AN EMPIRICAL ANALYSIS OF GROWTH DETERMINANTS IN INDIA AND SOUTH KOREA: POSSIBLE LESSONS FOR INDIA

Gulshan Farooq BHAT*
Dr. Sandeep Kaur BHATIA**

Abstract: Since the second half of the twentieth century, most imperative experience in the rise of the global economy had been the upswing of East Asian industrializing countries including South Korea. The spectacular sociopolitical and economic revolution of South Korea in the last few decades made it a development model worth replicable. The study advances the theoretical and empirical research on the role and performances of major sectors and indicators in India and South Korea and to find out the possible lessons for India. The comparative analysis identified that India lags behind as a wide gap emerges between systematic quality, management and development expenditures of various important sectors including Education, R&D and some other correlated sectors including corruption. Korea made an impressive and enormous strides in the fields, especially Capital formation, Manufacturing, Trade mainly exports and Innovation (R&D), controlling red tape, which in turn helped them a great deal in the overall development. The empirical study makes it that Education, Trade, Manufacturing, R&D that augmented the development process in Korea and made it a replicable model, may also prove the same for India if followed sensibly.

Keywords: Economic Development, R&D, Trade, Granger Causality, Cointegration, India, South Korea
JEL Classification: O1, O32, F10, C01, 053.

1. Introduction

The sole aim of any economy is to grow fast in real terms to achieve its targeted goal of inclusive growth and well-being. Return to the basics, it is the individuals that comprise the society as a whole, and thus wellbeing of these individuals determine the prosperity of a nation. So, it is quite natural, that there is an inherent urge and needs to improve for the betterment in every sphere of an individual to be on the path of civilization. While climbing towards the stages of development, one met with numerous constraints, which are the reality of life and success is measured in how one efficiently minimizes these constraints. Similarly, some countries experienced rapid progress which controls their economies in their respective problems. Amongst them are the emerging East Asian Nations popularly known as 'Asian Tigers'; Hong Kong, Singapore, South Korea and Taiwan. Amongst these emerging economies, South Korea's extraordinary inclusive economic growth since the takeoff in the 1960s triggered a hot debate on the grounds behind its economic growth, which make it the model of development worth replicable. Once compared with the poor African countries, today Korea is the modern industrialized economy and a member of the club of prosperous economies - Organization for Economic Cooperation and Development (OECD).

* Gulshan Farooq Bhat, Research Scholar. Email: bhatgulshan60@gmail.com,
**Dr. Sandeep Kaur Bhatia, Assistant Professor. Email: kaursandeep00@gmail.com. Central University of Punjab-Bathinda (India)(Corresponding Author)

The growth success in Korea essentially relied mostly on earlier attention towards education and well-disciplined moral behavior inspired from Confucianism teachings (Kowalski, 2000 and Shek, 2017). Once achieved the well human development through education and health improvements, hence enhanced their labor productivity. Subsequently, attention was diverted toward well-organized industrial sector during its early reforms period while following the standard pattern of advanced industrialized countries aiming at export promotion. Indian economy on the other side is service driven despite tried hard for industrialization and enhancing capacity for manufacturing foundation. Both India and Korea shared some common features at the beginning of their reforms as same growth rates, and per capita income but Korea succeed in pushing up its economic growth and income, utilized US and Japan model, aid and resources in an appropriate manner. Indian reforms start late due to domestic and foreign problems. Conflicts at domestic and wars at the global level with China and Pakistan in the 1940s and 1960s slow down the reforms process and diverted funds towards building the defense and security measures (Singh and Bhangoo, 2014).

Since independence, India initiated several strategies for its economic development process mainly through their several annual and five-year plans. Their development strategy had focused on the organization of socialistic pattern of the society with self-reliance, public justice and eradication of poverty in a democratic political framework of a mixed economy. By some means, the mentioned plans did target some of the sectors to speed up the pace of development. However, the actual outcome has not been on the potential and expected lines. India receives highest remittances from Asian countries to tackle the problem of widespread poverty and inequality. Near about 35 percent Indian emigrants reside in Asian followed by 19 percent in Gulf, 14 percent in North America, 13 percent in Africa and 10 percent in Europe (Kaur, 2015).

The most important reforms came up in 1990 under the Finance Ministry of former Indian Prime Minister, Dr. Manmohan Singh. Since these twenty-five years of reforms per capita income has risen almost 15 times, income has jumped five and a half times with an average growth rate of 6.8 percent which is the second fastest growing economy only after China. During 1991 India happened to be a 17^{th} largest economy regarding GDP, and now it is 6^{th} largest economy surpassing China in growth (Forbes, 2016).

Recently, India launches world's most extensive financial inclusion scheme "Jan Dhan Yojana" to bring banking services to every adult. The same kind of changes had been seen in information communication and technology sectors. But unfortunately, Socio-economic indices reveal the other way round. In India two out of five people are self-employed, and it takes a long month and ten days on average to start a business with endless red tape and corruption discussed on data in detail below. India is ranked 126 on recently published global freedom index as compared to Korea on 27 ranks (Index of Economic Freedom, 2016), and ranks 131 in ease of doing business against Korean rank of 5 which stands even among top five countries (World Bank, 2016). But a considerable jump was seen in World Banks ease of doing business report 2018 in which India improves by 30 points and stands at 100^{th} place (World Bank, 2017). This may offer a wide range of opportunities to entrepreneurs and an indication of successful start-up program ahead and more interestingly will attract FDI from major world economies and at the same time may help 'Make in India' successful. But that is

not enough rather a lot of administrative and sectoral reforms are needed to improve further.

Again Transparency International put India in the red zone in tackling with corruption and was ranked 79/176 with a score of 40 with Brazil and China and called Indian's increasing growth with inequality (Transparency International, 2017). It is unfortunate and harmful for the Indian economy to be on the path of stealth reforms even after two and a half decades of reforms. Since new government under Narender Modi promised with the agenda of development *"Vikas"* formulated major reforms like Jan Dhan Yojana, Make in India and more recently Demonetization drive to curb black money. Not only mere utterance of words or policy will work, instead needs a pragmatic approach under free market largest democracy (Das, 2015).

Mechanically no country can adopt the model of some other country and will expect to grow at the same rate as there are many country-specific problems amid changing global economic policy outlook as well, but still, we can draw some concluding lessons from the rise and fall of nations. IMF too projected high expectations from the emerging and developed markets in the current and next fiscal years of 2017 and 2018 respectively after a plausible outturn in 2016. At the same time, widespread dispersals may come in the realm of the uncertainty of policy changes by US administration, and it's out world implications and consequences. The focus of the study is to find out the policies and other factors contributed to development convergence of Korea and put forward the possible measures to replicate them for other emerging countries like India to stimulate and promote equally rapid growth and development.

