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The Nexus between Economic Growth, Trade Liberalisation, and Volatility Revisited: Empirical Evidence from the European Union Countries

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The current research revisited the impact of trade liberalisation on economic growth and volatility of macroeconomic variables for European economies. For this purpose, this study divided the data set in two different groups based on joining the European Economic Community which was established in 1993 and initiated free trade. The purpose of this division is to compare the impact of trade liberalisation on economic growth before and after 1993. This division also provides a comparison of an analysis of the volatility of the economy for both periods. The results confirm that trade liberalisation and economic growth are positively correlated. Trade liberalisation has a significant positive impact on economic growth. This study concludes that trade liberalisation leads to higher GDP per capita growth rate. In addition, economies that are more liberal from a trade perspective are less volatile than less liberal economies for trade.

Key words: *Trade liberalisation, Growth, volatility, European Economic Community.*

JEL Classification: O40**,** E32, F13, F10

Introduction

After the world war, II economies gave due attention to trade liberalisation because of continuous discussion on its role to determine the economic growth of an economy. Several researchers provided strong justifications in favor of trade liberalisation but most of the justifications were theoretical ((Srinivasan and Bhagwati (2001); Grossman and Helpman (1991)). Nonetheless, a group of researchers published their research against free trade because they consider it harmful for the local industry particularly infant one due to the intensification of competition (Lucas

(1988); Young (1991); Matsuyama (1992)). Therefore, there is a need for a clear and robust empirical evidence to solve this controversy because empirical evidence is also conflicting. For example, a group of studies identified that trade liberalisation is a good option to increase per capita income and decrease the poverty level in an economy. Furthermore, trade liberalisation policies are also favorable for rapid economic growth along with low poverty rate (Dollar (1992); Edward (1992); Estevadeordal and Taylor, (2008); Sachs and Warner (1995); Dollar and Kraay (2000 and 2001)).

However, Rodríguez and Rodrik (2001) criticized their findings based on their approach to investigate this phenomenon because they used a simple and general approach. Furthermore, the later authors also raised a question on their methodologies to deal with cross-section data and reported that because of serious problems with their methodology the findings of these studies are not robust. Therefore, Rodrik (1999) points out that there is a probability of reverse causality between trade liberalisation and economic growth because fast-growing economies may become more open for trade rather than more open economies grow faster. It implies that rapid economic growth may lead to trade liberalisation. Thus, after controlling this problem Rodríguez and Rodrik (2001) report that the benefits of free trade for economic growth are conditional. Furthermore, Panagariya (2003) comments that although trade liberalisation is a source of rapid economic growth, a country cannot depend on it solely to grow faster. In sum up, they are in favor of free trade to increase the per capita income of a country but also advice to improve sectors as well.

In contrast, on the other hand, Harrison (1996) argued that liberalisation is responsible for the increase in competition in an economy which can reduce the incentive for innovative activities. Consequently, existing firms may reduce their research and development expenditures, and ultimately there will be an adverse effect on innovation. In this background, Label (2008) declared that innovations are the main determinants of long-run economic growth; hence, this aspect is harmful in the long-run for economic growth.

The above-cited literature shows controversy among different researchers on the role of trade liberalisation in the determination of economic growth. In addition to this, there is also a controversy on the exogenous role of trade openness and the robustness of the relationship between trade liberalisation and economic growth (Rodriguez and Rodrik (2001); Easterly (2005)). Krugman (1994), and Estevadeordal and Taylor (2008) confirm the robustness of the relationship while Srinivisan and Bhagwati (1999) conclude otherwise. Furthermore, the role of trade liberalisation in the determination of volatility of macroeconomic variables in an economy is also controversial. Giovani and Levchenko (2009) and Ahmed (2009) conclude that trade openness is responsible for an increase in the volatility of macroeconomic variables. On the other hand, Georgeous Karras, (2006) finds that trade openness is a source of reduction in the volatility of output, consumption, and investment in an economy. Therefore, after incorporating all available information an empirical study by Ali *et al*. (2014) investigates the relationship between trade

openness and economic growth and concludes that trade openness is a source of not only rapid economic growth but also a reduction in the volatility of macroeconomic variables. This study used data from selected European Countries from 1960 to 2014. Unlikely, Sabina, and Eldin (2018) report that passive trade liberalisation may not has a positive impact on economic growth. Similarly, Ali *et al*. (2018) conclude that free trade is harmful to economic growth. Likely, Olumuyiwa and Olalekan (2020) report that trade and financial liberaisation are responsible for higher volatility in macroeconomic variables.

