org/10.1016/j.jpubeco.2007.01.003.

Simuţ, R., Meşter, L. (2014). An investigation of cointegration and causality between investments, exports, openness, industrial production and economic growth: A comparative study for the East European countries. – Annals of the University of Oradea, Economic Science Series, Vol. 23(1), p.369-378.

Sineviciene, L., Vasiliauskaite, A. (2012). Fiscal Policy Interaction with Private Investment: The Case of the Baltic States. – Engineering Economics, Vol.23(3), p. 233–241. Retrieved from: https://doi.org/10.5755/j01.ee.23.3.1934.

Sultan, Z. A., Haque, I. M. (2011). The Estimation of the Cointegration Relationship between Growth, Domestic Investment and Exports: The Indian Economy. – International Journal of Economics and Finance, Vol. 3(4), p. 226-232.

Tekin, R. (2012). Economic growth, exports and foreign direct investment in Least Developed Countries: A panel Granger causality analysis. – Economic Modelling, Vol. 29, p. 868-878.

Annexure 1

Trends in macro growth factors in EU – 1995 to 2016 annual series (figures in EUR bn)

Year	GDP	C	I	G	X	M	X-M
1995	10692.02	4219.71	1542.55	1443.70	2048.20	1939.87	108.33
1996	9872.44	4470.02	1621.94	1519.54	2185.67	2061.88	123.79
1997	10156.23	4741.63	1692.12	1574.78	2454.17	2304.71	149.46
1998	10457.49	4963.80	1809.22	1625.49	2587.89	2472.90	114.99
1999	10773.41	5229.42	1936.71	1718.16	2739.65	2665.38	74.27
2000	11186.01	5626.00	2108.88	1831.45	3254.17	3225.09	29.08
2001	11429.82	5849.80	2151.52	1924.58	3391.09	3311.66	79.43
2002	11584.37	6036.87	2179.10	2040.70	3445.50	3297.49	148.01
2003	11738.56	6118.65	2195.29	2114.57	3431.16	3312.30	118.86
2004	12033.10	6402.81	2314.06	2213.77	3747.11	3612.99	134.12
2005	12285.36	6698.09	2457.46	2322.41	4074.01	3984.65	89.36
2006	12689.92	7018.74	2681.28	2442.05	4715.04	4512.82	202.22
2007	13075.76	7354.63	2917.27	2546.02	4926.27	4849.53	76.74
2008	13134.12	7419.88	2928.52	2632.36	5082.24	5060.61	21.63
2009	12563.88	7087.68	2521.72	2677.26	4282.05	4161.34	120.71
2010	12828.98	7354.06	2569.24	2752.00	4947.65	4835.66	111.99
2011	13051.62	7537.25	2658.10	2771.17	5467.00	5325.26	141.74
2012	12990.73	7732.53	2649.47	2824.54	5730.79	5462.97	267.82
2013	13027.56	7756.83	2608.66	2847.52	5809.57	5459.93	349.64
2014	13255.79	7968.40	2718.94	2920.06	6052.29	5667.43	384.86
2015	13561.43	8328.65	2881.52	3023.32	6480.96	5965.74	515.22
2016	13824.16	8353.27	2950.78	3036.00	6457.23	6037.50	419.73

Source: Compiled by author from CEIC data portal.