2. Literature Survey

Poor economies having the potential to grow will tend to grow faster than that of the richer economies on behalf of low diminishing returns to capital as compared to the developed ones- (Catch-up effect hypothesis). Abramovtiz (1996) emphasis on the call for 'Social Capabilities' to take advantage of catch-up growth. These may take account of ability to absorb the new wave of technology, social norms, civic engagements, and networking, attract foreign capital and investment with the participation in the global market. Sachs (1997) blames closed economy policies responsible as a hindrance in catch-up and can be solved through free trade and openness. Traditional emphasis was on the capital accumulation process which gradually shifted towards 'Market Friendly Approach' (World Bank, 1993) as applied by the South Korean Economy (Fagerberg & Srholec, 2005). The aim is to propose how India as a developing nation may catch-up or converge to the developed economies like South Korea as did so far. This perspective is extremely useful nowadays since developing countries need not only to develop at domestic level but under the strong pressure and competition of globalization. The local and foreign dynamic interaction led us to understand the development experience of such countries. In today's world, generation of new ideas and systems mostly come up with the names of the market mechanism, conditionality, democracy, Poverty Reduction Strategy Papers (PRSP), Sustainable Development Goals (MDGs), international best practices and so on (Ohno, 2006).

The consistent and incredible rates of economic growth and development experience of High Performing Asian Economies (HPAEs) since fifties and sixties have been spectacularly diverse and thus provide very informative lessons. Among them, the

rapid overall and inclusive growth and development of South Korea makes it unique and forces a close study of the comparison of macroeconomic measures. There are perceptive reasons for the comparison of these two economies, which compels us to find out the convergence and divergence of these economies. Both the countries departed from the more or less from the same point and had similar characteristics like government dominance, import substitution strategy and agrarian economies at the beginning of the independence. The GDP growth rates in both countries were more or less the same in 1962, 2.7 percent for India and 2.1 percent for South Korea (Reddy, 2003). However, with the passage of time even within less than forty years, Korea's rate of growth started increasing rapidly at around 9 to 10 percent. At the close of the eighties, its per-capita income in the same 1980 dollars had increased to $2,900 which is an increase of nearly six percent a year and persistent for more than three decades. No country of the time had gone such a speedy progress of transformation in the economic structure. Compared with India, Its per-capita rises from $150 to $230 that is a growth of about one and a half percent per annum within the period of 1950 to 1980. India was viewed as the development malfunction, but over the past few decades, India has achieved more progress and going to be a fast-growing economy as is evidently shown in the comparative analysis of the study. And also claimed by the multinational organizations like World Bank, IMF and many others on analyzing its growing growth path (Crook, 1992).

3. Materials and Methodology

For the empirical relationships, Johansen Cointegration, Vector Error Correction, Granger Causality and Vector Auto Regression have been employed among the variables. Annual time series data for the years 1961-2013 has been used to find out the cointegration and causal relationship among GDP, Trade, Manufacturing, Education, Money Supply and Capital Formation (Investment in infrastructure).

In the Annex, we include some explanations about the Stationary Testing Procedure and VAR estimation used in this study.

4. Comparative Analysis

4.1 Gross Domestic Product and Gross Fixed Capital Formation (% of GDP)

GDP as a major gauge of economic performance, grew at a slower pace in India till 1990 while the Korean economy showed the smooth functioning from the period of reforms during 1960-90 and reached the double-digit growth of 11.49 percent in 1966-70 and 10.44 per cent in 1986-90.

The growth rate of India shows somehow stationary trend till 1990 and gradually started to grow since the 1990s. The growth of India stood higher from 2006 to 2010 at 8.33 percent and lowered in 1971-75 at 2.94 percent. After the global financial crisis of 2008, the Korean growth rate had started declining while India is showing an increasing trend as India got relatively least affected by the said crisis. In 2011-13, India is at the better position than that of the Korea in GDP growth (Figure 3.1). Recently by an American multinational investment banking firm 'Goldman Sachs' present that situation of India resembles with Korea of 1970 when they started their series of reforms (a big push) to boost their economy (Moneycontrol, 2014).

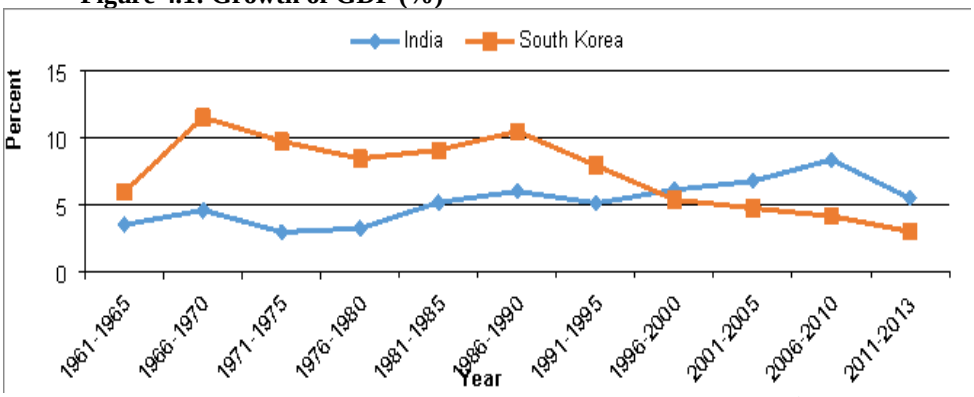
From the foundational perspectives of policy evolution in Korea, the policy had been distinguished broadly into *three stages*: 1) import substitution stage (1954-1960); 2)

outward orientation stage (1961-1979); and 3) balance and stabilization stage (post-1980) (Kim, 1991).

Different instruments and strategies of policies and goals are recognized for each phase. The first period was mostly dedicated by them to the building of physical and human capital infrastructure that serves as the foundational stone for the following industrial development of Korea. The second stage aimed at export based industrialization started through the development of a robust export machines, emphasized mostly on export expansion, which segregates the contribution of different sources of demand to the country's economic growth. Korea had emphasized on the export-oriented economy, which is reflected from the availability of their products at the global level like Samsung, L.G., Hyundai, etc. The oil shocks of 1990 decelerated Korean economic growth, but they managed to grow with the help of exports. The key feature of their rapid growth and miracle was the result of an enormous increase in their international trade. They followed the path of neoclassical growth framework, in which Total Factor Productivity (TFP) and capital stock determine the per capita output. The reduction in the trade barriers facilitates their resources allocation to the most efficient use that enhanced their TFP in the economy through the imports of investment goods, i.e., a technology that led to their increase in the aggregate capital stock (Mu Yi, 2008).

After the reforms period, trade liberalization has shown increased trends in the Indian GDP growth rate and is now ahead of South Korea. Economic Reform Program has been started by the Indian government following the guidelines of IMF and World Bank with some aims and ends keeping in opinion. One among them is the enhancement of the annual growth of GDP through the trade liberalization.