Therefore, the objective of this study is to readdress the above-stated controversies. For this purpose, the study again uses the data of 15 European countries that are part of the European Union and for robustness purpose, this research once again uses the data of 7 developing countries but this time the period has been changed which is 1965 – 2018 for European Union Countries and 1985 – 2018 for Asian economies. This type of data provides rich dynamics than that of time series and cross-section because it incorporates characteristics of both time series and cross-section at the same time. The purpose of constructing two panels is to address the issue of robustness across the region. Furthermore, the sign of coefficient will address the nature of the relationship between trade openness and economic growth while the use of GMM will address the problem of reverse causality.

Fundamental Characteristics of Selected Countries

At present, the European Union consists of 28 states that are situated mainly in Europe. All member states operate under the umbrella of super-national institutions and standardized laws. It formulated a single market with the purpose to make sure free movements of labor, capital, and goods and services. The first practical step to promote free movement of factors of production along with goods and services was taken by the formulation of the European Economic Community in 1993. At that time 12 states namely Belgium, France, Germany, Italy, Luxembourg, Netherlands, Denmark, Greece, Ireland, Portugal, Spain, and the UK, were the part of the European Union. The first 6 states are the founders of this politico-economic union and the rest of the states joined latterly but before 1993. In addition, 3 more countries in Europe namely Austria, Finland, and Sweden became members of this union in 1995.

Therefore, the study disaggregates data for European countries into two different periods, one is from 1965 to 1992 and the other from 1993 to 2018. The purpose of this classification is to investigate whether, after the formation of the European Economic Community, the impact of trade openness on economic growth is increasing or not for the selected European countries. Furthermore, there are still some doubts about the nature of the relationship between trade openness and volatility in an economy (Giovanni and Levchenko, 2008). This study analyses volatility of the key macroeconomic variables before and after the adoption of trade openness.

Analytical Framework

If we consider a small, free-market economy, trade liberalisation is an optimum option for that economy. This is based upon the earlier theory of comparative advantage. According to the old-growth theories, free trade declines the price of fixed capital but raises the rate of return on capital along with savings in a country (Dolar 1992, Edward 1992; Estevadeordal and Taylor, 2008). On the other hand, the literature of new growth theories reflects the spillover effects due to more availability of advanced technology. This causes an increase in research and development expenditures (Taylor, 1999).

The interesting and more influential research work in favor of free trade is that of Sachs and Warner (1995). Trade openness helps in getting a wide range of innovations, enhanced financial development, and ensures more labor productivity by adopting the most efficient techniques of production. Furthermore, it indirectly affects the employment level for women in the economy (Shehbaz 2012, Stephen and Mukti 2000, Bussman 2008). By ensuring the availability of advanced technology at low prices, it promotes the service sector especially the telecommunication and financial sector (Antoine *et al.* 2006).

However, the process of technological progress is the main source of the increase in output of an economy but this is only possible in case of capital deepening which enhances a variety of capital goods (Romer1990, Grossman and Helpman 1991, Barro and Sala-i-Martin 1995). Thus, our analytical framework links the economic growth with two types of variables; physical capital stock and human capital stock. The study measures physical capital stock by gross fixed capital formation but for human capital, education attainment, and health status are used. Therefore, to capture these ideas empirically, the current research follows adopts a simple production function for one commodity:

$$Y_t = AH_t^{\alpha} K_t^{1-\alpha} \quad (1)$$

where A reflects technology which is exogenous, H is human capital and K is physical capital, α is the share of human capital and $1-\alpha$ is the share of physical capital. Thus, we can write our growth function in period t, Dy, for the values of its synchronal determining factors as

