Financial Integration, Knowledge Sharing and Economic growth: Does the experience of developing countries differ from developed countries?

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Abstract

Economic growth is still a central macroeconomic goal of every society, whether rich or poor and this study has explored the role of financial integration and knowledge sharing in this regard by assuming that their effect on the economic growth of developing and developed countries may be different. This study has chosen the country classification made by the United Nation's WESP classification. Feasible generalized least square (FGLS -hetero) approach is used for estimation from a data set of 1995 to 2019 and the results show that financial integration has a positive impact on the economic growth of developed nations but has a negative impact on the economic growth of developing economies. Knowledge sharing, research and development expenditure, institutions, interpersonal globalization have a positive impact on the economic growth of developing and developed economies.

Keywords: Economic growth, financial integration, information, globalization, institution, research and development.

JEL Classification: O 11, F02, F15, F38,

1. Introduction

Economic growth is essential for improving the standard of living in a society as it increases the rate of consumption of goods and services by minimizing poverty. It is also a reflection of the state of the innovative ability of a nation and how effectively the society takes limited resources and makes better use of them. GDP growth is important for consumption, creation of jobs, education, health, investment, public services and it gives a greater choice of lifestyles leading to a virtuous cycle of economic prosperity and happiness. Nations can achieve economic growth in different ways and this study emphasizes the role of financial integration and knowledge sharing in this respect.

Now a day, financial markets are integrated and there is organized coordination among financial institutions that enable them to share information and financial technology.

Financial integration is a movement of capital instruments without any legal restriction across the nations.

Neal (1990) explored that financial integration is dated back to the 1690s when the Dutch empire established Amsterdam as a financial hub for bullion trading, stock trading, and foreign exchange trading and banking.

Jackson and Lothian, (1993); Lothian, (2000) figured out that it was Gold Standard Era (1875-1915) when Europe became financialyl linked in an organized way and then in the periods of 1980s and 1990s, volatility in the real exchange rate and financial markets compelled leaders to reduce further legal restrictions on capital mobility and avoided costly capital control measure.

Proposed benefits of financial integration are identified by various scholars like Levine (2001) concluded that financial integration improves the domestic financial sector that is helpful for efficient capital allocation, investment and growth opportunities. (Kose et al., 2006) were in an opinion that firms can gain efficiency by competing to foreign rivals as there is more capital flow from rich countries to developing countries because of prospects of unused resources. Obstfeld, (1994); Lewis,(1999); Wincoop, (1999) studied that financial integration can cause financial risk to spread.

Now the question arises how can we measure financial integration? Lothian, J. R. (2000); Kose et al. (2006) suggested measures like financial openness, gross capital flows (capital inflow plus capital outflow), degree of co-movement of stock return and stock of foreign assets and liabilities. In comparison, Juraev (2012) suggested that bilateral capital flows should be taken rather than gross capital flows. KOF Swiss economic institute develops financial globalization index from various variables. The institute uses two parameters for financial globalization, de facto and de jure. De facto indicates actual practice/transactions and de jure is the legal framework for financial easiness. Financial globalization and financial integration are interchangeable terms (Prasad, 2003, IMF Paper), although they have different textbook definitions. In this study, the term, financial integration will be used.

In this study, both de facto financial integration and de jure financial integration are used as two separate explanatory variables for economic growth. The reason is that there is some gap between deregulation of the financial market (de jure) and actual market integration (de facto). Here example of Latin countries can be put forward, such countries have some restrictions on financial movements but their actual transactions are relatively high. Based on de jure, Latin Countries are closed but based on de facto, they are open economies. Another example is African countries that are open to international markets in terms of de jure as they have less regulation but their volume of the transaction with the rest is less (low de facto) (Prasad 2003).

The figure 1 indicates the progress of financial integration during the last 50 years.