Figure 4.1: Growth of GDP (%)

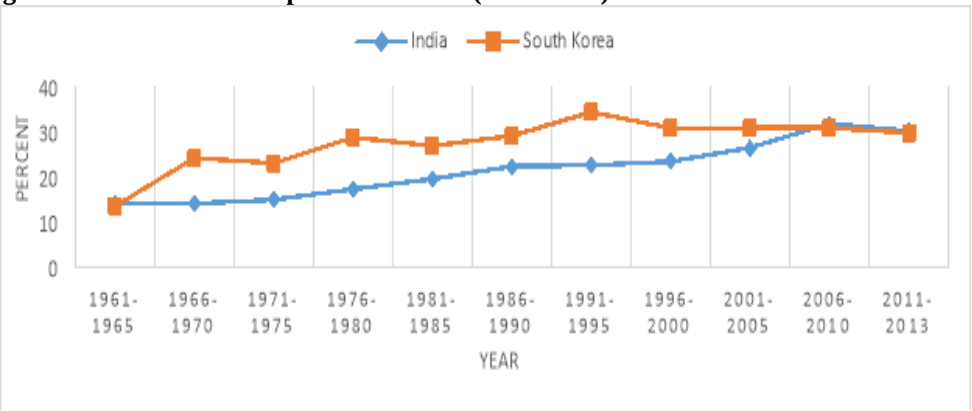


Source: World Bank, World Development Indicators.*Note: Averages of Data are computed for specified period for all figures*

As the Philosophy of comparative advantage states, it is the free trade can increase the GDP of the trading economies. GDP growth of India as depicted in the data is found to be a somehow stationary process. There are still key issues around central vs. state system of government, corruption, black money and tariff barriers that call for addressing. The major socio-economic indicators like Inflation, population growth, scarcity of resources, unemployed youths, and primitive technology in agriculture and over-dependence on agriculture had put a check on the growth rate of

GDP in India. Now, what is needed to sustain the stable growth is to remove the unnecessary bureaucratic controls, take careful measures to integrate Indian with the world economy, remove restrictions on foreign trade and investment, which led South Korea on the fast track and crackdown in public enterprises that yielded meager returns.

Figure 4.2: Gross Fixed Capital Formation (% of GDP)



Source: World Bank, World Development Indicators

Gross fixed capital formation during the initial periods of reforms; 1961-65, grew at a rate of 14.31 percent in India while in Korea 13.51 percent rate was observed. After 1966, India showed a marginal increase while as Korea had jumped with an abrupt increase in capital formation. Throughout 1966-2005, Korea remained ahead of India while after 2005-2013 both stood more or less at the same spot. From this, it can be depicted that at present, India is growing towards the fast-growing economy with gaining momentum in investment activities. As the graph above shows, over the past fifty-two years this indicator reached a maximum of 31.84 percent of GDP during 2006-10, and a minimum of 14.31 during 1966-70.

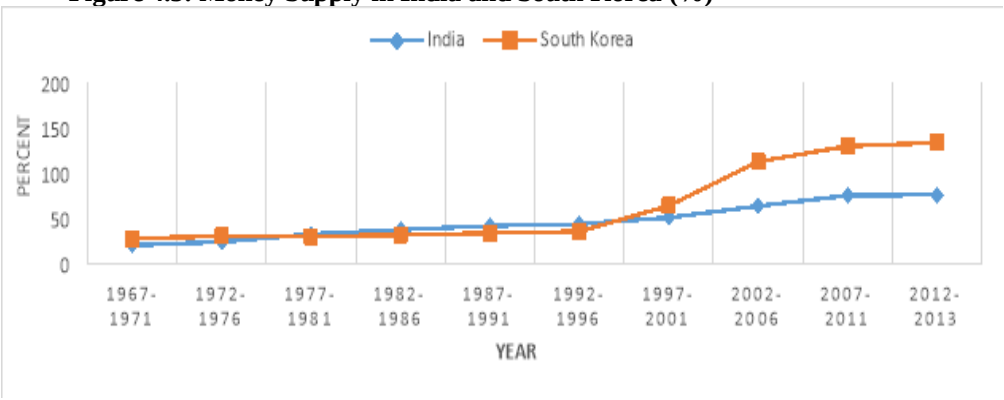
4.2. Money Supply and Inflation

Korea departed with a bit higher money supply during 1967-71 and more or less same from 1992-96 and after that, a wide gap existed between Indian and Korean Money supply, Korea being with higher money supply than that of India since 1996. This depicts the higher capital inflow in Korea with managed Inflation. In Korea money supply is increasing with growing real output, i.e., capital formation depicted from Figure 4.2 accompanied with the low inflation (Figure 4.4). This discloses the economy is growing at a low-interest rate and low inflation which is a good sign of the sound functioning of an economy. While India, having lower money supply than Korea with somewhat more inflation and growing capital formation reveals low capital and FDI inflow.

Keeping in view the adverse effects of inflation on both domestic (price level) and external (exchange rate), Korea put forward many policy measures to tackle with the rising inflation. In fact, it was the inflating targeting (IT) regime which helped Korea to put inflation and other adverse effects in check. Korean outcomes are to be understood

as taking a gradualist approach to inflation targeting by their central bank 'Bank of Korea' (Yang, 2007).

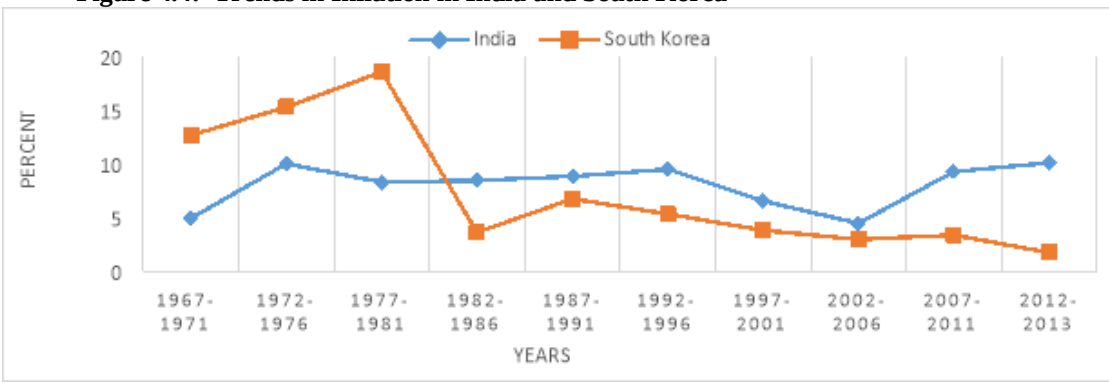
Figure 4.3: Money Supply in India and South Korea (%)



Source: World Bank, World Development Indicators

Korea had succeeded to keep a check on it even though it got more severe inflation earlier. The major advantages of the IT policy as an advocate by the major supporters of the said policy are the accountability and transparency for the policy-making purposes. It helps in placing a quantitative and a stable target horizon. The central banks of the respective countries following IT policy have to publish a regular report on monetary policy that includes banks forecast of inflation and other variables. Flexible IT also helps to monitor in monitoring the other variables as well such as output gap. It had helped a lot to put a check on the volatility of inflation on the countries which adopted it notably New Zealand and Germany (Hammond, 2012). This, as a result, encourages economic activity, manages exchange rate volatility and had been proved as a resilient during the period of financial crisis in some countries. More recently India had also adopted IT of 4 percent with an upper limit of 6 percent and lower limit of 20 percent under monetary policy framework for next five years till March 31, 2021. The results are quite evident that Indian inflation had been under check since then (Economic Times, 2016).

Figure 4.4: Trends in Inflation in India and South Korea



Source: World Bank, World Development Indicators

The issue of inflation in its measurement has always received a lot of attention in India. India mostly measures inflation by Whole Sale Price Index (WPI), while as South

Korea uses Consumer Price Index (CPI). CPI reflects the cost of living at retail prices on which consumer spends a major part of their income while as WPI does not include the price of services. Broad-based CPI accounts both manufacturing and services had a comprehensive role in monetary policy. As it is quite evident from the above data while using CPI and Inflation targeting, Korea had succeeded in controlling the inflation. Trying to adopt international best practices, India had also shifted from WPI to combined CPI measure of inflation for the purpose of policy formulations from 2014 (The Hindu, 2016).