$$Dy = f(y_{-1}, k_t, h_t, ...) \quad (2)$$

where, Dy is the growth rate of GDP/POP, called GDP per capita, y_{-1} is the initial level of GDP, k_t is the stock of Physical capital, and h_t is human capital. After the inclusion of inflation as a control variable and the variable of interest, trade openness as an explanatory variable, the final equation of growth follows the regression methodology of Barro and Lee (1994). We hold the following specification for our growth equation:

$$GDPP_{it} = \beta_O + \beta_1 GDPP_{it-1} + \beta_2 TL_{it} + \beta_3 INVST_{it} + \beta_4 INF_{it} + \beta_5 EDU_{it} + \beta_6 Fertiltity_{it} + \nu_i + \eta_t + \mu_{it} \quad (3)$$

Where $GDPP_{it}$ is a measure of economic growth, $GDPP_{it-1}$ is the initial value of the dependent variable, TL is the measure of trade openness, $NVST$ is a measure of investment, INF is the measure of inflation, EDU_{it} is the measure of education, $Fertility$ is the measure of fertility rate of women. The above model contains (μ_i) which captures country-specific effects and remains fixed over time such as geography, whereas, (η_t) reflects time-specific effects that remain common for all countries, and at the end ν_{it} is a Gaussian random error.

Data and Variables

According to the model defined in the previous section, the dependent variable is representative of economic growth measured by the natural log of real per capita GDP. The main right-hand side variable, trade liberalisation, is measured by the ratio of the sum of real exports and real imports to real GDP. In the same way, control variables that reflect human capital, as well as physical capital, are expenditures on secondary education as a percentage of gross expenditures, average fertility rate measured by the births per woman, and investment measured by the natural log of gross fixed capital formation.

The data covers the period from 1965 to 2018 for 15 countries of the European Union and the period 1985 - 2018 for 7 Asian countries. To capture the effect of trade liberalisation in developing countries for robustness, the study includes four South Asian countries namely Bangladesh, India, Pakistan, and Sri Lanka, two Southeast countries namely Indonesia and Malaysia, and one from West Asia which is the Islamic Republic of Iran. The Panel of Asian countries covers the period from 1985 to 2018 due to missing values for some variables before 1985.

Descriptive Statistics

First of all, the study reports values of descriptive statistics of the model for the panel of European countries, presented in Table 1. One can analyze that there is a large dispersion in some variables of the data set because of high values of standard deviation, particularly in education, inflation, and investment despite the nature of these variables. Here all are in percentage form except investment which is in log form. This is a built-in problem in panel data because of the existence of heterogeneity. In econometrics literature, this is called heteroscedasticity which is the main problem of the panel data set. Education has the least number of observations than all other variables because of missing values before 1985 for most of the countries.

In the next step, the current research reports co-movements of these variables in table 2, described by the values of pairwise correlation among all variables significant at a 5 percent significance level. In this data set, all right-hand side variables have a high and significant correlation with the dependent variable of the model. Similarly, the study repeats the whole process on the data set of Asian countries which is representative of developing countries. The values of descriptive statistics are not much different from those of developed countries. However, in developing countries, inflation has a much higher variation. This is a typical phenomenon of developing countries as their inflation is more volatile than in developed countries.

Table 1: Descriptive Statistics (European Countries)

Variables	*Observations*	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
GDPP	804	27831.37	12540	3717.71	87743.57
TL	803	0.69	0.51	0.074	3.68
INVT	727	24.97	1.31	21.04	27.87
INF	789	5.25	5.33	-3.91	27.21
EDUS	582	41.22	22.46	1.07	127.36
FERTILITY	808	1.90	0.54	1.16	4.05

Table 2: Pairwise Correlation (European Countries)

	GDPP	*TL*	*INVT*	*FERTILITY*	*EDUS*	*INF*
GDPP	1					
TL	0.7663*	1				
INVT	0.0882*	0.3643*	1			
FERTILITY	-0.5917*	-0.3973*	-0.2620	1		
EDUS	0.4430*	0.2645*	0.4021*	-0.3188*	1	
INF	-0.4197*	0.4244*	-0.1585*	0.2364*	0.5866*	1