Figure (1)
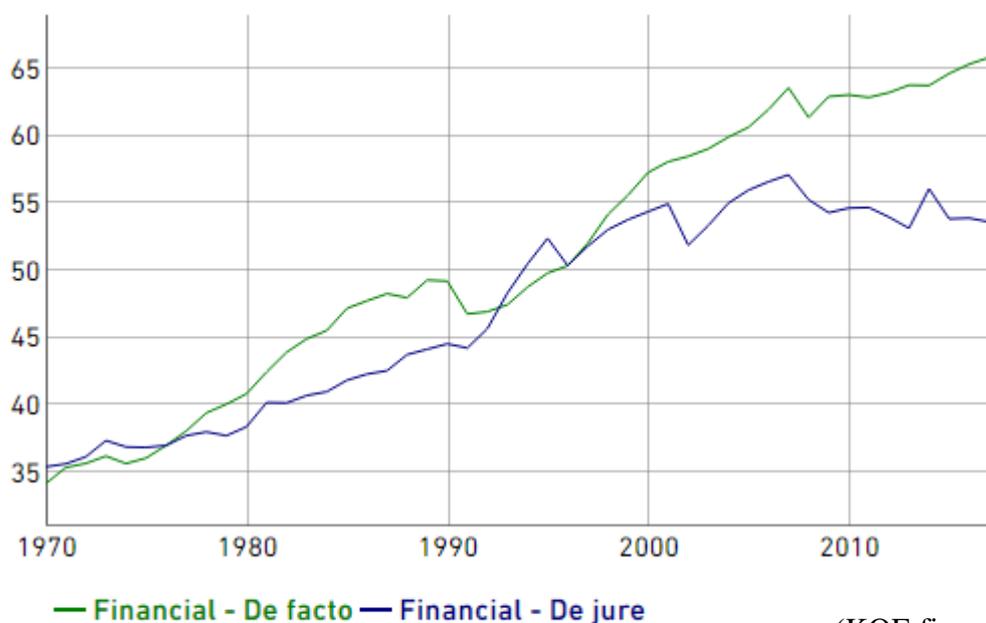
(KOF financial index 2019)

Figure 1 shows hat there is an almost smooth increase in financial integration from 1970 to 2008 and after the 2008 financial collapse, there is a fall in de jure integration and that has also affected the de facto integration. It appears that after the financial crisis of 2008, some countries made regulations for capital flow.

Besides financial integration, the effects of knowledge sharing on economic developments are also studied. Knowledge is awareness about facts and in the context of economics, it is, information about production, consumption, distribution and exchange of material items. Sharing of information about technology and technique of production, enables developing countries to catch up with developed economies and it's not a free ride, developed economies also grow because their knowledge is protected by intellectual rights.

Knowledge sharing is like, if a piece of information is available in the USA, the rest of the world must have access to it. Telephone, internet, high technology export, license rights, franchises and multinational business play a role in the transfer of information and skills. The different researchers have adopted different proxies for such knowledge sharing. Internet is used as a variable by Kenny (2003); Choi, C., & Yi, M. H. (2009); Manyika, J., & Roxburgh, C. (2011); Meijers, H. (2014); Maurseth, P. B. (2018). Television access is used by Waterman et al. (2013). Kabaklarli et al. (2018) studied high technology export.

This study has used two separate indexes for knowledge sharing that provide a comprehensive study of all variables that can be studied for knowledge sharing. KOF informational de facto index and KOF informational de jure index are used as two

explanatory proxies for knowledge sharing. KOF informational globalization de facto shows the degree of actual access to knowledge and KOF informational globalization de jure indicates the extent of rules and regulations to gain knowledge.

Figure (2) shows the progress of information sharing with de facto and de jure indexes.

Figure (2)

Information - De facto   Information - De jure
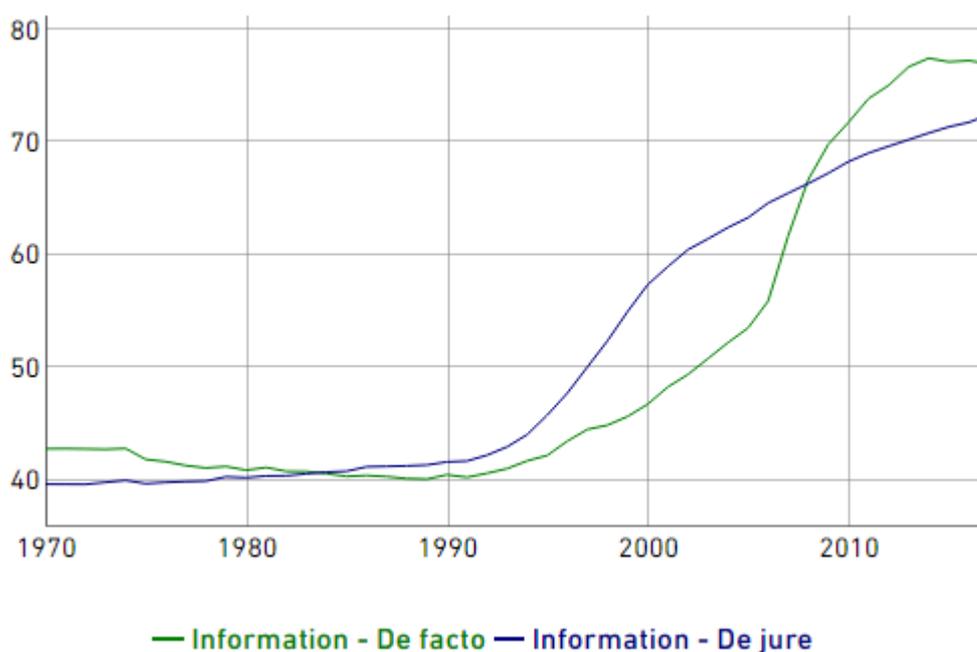
(KOF information index 2019)