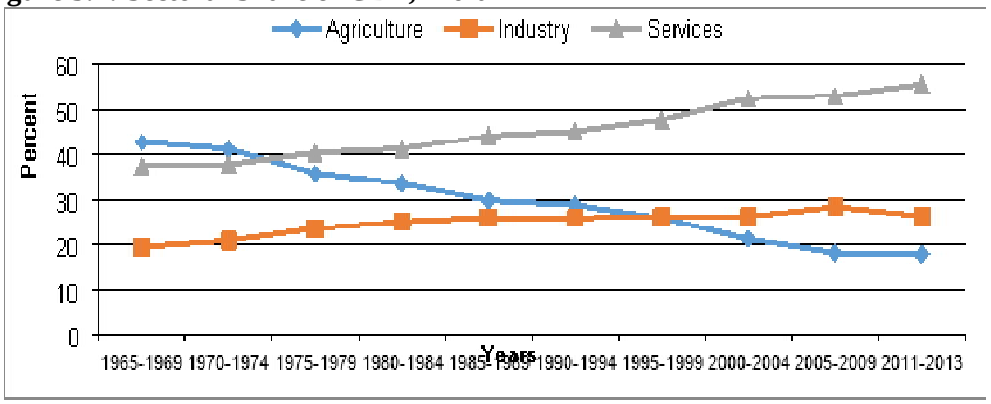
4.3 Structural Transformation

The sectoral share as the percentage of GDP of India and Korea reveals that the share of agriculture goes on declining while as the shares of the rest of the two sectors go on increasing. It is quite natural that whenever a country reaches towards the industrialization, the developmental structure changes. Employment accelerates in a non-agriculture sector which is drained out from agriculture sector depends upon the labor intensity of industrial or service sector.

The contribution of agricultural was higher during the early periods as both economies were the agrarian at the beginning. When it is compared with the industrial and service sectors, agriculture remained the most inactive sector of the economies, especially in the South Korea.

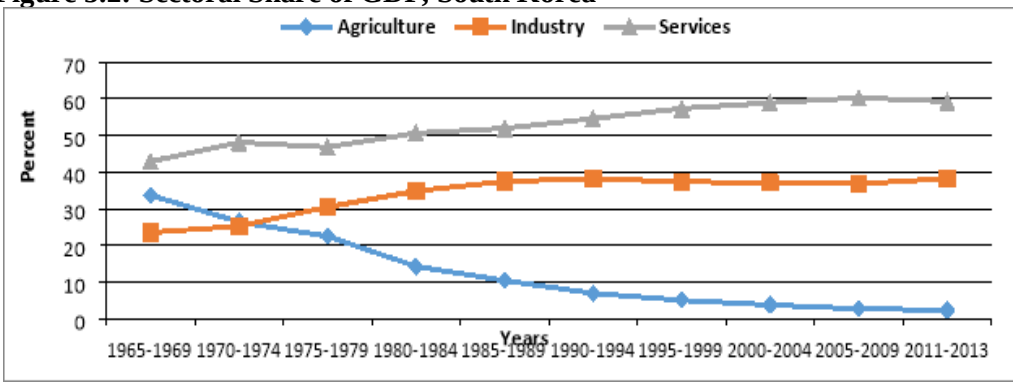
The economic boom in the South Korean economy started earlier in 1963 in which the majority were engaged in agriculture. Sixty-three percent of the population of nations lived in rural areas. As came to know that only agriculture could not bring them on the path of rapid success and development, Korea shifted their focus on industrialization and urbanization. After a short span of time, South Korea grew from a primarily rural agricultural nation into an urban newly industrialized country, and agricultural workforce contracted to only 21 percent in 1989. From the very beginning, since the 1960s South Korea has put economic-development accounts with a growth formulation that focused on heavy-industrial parks and manufactured exports with the triple increase in GDP in just 20 years. It was all because of a massive concentration of South Korea on the export targeted industrial sector that led to achieving a remarkable and sustainable economic growth (Handbook of Korea, 1990).

Figure 5.1: Sectoral Share of GDP, India



Source: World Bank, World Development Indicators.

Figure 5.2: Sectoral Share of GDP, South Korea



Source: World Bank, World Development Indicators.

There was relatively rapid economic growth with an abrupt reduction in inequality and poverty and rapid industrialization in Korea during the last 40-45 years. It has been mostly interlinked with the structural changes, in the 1960s; the share of industry in GDP was 19 percent and that of agriculture 34 percent. Employment share in agriculture has considerably decreased from 34 percent in 1980 to 18 percent in 1990 and only 9 percent in 2003 (World Bank, 2006). The growth strategy of government laid its prominence on industrialization and urbanization, which have steered to more rapid growth of income in urban areas (Kniivila, 2007).

4.4. External Performance

India's trade during the initial period shows the dismal performance as it was the closed economy. Up to 1990, there is a decelerating performance shown in the external performance of India, i.e., in both import and export sectors. The share of imports and exports up to 1990 fluctuate between 5 percent to 7 percent and 3 percent to 6 percent respectively. Many causes stood before such slacken performance for India even after decades of independence.

The persistent low GDP growth of 3.5 percent per annum with per capita income of 1.3 percent annum, phenomena known as "Hindu rate of Economic Growth" which persisted till 1979-80 as there was less trade with the rest of the world followed by the restrictive tariff and quota policies. After 1961-65, the developmental and growth strategies of Korea had surpassed India in every sphere of external performance. Here it is depicted from the data that difference is less in the case of imports whereas difference is much higher in the case of exports. This important question has a relationship with the differences in industrial development.

Guisan, Aguayo and Exposito(2001) analyses the role of industry in World development and state that there is a strong empirical evidence regarding the positive impact of real-value per head of industry, accordingly to Kaldor´s laws, among other factors. We must have into account that Manufacturing per head in South Korea evolved from 5072 to 8378, for the period 2000-2010, while in India evolved from 258 to 430. The average levels in Asia-Pacific were 903 and 1443, and at World level 1491

and 1728, accordingly to Guisan and Exposito(2015) with data measured in Dollars at 2005 prices and purchasing power parities (PPPs).

Table 6.1: Export and Import (% of GDP)

Year	Imports of Goods and Services		Exports of Goods and Services		Manufacturing Exports	
	India	S. Korea	India	S. Korea	India	S. Korea
1961-1965	5.66	15.28	3.90	5.75	35.76	33.84
1966-1970	5.00	23.00	3.86	11.82	50.59	70.72
1971-1975	4.93	29.20	4.40	22.00	51.51	83.04
1976-1980	7.51	31.82	6.34	27.78	57.12	87.76
1981-1985	7.85	32.59	5.75	30.96	54.06	90.91
1986-1990	7.48	27.59	6.07	31.35	68.57	90.91
1991-1995	9.85	25.93	9.41	24.96	73.81	92.75
1996-2000	12.46	30.49	11.11	33.74	75.95	93.09
2001-2005	16.97	32.21	15.57	34.27	74.32	91.37
2006-2010	25.82	42.70	21.42	44.65	64.76	88.28
2011-2012	----	----	----	----	63.50	85.50
2011-2013	29.78	52.22	24.22	55.33	----	----

Source: World Bank, World Development Indicators. *Note: Averages of Data are computed for a specified period, and ---- indicates non-availability of data.*

In 2011-13, the difference stood at 21.11 percent in the case of exports of goods and services, 22.44 percent in the case of imports of goods and services and 22.0 percent in the case of manufactured exports. As stated earlier that during 1960s Korea had shifted their focus from agriculture to industrialization and urbanization.