Econometric Methodology

The data set consists of an unbalanced panel of 15 European countries for the period 1965-2018. According to the specification of the model most of the right-hand side variables, primarily the key explanatory variable, trade openness, are probably correlated with the error term due to their endogenous relationship with economic growth. In the presence of this relationship, the results of OLS or Fixed effect estimation will be biased. Therefore, the researchers use the GMM estimation technique to tackle this problem proposed by (Arellano and Bond, 1991) for the estimation of dynamic panel models. The beauty of this approach is that we do not need to use any external instruments for endogenous variables. This method considers the regression equation in the first difference and then uses the lag values as instrumental variables. Thus, the model takes the form:

$$y_{it} = \alpha_0 y_{it-1} + \beta' X_{it} + \tau_t + \gamma_i + \mu_{it} \qquad \text{for } i =,\ldots, \text{N and } t =2,\ldots, \text{T} \qquad (4)$$

Where y is the dependent variable, y_{it-1} is the lag of dependent variable, X is the vector of explanatory variables, τ_t and γ_i are time-specific and country-specific effects respectively, whereas v_{it} is the disturbance term of the model. The country-specific effect is also creating endogeneity in the model. Now the model will be transformed by taking the first difference to remove this effect, which is unobserved and we are left with:

$$y_{it} - y_{it-1} = \alpha_0(y_{it-1} - y_{it-2}) + \beta'(X_{it} - X_{it-1}) + (\tau_t - \tau_{t-1}) + (\mu_{it} - \mu_{it-1}) \quad (5)$$

It can be written as

$$\Delta y = \alpha_0(\Delta y_{it-1}) + \beta'\Delta(X_{it}) + (\Delta\varepsilon_{it}) \quad (6)$$

Where Δ shows the first difference of variables and idiosyncratic disturbance term. An important assumption regarding the disturbance term of this method is that there is no serial correlation in the model:

$$E[\mu_{i,t} - \mu_{i,s}] = 0 \text{ for } i = 1, \ldots., N \text{ and } s \neq t \quad (7)$$

Now one can use the lagged values of explanatory variables as instruments for equation (5), (Arellano and Bond, 1991), using the moment conditions. The moment conditions are:

$$E[y_{it-s}(\mu_{i,t} - \mu_{i,t-1}] = 0 \quad (8)$$

$$E[X_{it-s}(\mu_{i,t} - \mu_{i,t-1}] = 0 \quad (9)$$

$$\text{For, } t = 3 \ldots T \text{ and } s \geq 2 \quad (10)$$

To check the validity of instrumental variables the study will consider the Sagan test with the null hypothesis that instruments are valid. Furthermore, this study will use the augmented version of this technique proposed by (Blundell and Bond, 1998) with the name of system GMM. In addition, (Windmeijer, 2000) further augmented the system GMM approach to incorporate strong heterogeneity in the data and to tackle the downward biased of standard errors. A manual program with the name of xtabond2[1] is available in Stata for this version of the system GMM.

Results and Discussion

As mentioned earlier, the current study selected two different regions to find a robust relationship between trade openness and economic growth. The first panel consists of the countries that belong to Europe and joined the European Economic Community before January 1993 except three countries namely Austria, Finland, and Sweden that joined in 1995. According to the methodology

[1] David Roodman, 2003. "XTABOND2: Stata module to extend xtabond dynamic panel data estimator," Statistical Software Components S435901, Boston College Department of Economics

section, the dependent variable, as a measure of economic growth, is the natural log of GDP per capita. And the variable of interest, trade openness is measured by the ratio of Exports plus Imports to GDP in constant US$. All other variables are in percentage form except investment and GDP Per Capita. Thus, the current study used a natural log of investment and GDP Per Capita to reduce the volatility. According to the nature of the model, the generalized method of moments is the most appropriable technique which tackles the problem of endogeneity, heteroscedasticity, and autocorrelation at the same time. Therefore, the lags of independent variables will be used as instruments. The important point regarding the validity of instrumental variables is that they should be good predictors of endogenous variables and should have zero correlation with the error term. The above dynamic model is estimated by the system GMM estimator.