Figure (2) indicates that there was a slow pace of knowledge from 1970 to 1990 and after 1990, there was a rapid spread of information across the world. Other control variables studied in this paper are political, cultural and social globalization.

1.2   Motivation of the study

In developing countries, it is supposed that their politician makes such policies that enable them to transfer their money to developed countries, so it is better to have control over financial outflows. In contrast, in developed countries, there is also concern that net investment is mostly negative for them because of freedom of financial integration that provides an opportunity for the investor to outflow their money and resources. Similar is a case of migration, developing countries face brain drain issue whereas developed countries face loss of jobs for natives along with other negative consequences of migration (Sanderson, M. R., & Kentor , 2009). So this study is a try to identify the possible effects of financial freedom on the economies of developing and developed nations, separately.

1.3   Objectives of the study

The objective of this study is to find the impact of financial freedom and knowledge sharing on the economic growth of developing and developed countries. It is hypothesized that the effects of financial freedom may be different- at least in magnitude- for developing and

developed countries. This study also found the impact of different types of globalization on the economic growth of developed and developing countries.

1.4   Research Questions
   a) What is the impact of financial integration on economic growth?
   b) What is the impact of knowledge sharing on economic growth?
   c) Is there any role of research and development on GDP?
   d) Does Interpersonal globalization have positive impact on economic growth?
   e) What is the effect of governance on economic growth?

1.5   Novelty of the Study

Many studies are available related to the movement of finance and economic growth, but they are either for a specific county or for a specific region. This study examines the impact of financial freedom on developing as well as on developed economies in order to find out whether this has a different effect- at least in magnitude- on developed and developing economies. Use of comprehensive financial and information indexes that represent a wide range of financial variables. The financial index used in this study is made of eight variables and the information index is made from six other variables. Details of these variables are given in part three of this study.

The rest of the paper is structured into different sections. Section 2 reviews the literature. Section 3 explains methodology and data collection. Results are discussed in section 4 . Section 5 deals with discussion and policy implications.

2.Literature Review

Almost a hundred years back, Schumpeter (1911) proposed that financial intermediaries stimulate technological innovation and economic growth. Many studies have been conducted, to test the impacts of finance on economic growth but even, the aftermath of rising globalization, less is studied on the effect of financial integration on economic development. Gibson and Tsakalotos (1994) suggested that financial reform (leading to financial integration) should be adopted with caution in developing countries, where financial markets are not strong enough to have a positive impact on economic growth. But still, they suggested that instead of the alternate of financial liberalization, there is a need to develop sound financial markets in the countries. On the other hand, Levine (2001) concluded that financial liberalization can decrease imperfection in domestic financial markets and enhance stock market liquidity that accelerates economic growth.

Baonza (2011) investigated the possible effect of financial spillovers in the context of sub-Saharan countries from a data set of 1994 to 2009 by using Solow Swan Augmented model with a financial sector component and found that it has no significant positive impacts on sub-Saharan economies.

Carmody (2013) examined the role of information and knowledge economy in the case of Africa and observed that information gathering through mobile was significant and welfare driven that became vital for reinforcing existing power relation but still there is a

need to convert its impacts as knowledge economy so its effect is 'thin' rather than 'thick' and it cannot alter the dependent position of the continent.