The most significant factor in rapid industrialization and development in South Korea was the adoption of outward-looking strategy during the early 1960s. Although recently from 2015 India's Current Account Deficit (CAD) has improved due to the inflow of net foreign assets (NFA) but still it is experiencing deteriorating trends due to increased imports and less competitive exports (Mohd and Bhatia, 2016). It can further be improved from a further increase in service exports in which India possess a comparative advantage. In 2016-17 contributed about 3.5 percent at a global level which is twice than that of India's merchandise exports (Kaur, 2011 and Mehta and Mangla, 2017).

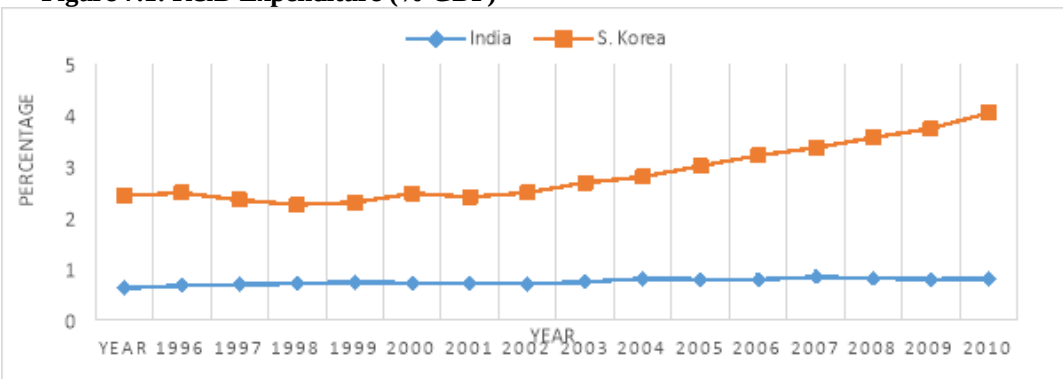
Korean strategy started with the promotion of economic growth through labor-intensive manufactured exports and then gradually towards high technology exports, because of capital and technology inflow. Government as well had played an important role in this process of development. The capital inflow was greatly encouraged to complement the shortage of domestic savings which made the South Korea achieve such a rapid growth in exports and consequent increase in income (A.M & Shaw, 1997). India possesses a comparative advantage in pharmaceutical products (Manisha and Kaur, 2016) and in information technology (Bhan and Bhatia, 2016). India may utilize with appropriate policies and with available technology and resources to

generate sufficient employment and exports to deal with current account deficit problemas and increase in global trade share. Again Indian receives huge remittances from migration, which, if utilized in a desirable manner will lead to poverty reduction, but unfortunately had not been seen so far (Kaur, 2015).

4.5. Research and Development

Korea had given much more importance to the innovative and technological based economy as is depicted from their behavior of investing in R&D activities. Korea pays attention to the development of basic institutions for the adaptation of foreign technology. Among them, the Ministry of Science and Technology (MOST), and the Korean Institute of Science and Technology (KIST), a government R&D facility are dedicated to applied technology. From the very beginning of reforms (1960), Korea made "Science and Technology promotion" their national goal (Campbell, 2012).

Figure 7.1: R&D Expenditure (% GDP)



Source: World Bank, World Development Indicators.

Table 7.2: Corruption and other Measurement Tools

	Measurement Tool	South Korea		India	
		Rank	Score	Rank	Score
Tools of Corruption Measurement	Corruption Perception Index(2016)	52/177	53/100	79/177	40/100
	Bribe Payers Index (2011)	13/28	7.9/10	19/28	7.5/10
	Control of Corruption(2010)	69%	0.42	36%	-0.51
Other Government and development indicators	Rule of Law (2010)	81%	0.98	55%	-0.05
	Voice and Accountability(2010)	69%	0.70	59%	0.42
	Press Freedom Index(2011-12)	44/179	12.67	134/179	58.00
	Judicial Independence index (2010)	69/142	3.8/7	51/142	4.3/7
	Human Development Index(2011)	15/187	0.89 (Very High)	134/187	0.54(Medium)
Measuring Transparency	Open Budget Index(2010)	Significant	71	Significant	67

Source: Transparency International, (Data and Research)

During 1996-2011, India's R&D expenditure to GDP ranges between 0.6 to 0.8, which shows negligible efforts to modernize and attain the pace of developmental activities of Indian economy. On the other hand, Korea having the highest R&D expenditure even among "OECD" countries, had the leading edge in and technology on par with many highly advanced countries like Australia, China, Israel, Japan, New Zealand, Russian Federation, Singapore, UK and the USA. As discussed earlier that R&D had a considerable impact on high tech manufacturing exports as seen from Korea. In the same line Krishan and Bhatia (2017) suggest for greater approval for foreign capital inflows, which are much needed in the enhancing R&D in the manufacturing sector in case of India.

During the 1970s, the emphasis was given to establish capital intensive industries, expanded technical and vocational training and established government labs to conduct R&D, along with an emphasis on the education system. Korea initiated the innovation process with the government sector than gradually provided by the private sector when it came to be compatible. Many research institutes were established with which government took many initiatives to speed up R&D in universities and industries. There is a lack of coordination among seats of the higher learning, i.e. quaternary sector and highest decision-making body, i.e., Quinary sector in India. This was quite evident from recent Demonetization drive by India on 8th of November 2016 for which growth forecast was trimmed by IMF for the current and next financial year from 7.6 to 6.6 percent. This was mainly on the reasons for the slowdown in economic activities and negative consumption by cash shortage and payment disturbances connected with recent cash withdrawal (IMF, 2017).The failure and dismal of administrative and executive performance of India as reflected arises because of the ministers with key portfolios under the heinous scandals. Korea, as compared to India, had got better scores in each and every aspect depicts their well maintained and strict law and order in practice.

5. Estimation Results

In the Annex, we include an analysis of stationarity and cointegration. In this section we present the results of an error correction model (ECM) for India, Granger causality test for India and VAR estimation for South Korea.

5.1. Error correction model for India

The short-run model of error correction is statistically significant with a negative sign. It is one more proof that long run association occurs among the variables used in this study. ECTt-1 coefficient with a negative value which is (-0.0011250) indicates the very high speed of convergence towards equilibrium. ECM contains one period lagged co-integrating equation and the lagged first differences of the endogenous variables.