According to the estimation results, trade openness has a significant positive impact on GDP Per Capita which is a measure of economic growth. Thus it implies, after considering the role of trade openness as endogenous and handling this problem with a suitable econometric technique, trade liberalization is still positively affecting the economic growth which implies that trade liberalization is a source of economic growth and countries should promote it further. These findings are consistent with earlier work ((Chitauro and Khobai, (2018); Estevadeordal and Taylor (2008); Sachs and Warner (1995); Marilyne *et al*. (2013); Echekoba *et al*.,(2015)). The results of the above model are presents in table 3. Model 1 in the table of results consists of the data of European countries for the period 1965-2018. Then model 2 in the table of results represents the results of the same region but this time, the data set covers the period from 1965 to 1992 when the European Economic Community was not established in this region. The impact of trade openness in this era is positive and significant but the magnitude and significance level is lower than the results of the full model because the full model contains the period from 1993 to 2018 also.

Then the study checked the impact of trade liberalisation on the data from 1993 to 2018. In this period, all countries were part of the European Economic Community. The magnitude of trade openness is much larger and the level of significance is also higher than the results of the earlier two models. This confirms that by adopting trade liberalisation one can achieve a higher growth rate. The result of this estimation is presented in table 3 under the heading of model 3. The next model which is mentioned by model 4 in the table of results consists of the data of Asian countries which represents the developing countries. Once again the trade openness is affecting significantly and positively to economic growth. Thus, one can say that there is a robust relationship between trade liberalisation and economic growth as we have confirmed it in two different regions of the world as well as by different periods. The value of the Sargan-test is confirming the validity of instrumental variables in all the equations. The secondary objective of the current study is to measure the volatility in macroeconomic variables of an economy before and after the adoption of trade liberalisation. All control variables are significant except education which is significant only in model 2. The possible reason for this result is that expenditures on secondary education have

been declining for a decade in the European Union. The World Development Index data set also confirms the declining pattern of expenditures on secondary education in the European Union.

The current study also calculated the volatility by using the value of the coefficient of variation. As much a series has a higher value of the coefficient of variation the more volatile that series will be. The value of the coefficient of variation for each series is presented in table 4 for all data sets. The reader can observe that after 1992, when these economies joined this community, the volatility of macroeconomic variables namely GDP growth Rate (GDP), exports (X), imports (M), final consumption expenditures (FCE), gross fixed capital formation (INVT), government general final consumption expenditures (GGFCE) & the ratio of all these variables to output (XTO, MTO, FCTO, ITO, and GGFTO), Gross Domestic Product (GDP), real interest rate (REAL) and inflation (INF) is significantly reduced. The reason behind these results is that now these sectors are more correlated with the rest of the economy because of trade liberalisation which is a source of the increase in production capacity consistently. Whereas the volatility of money supply as a percentage of GDP (M2%), lending interest rate(LIR), depositing interest rate (DIR), value-added of agriculture and industry as a percentage of GDP has been increased (AGR and IND). This is a typical pattern of series because trade liberalisation creates specialization and producers find new options and markets. Consequently, the size of the industry and loan supply becomes more volatile. Unlikely, the volatility of the value-added services sector is the same in both periods. The conclusion is that most of the macroeconomic variables become more stable after trade liberalisation. Thus, trade liberalisation is reducing the overall volatility in the entire economy for European countries after joining the single market economy. Thus, more open economies to trade are less volatile than less open economies to trade. These results are consistent with ((Hadded *et al*. (2012); Georgeous Karras, (2006)).