Asongu (2014) studied financial globalization and economic growth in the case of the African countries from a data of 1980 to 2010. He was interested to check the initial financial threshold condition for the significance of financial globalization and empirically showed that the level of financial development in terms of size, efficiency, depth and activity is necessary to have a positive impact on economic growth.

Svyrydova (2018) suggested that information globalization is a key resource to coupe with a lack of skills in developing economies and a tool to get cheap resources for developed economies. The Growth of information is vital for selection, analysis and comparing of resources to use in the production process. He suggested that initially regions like European countries were developed because of the flow of techniques from one country to its countries but now, because of information technology, such information is available to every corner of the world.

Khatun and Bist (2019) in their paper emphasized that for the full gain of financial openness, nations are required to have better development in banking, stock market, bond market and insurance sector markets. They used a sample period of 1990 to 2012 for BRICKS countries.

Kurniawati (2020) examined the short-run and long-run role of information, innovation and globalization in the case of OECD countries from a data set of 1996-2017. The study constructed indexes for the variables, using principal component analysis. The study used pooled mean group regression, fully modified ordinary least squares, dynamic ordinary least squares and panel Granger causality to examine the impact and found information, innovation and globalization have a positive impact on the economic growth of OECD countries.

Sahoo and Sethi (2020) explored the relationship between financial globalization, trade openness and economic growth for the selected South Asian countries over the period of 1990 to 2017 and applied panel unit root tests of Im–Pesaran–Shin (IPS) and Levin–Lin–Chu (LLC) to check the stationarity of the variables. Kao, Fisher and Pedroni's residual cointegration tests are used to examine the long-run relationship among the variables. They found a positive impact of financial globalization on the economic growth of South Asian countries. The pairwise Granger Causality test indicated that there is a bicausal relationship between growth and financial globalization. Moreover, full modified ordinary least squares (FMOLS) and dynamic ordinary least squares (DOLS) methods also confirmed the long-run dynamic relation between financial globalization and economic growth.

2. Methodology

3.1   Classification of countries

This study assumed that the impact of financial integration and knowledge sharing is different for different types of countries and this study has chosen the country classification

made by the United Nation's WESP classification. The world economic situation and prospects (WESP) classifies all countries of the world into one of the three broad categories: developed economies, economies in transition and developing economies. The study has put transitional economies in developing economies by considering its characteristics similar to developing economies.

3.2   Sample of study and Model Framework

As the aim of this study is to examine the impact of financial integration and knowledge sharing on the economic growth of developing and developed countries so two models are constructed for the analysis purpose. One, for 36 developed countries and the other for 120 developing countries. A list of the countries for each model is given in appendix 1. This study has taken data from 2001 to 2017 to estimate the impact of independent variables on economic growth

3.3   Estimation Techniques

This study has used Feasible Generalized least squares (FGLS). FGLS is a technique for estimating the impact of independent variables on the dependent variable when there is a correlation between the residuals in a regression model and/or heteroscedasticity. This study first adopts Pooled OLS, Fixed Effect (FE) and Random Effect (RE) models but they could not pass through the diagnostic tests of heteroscedasticity because of the different nature of cross-sections so this study has used FGLS hetero to robust it. FGLS heteroscedasticity robust is appropriate when cross-sections are higher than time and all models of this study are also fit for this condition because the number of countries is higher than the number of years.

3.4   Functional Form

The model is developed in it general form for both developing and developed countries as:

$$GDPPC = \beta 0 + \beta 1 KFI + \beta 2 KNOW + \beta 3 GOV + \beta 4 R\&D + \beta 5 KIP + \mu$$

The detailed information regarding the variables is presented in Table 1.

Table 1

Variable Name	Symbol	Brief Definition	Source
Economic Growth	GDPPC	Gross domestic product per capita	WDI, the World Bank (2020)
Knowledge Sharing	Know	de facto Index of three Variables: 1) Used internet bandwidth 2) International patents 3) High technology exports. de jure Index of three Variables: 4) Television access	KOF Swiss institute (2020)

		5) Internet access 6) Press freedom	

Governance Indicators	Gov	Index of 6 variables:
		  a) Control of corruption
		  b) political stability
		  c) regulatory quality
		  d) voice and accountability
		  e) rule of law
		  f) government effectiveness
			WGI, the World Bank (2020)

Research and development	R&D	Research and development expenditure as a percentage of GDP	WDI, the World Bank (2020)

Interpersonal globalization	KIP	Index of 8 variables:
		  1. International voice traffic
		  2. Transfers
		  3. International tourism
		  4. International students
		  5. Migration
		  6. Telephone subscriptions
		  7. Freedom to visit
		  8. International airports
			KOF Swiss institute (2020)

3.5 Governance Indicators

Control of corruption, political stability and absence of violence, regulatory quality, voice and accountability, rule of law and government effectiveness are six governance indicators that are estimated by the World Bank and are used in this study.