Table 8.4: Estimates of Error Correction Model (Short Run Causality) (India)

Variable	Coefficient	t-Statistic	Prob.	Remarks
ECT_{t-1}	-0.001250	-2.343225	0.0238**	Significant
D(GDP)	-0.017610	-0.117280	0.9072	Insignificant
D(TR)	-0.003109	-0.477600	0.6354	Insignificant
D(MS)	0.009284	1.293144	0.2029	Insignificant
D(MUF)	0.773828	2.616907	0.0122**	Significant

D(ED)	0.058043	0.997068	0.3243	Insignificant
D(DCPS)	0.016107	1.379974	0.1747	Insignificant
C	0.011423	0.527702	0.6004	Insignificant
R-squared =0.307018 F-statistic =2.721522		Durban-Watson stat = 2.286320 Prob. (F-statistic) = 0.019841		

*Note: '**' indicates the significance of the coefficient at 5 percent.*

The overall result shows a significant presence of an error correction in the equation and its negative sign suggests that at whatever time there is a disequilibrium, GDP regulates towards equilibrium to be restored as market forces both domestic and foreign are in operation. The estimated value of ECTt-1 is -0.001250, indicating the speed of adjustment to long-run equilibrium in response to disequilibrium. Empirical results reveal that manufacturing is significant in short run affecting the GDP, which is also evident from our comparative analysis from the previous chapter. As the manufacturing value added and manufacturing exports grew, GDP also gains momentum. So there is a need to promote the competitiveness of the Indian manufacturing sector at the global level, which is imperative for the sustainable growth, employment generation and the success of the 'MAKE IN INDIA' campaign by eliminating the unnecessary rules and regulations.

5.2. Results of Granger Causality for India

As it is tested before that the data is stationary at first difference and the Cointegration Test has also validated the long-run relationship among GDP, trade, money supply, manufacturing, education and domestic credit to private sector, which is the foremost requirement for the causality test.

Regarding the interpretation of the results, we must have into account some important questions pointed out in Guisan(2015): 1) Accordingly to several studies, Granger´s test of causality is often useful but has some limitations due to multicollinearity, the effects of missing contemporaneous variables and other causes. 2) Another important question, in causality analysis, is the selection of units of measurement of variables because sometimes strong relationships in per capita terms do not hold when the analysis mixes rates of growth and shares.

In this article we find the following results, as seen in table 8.5:

Bidirectional causality exists between:

Money supply and domestic credit to private sector (MS↔DCPS), Money Supply and GDP (MS↔GDP);

Unidirectional causality between:

GDP and Education (GDP→ED), Manufacturing and Education (ED→MUF), Education and Trade (ED→TR), Manufacturing and GDP (MUF→GDP), Manufacturing and Money Supply (MUF→MS), Money Supply and Trade (MS→TR), Manufacturing and Trade Manufacturing (MUF→ TR)

Whereas *no causality* between:

Education and Domestic Credit to Private Sector (ED≠ DCPS), GDP and Domestic Credit to Private Sector (GDP ≠ DCPS), Manufacturing and Domestic Credit to Private Sector (MUF≠ DCPS), Trade and Domestic Credit to Private Sector (TR ≠ DCPS),

Money Supply and Education (MS ≠ EDU), Trade and GDP (TR ≠ GDP) presented in the table below.

Table 8.5: Results of Granger Causality Test. (India)

Null Hypothesis	F-Statistic	Prob.	Remarks
ED does not Granger Cause DCPS	1.01900	0.3690	
DCPS does not Granger Cause ED	0.57504	0.5667	None
GDP does not Granger Cause DCPS	0.96644	0.3880	
DCPS does not Granger Cause GDP	1.89417	0.1620	None
MS does not Granger Cause DCPS	3.25433	0.0477*	
DCPS does not Granger Cause MS	12.5969	4.E-05*	Bidirectional
MUF does not Granger Cause DCPS	1.67845	0.1979	
DCPS does not Granger Cause MUF	0.58250	0.5626	None
TR does not Granger Cause DCPS	1.27657	0.2887	
DCPS does not Granger Cause TR	0.23536	0.7912	None
GDP does not Granger Cause ED	3.26043	0.0474*	
ED does not Granger Cause GDP	0.32255	0.7259	Unidirectional
MS does not Granger Cause ED	1.71984	0.1904	
ED does not Granger Cause MS	1.24210	0.2983	None
MUF does not Granger Cause ED	1.67640	0.1983	
ED does not Granger Cause MUF	2.58363	0.0864**	Unidirectional
TR does not Granger Cause ED	0.23051	0.7950	
ED does not Granger Cause TR	2.82166	0.0698**	Unidirectional
MS does not Granger Cause GDP	5.74352	0.0059*	
GDP does not Granger Cause MS	3.44238	0.0404*	Bidirectional
MUF does not Granger Cause GDP	5.87699	0.0053*	
GDP does not Granger Cause MUF	0.56273	0.5735	Unidirectional
TR does not Granger Cause GDP	1.25454	0.2948	
GDP does not Granger Cause TR	0.79110	0.4594	None
MUF does not Granger Cause MS	4.84344	0.0123*	
MS does not Granger Cause MUF	2.34423	0.1073**	Bidirectional
TR does not Granger Cause MS	0.56831	0.5704	
MS does not Granger Cause TR	4.32825	0.0190*	Unidirectional
TR does not Granger Cause MUF	0.95760	0.3913	
MUF does not Granger Cause TR	3.51251	0.0381*	Unidirectional

Note: '*and '' indicates rejection of null hypothesis at 5 and 10 percent level of significance respectively.** GDP is Gross domestic product at current prices in US $, ED = Education, TR = Trade as percentage of GDP, DCPS = Domestic Credit to Private Sector, MUF = Manufacturing Value Added, MS = Money, and quasi-money (M2) as percentage of GDP

The results found in the comparative analysis bear a resemblance to the outcomes of the empirical analysis, as the graph of the money supply, GDP and capital formation moves along the same way, reveals the close association among these variables and is

also shown through casualty test. The findings have an important policy implication for India as the above variables having an important economic impact. There is a need to manage the money supply with the adequate inflation that affects most of the variables. The conclusion drawn from the analysis could be useful for the education policy makers to invest in education and R&D that had an impact on trade and manufacturing, which are the pivot of the economy to lead on the path of an advanced level of development as seen in the case of Korea.

5.3. Estimation Results for Korea

Vector Auto Regression (VAR) model has been applied for Korea.

Table 8.6: Results of Vector Auto Regression (VAR) (Korea)

Dependent / Independent	GDP	EDUCATION	Domestic Credit to Private Sector	MONEY SUPPLY	MANU FACTURING	TRADE
GDP	0.2488 (0.2488) [0.1389]	0.2283 (0.3524) [0.7248]	5.4702 (0.7159) [0.4747]	-6.2638 (0.6632) [0.5078]	-0.0539 (-0.4982) [0.6187	-4.1415 (0.5113) [0.6095
EDU	-0.0000 (-0.0138) [0.9890]	-0.5051 (3.8274) [0.0002]	-0.54335 (-0.3490) [0.7273]	-0.06438 (0.0334) [0.9733]	-0.0048 (-0.2185) [0.8272]	-0.0314 (0.0190) [0.9848]
DCPS	-0.0170 (-2.89554) [0.0041]	0.00450 (0.1978) [0.8433]	0.21810 (0.8125) [0.4172]	0.18990 (0.5723) [0.5676]	-0.0052 (-1.3816) [0.1682]	0.0920 (0.3234) [0.7466]
MS	0.01562 (3.0789) [0.0023]	-0.0038 (0.1952) [0.8453]	0.1695 (0.7331) [0.4641]	0.0638 (0.2231) [0.8234]	0.00548 (1.6734) [0.0954]	-0.2297 (0.9344) [0.3509]
MUF	0.1021 (0.3883) [0.6981]	-0.3614 (0.3556) [0.7225]	5.5331 (0.4613) [0.6449	11.6712 (0.7878) [0.4318]	0.2365 (1.3927) [0.1649]	4.2010 (0.3376) [0.7411]
TR	-0.0008 (-0.8042) [0.4218]	0.0008 (0.2304) [0.8179]	0.011421 (0.2508) [0.8021]	0.0431 (0.7662) [0.4441]	-0.001784 (-2.7658) [0.0061]	0.9735 (20.1886) [0.0000]
C	0.1305 (1.6996) [0.0904]	0.0065 (0.0222) [0.9823]	-0.5107 (-0.1459) [0.8841]	-1.3911 (0.3217) [0.7480]	0.1594 (4.0255) [0.0001]	3.4158 (0.9272) [0.3575]