Table 3: Impact of Trade Liberalisation on Economic Growth

	Dependent Variable: Gross domestic product per capita(*GDPP)*			
Regressors	**Mode 1**	**Model 2**	**Model 3**	**Model 4**
	1965-2018	*1965-1992*	*1993-2018*	*Asian Countries*
TL	0.051***	*0.043 **	*0.21****	*0.032****
	(.0121)	*(.0214)*	*(.0443)*	*(.0041)*
INVST	*0.091****	*0.105 ****	*0.266 ****	*0.193****
	(.0090)	*(.0253)*	*(.0131)*	*(.0161)*
INF	*-0.001**	*-0.002**	*-0.002**	-0.001*
	(.0005)	*(.0010)*	*(0.0010)*	(.0006)
EDUS	*0.002*	0.003****	0.001	0.002**
	(.0031)	(.0016)	(0.0021)	(0.0008)
FERTILITY	-0.031***	-0.032**	-0.028*	-0.071*
	(.0022)	(.0131)	(0.0167)	(0.0421)
$GDPP_{t-1}$	0.730***	0.542***	0.368***	0.486 ***
	(.0126)	(.0304)	(.0315)	(.0453)
Diagnostic Tests				

No. of observations	499	237	195	130
Sargan Test	0.24	0.51	0.221	0.417

Note: *Standard Errors are in Parenthesis*

Table 4: Volatility Analysis

Series	**X**	**M**	**FCE**	**INVT**	**GDP**	**GGDP**	**GGFCE**
CV (Before 1993)	1.14	1.12	1.12	1.13	1.16	7.71	1.17
CV (After 1992)	*0.97*	*0.95*	*1.04*	*0.98*	*0.99*	*7.84*	*0.98*
Series	**XTO**	**MTO**	**FCTO**	**ITO**	**GGFTO**	**INF**	**M2%**
CV (Before 1993)	*0.90*	*0.78*	*0.59*	*0.42*	*0.21*	*0.71*	*0.21*
CV (After 1992)	*0.74*	*0.61*	*0.12*	*0.14*	*0.15*	*0.69*	*0.75*
Series	**FDI%**	**LIR**	**REAL**	**DIR**	**AGR**	**IND**	**SER**
CV (Before 1993)	*0.93*	*0.35*	*1.09*	*0.52*	*0.37*	*0.11*	*0.07*
CV (After 1992)	*3.83*	*0.51*	*0.65*	*0.76*	*0.55*	*0.20*	*0.07*

Conclusion

The trend to determine the economic growth from variables representing various sectors varies over time. In different periods, different sectors are being used by different studies such as economic, social, environmental, and institutional. The current study is developed to know the trade sector's effect on economic growth in which concentration is being given to trade liberalisation. The study adopted a model to capture the effect of trade liberalisation on economic growth along with its impact on the volatility of the economy. The variable for trade liberalisation is measured by the ratio of exports plus imports to GDP in real terms and for economic growth, the study used the Per Capita GDP. Similarly, many economic variables suggested by former studies are also used in our analysis that captures the effect of human and physical capital namely; education, fertility rate, and investment respectively along with inflation.

The dataset consists of 15 European countries that joined a single market economy before 1993, which allows free trade among these countries and covers the period from 1965 to 2018. The study divided the data into two different parts, one is representative of the period before trade liberalisation from 1965 to 1992 and the second one is representative of the period after the adoption of trade openness because in 1993 single market treaty was established, this allows the free movements of labor, capital and goods and services across the border among European countries.

The instrumental variable technique is employed to conduct empirical estimation. The first difference generalized method of moments is applied to determine the impact of trade liberalisation

on economic growth. To check the effect of trade liberalisation on the volatility of the overall economy the current research calculated the values of coefficient of variation for both periods to make a comparison before and after trade openness. The results show a positive relationship between trade openness and economic growth that are consistent with the prediction of (Chitauro and Khobai, (2018); Estevadeordal and Taylor (2008); Sachs and Warner (1995); Marilyne *et al*. (2013); Echekoba *et al*.,(2015)). According to the results of volatility analysis trade openness reduces the volatility in the overall economy. Trade openness reduces volatility more efficiently for more open countries to trade than less open countries. These results are also consistent with (Hadded *et al*. (2012); Georgeous Karras, (2006)).

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