An index for the institution is constructed in SPSS using the principal axis factoring technique and its results are checked with the help of KMO test that is used to assess sample adequacy and if sample adequacy is higher than 0.50 or 0.60, the index is considered valid. Results show that the test value is 0.897 which is higher than 0.50 so it is considered suitable to use for estimation. Bartlett's test checks the sphericity and significance indicates that data varies sufficiently for the index making. Another test of total variance shows the variance

explained by the index and the test indicates that the index has made the model 84.35% simple and the fall of efficiency is only 15.65%.

Johnson and Koyama (2017), Ketterer and Rodríguez (2018), Urbano et al. (2019), Čermáková et al. (2020) and Olaoye et al (2020) have examined the impact of institution on economic growth.

4.Estimation and Discussion
4.1 Descriptive statistics

The nature of data is provided in table 1, which is descriptive statistics and traditionally, it is a starting point to look the data before the beginning of the proper analysis. Table (2) indicates the distribution of data and its different aspects such as the number of observations, standard deviation, mean, minimum, maximum and standard deviation.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lngdppc	3551	8.746288	1.553848	5.233868	12.23533
rd	2933	.7080329	.9795556	-6.40862	5.08954
Gov	3599	.1457054	.9984556	-4.05525	4.72156
kfi	3455	57.24894	20.97028	0	98.20197
kip	3455	58.93056	21.48441	0	96.82964
know	3455	64.34437	21.0719	0	98.63644
kcu	3455	52.59363	25.22315	0	99.6895
kpo	3455	62.80123	24.63378	0	98.95037

4.2   Matrix of correlations

The correlation matrix displays the association among different variables and it may have a positive or negative sign. Its range falls between zero to plus one or between zero to minus one. The negative sign indicates reverse relation between two variables and the positive sign shows that the direction of movement is similar and if one variable increases, the other will also increase. Correlation may be weak if the value is low and it will be strong at the time when the value is high.

Table 3 : Matrix of Correlations

Variables	GDP	Research	Governance	Financial	Interpersonal	Knowledge	Cultural	Political
Lngdppc	1.0000							
Rd	0.4982	1.0000						
Gov	0.7816	0.5443	1.0000					

Kfi	0.4598	0.4091	0.5528	1.0000				
Kip	0.8467	0.3641	0.7275	0.4940	1.0000			
Know	0.7381	0.4664	0.6352	0.5572	0.7601	1.0000		
Kcu	0.6691	0.5816	0.6808	0.8039	0.6251	0.7238	1.0000	
Kpo	0.1839	0.4890	0.2692	0.4717	0.0618	0.3971	0.6243	1.0000

4.3 Multicollinearity Diagnostic Criteria

If independent variables become a function of each other and cause to change their coefficients then there is a problem of Multicollinearity and it can be checked theoretically by seeing the construction of functional form and it can also be checked by numerous tests. Table (3) shows that VIF (variance inflation factor) is lower than 10 in all variables and it means that there is no Multicollinearity in this study.

Table (4)

Variables	VIF	1/VIF
Research and development	1.78	0.561239
Governance Indicators Index	2.85	0.350577
Financial Integration	2.89	0.345541
Knowledge Sharing	4.47	0.223560
Interpersonal Globalization	3.44	0.291106
Cultural integration	6.59	0.151639
Political integration	2.67	0.374526

4.4 Results and Discussion

Feasible Generalized least squares (FGLS) is a technique for estimating the impact of independent variables on the dependent variable when there is a correlation between the residuals in a regression model and/or heteroscedasticity. This study first applied Pooled OLS, fixed effect and random effect models but they could not pass through the diagnostic tests of heteroscedasticity because of the different nature of cross-sections so this study has used FGLS hetero to robust it. FGLS heteroscedasticity robust is appropriate when cross-sections are higher than time and all models of this study are also fit for this condition because the number of countries is higher than the number of years. Table (5) summarizes the results of the FGLS test, performed in Stata 14.2.