Note: Values in Parenthesis are T-statistics and in Square Bracket are of Probability

The findings from the South Korea displays that GDP is enhanced by the capital formation and money supply as it has also been shown in comparative analysis that GDP and domestic credit to private sector go through the more or less same way, it also supports the results of the study made by Khan, Batool and Sarwar (2013) that trade causes GDP to grow in South Korea. Also, Education had an important impact on the further betterment in education investment as concluded from the comparison with India. The findings of Maksymenko and Rabbani (2009), Khan and Sarwar (2013) and Kuznets (1988) also supports the positive effects of human capital and education enhancement and trade openness on GDP growth in South Korea. Finally, the manufacturing is affected by the money supply and trade openness. From the very beginning, it has been analyzed that the Korean success had been mostly by Education, Manufacturing, and Trade that paved their way towards opportunities for exploitation of the global market. Furthermore, the results made by Park (2012) proposes that it was the strong manufacturing sector that maintained the health of the South Korean

economy to compete globally and that helped the South Korea to get least affected by the 2008 Global meltdown.

6. Conclusion.

Korea's heavy and chemical industries promotion plan is well documented in revealing the intent of government to achieve economic growth and international competitiveness. The lessons which to implement mostly deal with the structural areas extraordinarily well-organized industries, strong governance, and leadership to make sure initial conditions such as reliable infrastructure, education, information technology and R&D.

These types of government support are either limited or missing in other Asian countries like India. As it has been argued by many scholars like Ohno (2006) and Kuznets (1988) that in a globalized dynamic world of competitiveness, the role of government is very important for industrial facilities and policies. It paves the way for the vibrant private sector through qualified human resources, incentives for the R&D investment with proper infrastructure. Probably South Korea has done this considerably in a proper manner while the India is still stuck in the middle-income trap. While summarizing it well "Liberalization and External Integration" might bring middle income, but still, more could be done with the building of industrial skills through vocational training that will be efficient logistic and support industries.

India needs to take the trade and industrial measures to the next level; there is an urgent need to boost its industrial production, i.e., manufacturing with export promotion as a primary objective, placing fiscal deficit in check with macroeconomic stability. Reduction of crowding out of private investment rather encourage the private investment, something that South Korea has successfully done so far. Investment growth is accelerating in India, had been well over twenty percent for two decades (Das, 2015). Still, the country is not able to transform its society. Early lack of foundational policies rather chooses inward-looking, denying itself to world market opportunities, inefficient and overregulated (license raj) monopoly public enterprises which discouraged competition in the market. Furthermore denied foreign investment and flow of foreign capital and technology in which Korea took the lead and had already a negligible share in R&D expenditure. And most importantly India ignored education particularly to the girls in which Korea had a leading edge from the very beginning (Das, 2015).

Analysts point out that if India would emulate the Korean model and the manufacturing will grow at the same rate as did Korea in the 1970s and 1980s then India could add 1.4 percentage points to its GDP growth annually for the next decade. Mostly manufacturing was encouraged by the cheap labor and infrastructure through industrial parks, reducing red tape and the cost of doing business with tax benefits and flexible labor laws. The power supply to industries was provided at cheaper than that of consumers.

The Korean experience shows that initiation of the development process is devoted to the building of physical and human capital infrastructure that serves as the foundational stone for the subsequent industrial development of Korea. That single-minded focus on manufacturing was missing in case of India. As examined by Kaur and Nanda (2011)

among emerging SAARC nations India had great export potential especially for Maldives, Bhutan, Pakistan and Nepal and had the comparative advantage of sharing a land border with four of SAARC nations and sea border with two of them. India may have many gains from trade with these emerging Asian giants and subsequently with rest of the world.

The empirical results using co-integration, error-correction estimation, and Granger causality indicate that the variables were taken, in one way or other had an impact on each other throughout the short-run and long-run. The results found in the comparative analysis bear a resemblance to the outcomes of the empirical study, as the graph of the money supply, GDP and capital formation moves along the same way, reveals the close association among these variables and is also shown through casualty test.

The findings have an important policy implication for India as the above variables having a significant economic impact. There is a need to manage the money supply with the adequate inflation that affects most of the variables. The conclusion drawn from the analysis could be useful for the education policymakers to invest in education and R&D that had an impact on trade and manufacturing. And supplies trained labor force for the successful implementation and adaptation of imported technology, which are the pivot of the economy to lead on the path of an advanced level of development as seen in the case of South Korea, supported by (Fisher, 2002) as well.

To emphasise it can be observed that the purpose of the government intervention is entirely different in the case of Korea, it was to support or make companies to become internationally competitive and productive. The other developing countries like India, mostly government intervention involved rent-seeking activities, other social problems, and nepotism. There exists the lack of export promotion or targets or pressuring of performance standards in socio-economic sectors.

The empirical study makes it that Education, Trade, Manufacturing, R&D and, of course, government's pivotal role that augmented the development process in Korea and made it a replicable model, may also prove the same for India if followed sensibly to attain the path of convergence.

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Annex to section 3. Methodology

3.1.1 Stationary Testing Procedure

Before applying cointegration, there is need to check whether the data is stationary or non-stationary and for that purpose, the Augmented Dickey-Fuller (ADF) test, proposed by Dickey and Fuller (1979) is applied to the data**.**

Johansen's (1991) multivariate cointegration test has been used to find the long-run relationship among the selected variables. In the VAR of order ρ, its initial point is given by the following;

$$x_t = \pi + \prod_1 x_{t-1} + \prod_2 x_{t-2} + \ldots\ldots + \prod_p x_{t-p} + v_t \ldots\ldots (3.2)$$

In equation (3.2) $x_t = (GDP_t, TR_t, MS_t, MUF_t, EDU_t, CF_t)$ and is a $6X1$ vector of variables, which is integrated of order one, i.e. I (1) and v_t is a $6X1$ matrix of error terms, while as $\prod_1$ through $\prod_p$ are $6X6$ coefficient matrices and π is a constant term.