Table (5): Models

Cross-sectional time-series FGLS regression
Coefficients: generalized least squares
Panels: homoscedastic
Correlation: common AR(1) coefficient for all panels (0.9416), (0.9580), (0.9574)

	Model 1 Developed Countries	Model 2 Developed Countries	Model 3 All Countries
Number of obs	792	2087	2879
Number of groups	33	87	120
Obs per group: Min	24	23	23
Wald chi2(7)	1075.24	1670.87	3682.21
Prob > chi2	0.0000	0.0000	0.0000

Table (6): FGLS Results

Variables	Models 1 Developed Countries	Models 2 Developing Countries	Models 3 All Countries
Research and development	0.1020134 ***	.0383856 **	.1044334 ***
Governance indicators	0.2978312 ***	.1113945 ***	.1707096 ***
Financial integration	0.0044211 ***	-.0006962	.0007245
Knowledge sharing	0.0039296 ***	.0040192 ***	.0034705 ***
Interpersonal globalization	0.0138509 ***	.0273067 ***	.0277134 ***
Constant	7.398425 ***	6.665505 ***	6.479852 ***

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

FGLS results show that research and development expenditure has a positive impact on the growth of the economy of all three specifications. It has a more positive impact on the GDP of developed countries as compared to developing countries. In developed countries, GDPPC increases 0.102 % and in developing countries, it increases by 0.038% by an increase in one percent of research and development expenditure. The rate of increase in developing countries is low because of their low level of research expenditure that hinders them to avail full benefit of research. Le Roux and Moyo (2015) and Svyrydova (2018) have shown similar results.

Governance indicators also have a positive impact on GDPPC of developed and developing economies but its impact on developed countries is again high as compared to developing countries. It shows that well-established institutions Accelerate the growth of the economy more as compared to improvements in weak quality institutions. In this study, the increase in GDPPC of developed countries is 0.29% and developing countries' GDP increases by 0.11% due to one unit improvement in governance index. Following researchers have concluded that institution has positive impacts on the economic growth Yiping et al. (2014), Owusu and Odhiambo (2014).

The free flow of finance across the globe has a positive impact on the economic growth of developed economies as the one-point improvement in the financial integration index leads to increase economic growth by 0.0044% in developed countries but the economic growth of developing economies falls by 0.00069%. Financial integration causes more outflow of finance from the developing countries and their scarce resources become scarcer. The conclusion of Kalemli-Ozcan et al. (2013) and Nasreen et al. (2020) was also the same. Chen and Quang (2014), Asongu (2014), Ahmed and Mmolainyane (2014), Khatun and Bist (2019), Kurniawati (2020) have also drawn a similar conclusion.

The impact of knowledge sharing on the economic growth of developed and developing countries is also positive at a 99 percent significant level but this time, developing countries gain slightly more from knowledge sharing as they are at receiving end. One unit improvement in knowledge sharing leads to an increase in GDP by 0.004% in developing countries and 0.0039 % in developed countries. Baonza (2011), Carmody (2013) has drawn similar results.

Developing countries also gain more in the case of Interpersonal globalization as their GDPPC increases by 0.027 % whereas such increase in developed economies is 0.013%. Interpersonal improvement enables developing economies to learn and earn more.

5. Policy Implications

Estimation results show that financial integration has a positive impact on the economic growth of developed nations but have a negative impact on the economic growth of developing economies where as research and development expenditure, institutions, knowledge sharing, interpersonal globalization have a positive impact on the economic growth of developing and developed economies.

Financial integration is an inevitable phenomenon and developing countries cannot avoid it in near future so basically, there is a need to have a well-established financial system and pass through a certain threshold to have a positive impact of financial integration on economic growth.

Research and development, governance, knowledge sharing cultural and interpersonal integration have a positive impact on the economic growth of developing economies so there is a need to indulge more in such areas as it will boost their economies.

The experience of developed economies is good in the case of all variables so there is a need to go further in the areas of financial integration, knowledge sharing, research and development expenditure, institutions and interpersonal globalization . Such advancement will provide them opportunities to excel their growth.

Interdependence among the countries has increased and it has led the nations to avail the opportunity to enhance their economic growth by cooperating in the form of globalization and integration.

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