Vector Error Correction Model focus on the dynamics of short-run of the endogenous variables. At least if one of the cointegrating vectors is found among the variables, there is always an equating error correction representation, which brings about that changes in the dependent variable can be framed as a function of the variations occur in the rest explanatory variables (Yang, 2011). The general construction of the error correction model system is as follows:

$$\Delta X_t = \alpha + \beta_0 \Delta X_{t-1} + \beta_1 ECT_{t-1} + v_t \ldots\ldots (3.3)$$

The first difference is represented by Δ, v_t is random error and ECT is the error correction term, measures the speed of correcting prior deviations from equilibrium.

$$\Delta GDP_t = a_0 + \sum_{i=1}^{c} \beta_{1,i} \Delta GDP_{t-i} + \sum_{i=1}^{d} \beta_{2,i} \Delta TR_{t-i} + \sum_{i=1}^{e} \beta_{3,i} \Delta MS_{t-i} + \sum_{i=1}^{f} \beta_{4,i} \Delta MUF_{t-i} + \sum_{i=1}^{g} \beta_{5,i} \Delta EDU_{t-i} + \sum_{i=1}^{h} \beta_{6,i} \Delta DCPS_{t-i} + \pi_1 ECT_{t-1} + v_{1t} \ldots\ldots (3.3.1)$$

Whereas Δ is lag operative, estimated coefficients are $\alpha_0, \beta's$ while, c, d, e, f, g, h are the optimal lags of the series gross domestic product (GDP), openness i ndex (TR), money supply (MS), manufacturing (MUF), education (EDU), and domestic credit to private sector $(DCPS)$. As, v_{1t} being uncorrelated random error terms, π_1 measures the dependent variables single period response to deviate from equilibrium.

$$ECT_{t-1} = GDP_{t-1} - \beta_1 GDP - \beta_2 Trade - \beta_3 MS - \beta_4 MUF - \beta_5 EDU - \beta_6 DCPS$$

Where, ECT_{t-1} is the error correction derived from the long-run cointegration equation.

3.1.2 Vector Auto Regression (VAR): VAR (p) Model has been applied in the case of Korea.

$$Y_t = A + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \ldots + \beta_p Y_{t-p} + \varepsilon_t \ldots\ldots\ldots (4.1)$$

Y_t represents Gross Domestic Product (GDP).

$$GDP_t = A + \beta_1 GDP_{t-1} + \beta_2 GDP_{t-2} + ... + \beta_p GDP_{t-p+} \varepsilon_t \quad \text{..... (4.2)}$$

The one periods back observation GDP_{t-1} is the 1th lag of GDP,
A = n × 1 vector of constants (intercepts)
β, = time-invariant n× n matrix and
ε_t = n × 1 vector of error terms, called impulse or innovations or shocks in the language of VAR.

Annex to section 5. Results

The ADF test results display that all the variables at their respective levels are non-stationary at 5 percent critical value. The number of augmenting lags (p's) are determined by minimizing, according to of Schwartz Bayesian Information Criterion.

Table 8.1: Results of Augmented Dickey-Fuller (ADF) Test (India)

Variables	t-Statistic	Critical Values at 5%	Prob.	Remarks
At Level				
GDP	0.381987	-2.918778	0.9803	Non-Stationary
Trade	1.018295	-2.918778	0.9963	Non-Stationary
Money Supply	0.852615	-2.919952	0.9940	Non-Stationary
Manufacturing	0.263713	-2.919952	0.9740	Non-Stationary
Education	-1.812895	-2.918778	0.3704	Non-Stationary
Domestic Credit to Private Sector	-0.511589	-2.921175	0.8800	Non-Stationary
At First Difference				
∆GDP	-6.545174	-2.919952	0.0000	Stationary
∆Trade	-7.396220	-2.919952	0.0000	Stationary
∆Money Supply	-4.677257	-2.919952	0.0004	Stationary
∆Manufacturing	-4.578160	-2.919952	0.0005	Stationary
∆Education	-6.560170	-2.921175	0.0000	Stationary
∆ Domestic Credit to Private Sector	-2.877596	-2.598551	0.0552***	Stationary

Source: Author's Results. '***' indicates Domestic Credit to Private Sector is stationary at 10 percent level.

From the result, the null hypotheses (unit root) for all variables are accepted as the absolute values of the test statistic are less than their respective critical values at level. While at first difference, the null hypotheses (unit root) are rejected as the absolute values of all the test statistics are greater than their critical values at 5 percent significance level. However, for the Domestic Credit to Private Sector, the critical value is taken at 10 percent level of significance. Thus, we accept all the alternative hypothesizes (i.e. there is no unit root). Meaning that all variables are stationary at first difference. All variables appear to be integrated at first difference, or the series are I (1). It is seen that all the variables are stationary at first differences, hence integrated of order one I (1).

8.1.2 Cointegration Analysis

Engle–Granger test is most acceptable in the case of two variables, while Johansen co-integration test is used in case of multivariate or more than two variables.

Table 8.2: Results of Johansen Cointegration Test -Trace Statistic (India)

No. of Cointegrated Equations		Eigen Value	Trace Statistic	0.05 Critical Value	Prob.**
Null Hypothesis	**Alternate Hypothesis**				
r = 0*	r ≥ 1	0.651543	123.0495	95.75366	0.0002
r ≤ 1	r ≥ 2	0.419455	69.28329	69.81889	0.0551
r ≤ 2	r ≥ 3	0.328290	41.55007	47.85613	0.1717
r ≤ 3	r ≥ 4	0.239810	21.25574	29.79707	0.3419
r ≤ 4	r ≥ 5	0.118478	7.272238	15.49471	0.5462
r ≤ 5	r= 6	0.016352	0.840844	3.841466	0.3592

Note: '' indicate the rejection of Null Hypothesis at 5 percent significance level*

Table 8.3: Results of Johansen Cointegration Test - Max Eigen Statistics (India)

No. of Co-integrated Equations		Eigen Value	Max Eigen Statistic	0.05 Critical Value	Prob.**
Null Hypothesis	Alternate Hypothesis				
r = 0*	r ≥ 1	0.651543	53.76625	40.07757	0.0008
r ≤ 1	r ≥ 2	0.419455	27.73322	33.87687	0.2261
r ≤ 2	r ≥ 3	0.328290	20.29433	27.58434	0.3211
r ≤ 3	r ≥ 4	0.239810	13.98350	21.13162	0.3664
r ≤ 4	r ≥ 5	0.118478	6.431394	14.26460	0.5585
r ≤ 5	r =6	0.016352	0.840844	3.841466	0.3592

Note: '' indicate the rejection of Null Hypothesis at 5 percent significance level*

Johansen Multivariate co-integration put forward two statistics: Max Eigen Statistics and Trace statistic to know the co-integrated vector amongst the multivariate system. (Johansen, 1988; Johansen and Juselius, 1990).

Table 8.2 and 8.3 presents the trace statistic and Eigen statistics. The first null hypothesis for both the test statistics is that there is no co-integrating vector against the alternative hypothesis that there is one co-integrating vector in the series. Similarly, for equation second, the null hypothesis is at most one co-integrating equation against the alternative hypothesis at most two or more co-integrating equations. Similarly, there are null hypothesizes $r \leq 2$, $r \leq 3$, $r \leq 4$, $r \leq 5$ and $r = 6$ against their alternative $r \geq 3$, $r \geq 4$, $r \geq 5$, and $r = 6$ which means that there may be at most five cointegrating vectors out of seven co-integrating equations. The null hypothesis is rejected when the absolute value of Trace statistic or Maximum Eigenvalue statistic is less than the critical value at 5 per cent. Here both the statistics determine that there is only one co-integrated equation in the system. The co-integration test is sensitive to the lag length criteria. Both the Trace statistics and Max-Eigen statistics indicate the presence of one co-integrated vector at 5 per cent level of significance. Hence, one Co-integration equation is considered based on the results of trace statistics and Max Eigen statistics which determined that there is a stable long-run relationship among the variables.