Determinants of Trade and FDI flows in the BRICS countries – Evidences from Gravity Model Analysis

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Submitted by

SABINA LASKAR

413HS1010

Under the Supervision of
Dr. Bikash Ranjan Mishra
Department of Humanities and Social Sciences

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA
SUNDARGARH, ODISHA – 769008

CERTIFICATE

It is certified that the work contained in the thesis entitled "Determinants of Trade and FDI flows in the BRICS countries – Evidences from Gravity Model Analysis", by Sabina Laskar, has been carried out under my supervision and that this work has not been submitted elsewhere for any degree.

Signature of Project Supervisor

Dr. Bikash Ranjan Mishra
Department of Humanities and Social Sciences
National Institute Of Technology, Rourkela.

DATE: _____ 2015

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Sabina Laskar (413HS1010)
Department Of Humanities and Social Sciences,
National Institute Of Technology, Rourkela
Odisha – 769008

ABSTRACT

In the recent days, some of the key developing countries like; Brazil, Russia, India, China and South Africa (BRICS) have been emerging as major destinations for Foreign Direct Investment (FDI) inflows and Trade inflows. The present study focuses on the factors responsible for trade and FDI flows in the BRICS countries using annual dataset from the period 2008 to 2012. The main objective of this research is to evaluate the determinants of Trade and FDI flows in the BRICS using the Gravity Model. A Panel data set-up is constructed and used to estimate the determinants and evaluate the empirical results. There are two-fold dependent variables in the present study, such as: Trade and FDI flows. Both are analysed independently in two different sections. The independent variables are Gross Domestic Product (GDP), GDP growth rate, distance between host and source countries, commonness in terms of language and border between the pair of countries and population of the host country and these data are collected from World Bank, UNCTAD, CEPII and UN-Comtrade database. The results reveal that the bilateral trade and FDI flows are positively linked with the market size and negatively with the distance between the pair countries.

KEY WORDS: BRICS, Trade flows, FDI flows and Gravity Model.

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CHAPTER – I
INTRODUCTION

1.1 **Motivation behind the study**

Trade and FDI continues to be the two major drivers of BRICS economies. In this study, these two factors are taken into account as they are impressively contributing for the growth and development of their respective host nations. The increase in direct investment flows has laid to the foundation for a dramatic expansion of international trade and production by transnational corporations[1]. The value of sales by these foreign affiliates has increased more rapidly than that of foreign trade (world exports).While FDI represents investment in production facilities, its importance for developing nations is much greater as it adds to the nations capital stock and promotes capital formation. In addition, FDI plays a significant role leading to long-term competitiveness and sustainable growth of the host countries. There are evidences of reports and articles about the Trade flows in the BRICS countries, which is the main factor in stimulating a nation's economic growth. From a recent statistics, it has been found that, Russia and China remain the most export oriented among the other member nations, followed by South Africa, India and Brazil. China has now become the leading exporting country in the world dominating Germany (2^{nd}) and US (3^{rd}). Apart from China, Russia ranked 8^{th} in the world with exports amounting to $536bn – is the only other BRICS country high on the list of top exporters. Now the main aim is to track whether the pattern and trends in bilateral and intra-regional trade of the BRICS economies are identical or whether they have varied in a wider sense till date.

BRICS countries are becoming increasingly attractive destinations from the past few decades; the main reason being that they can offer investors with a wide range of "Created assets". A paper by Goldman Sach's in 2003 – Dreaming with BRICS: The path to 2050 predicted that over the next 50 years, the BRICS could become a major force in the world economy. The following predictions were supported by the emerging dynamics over the last decade. It is seen that with share of a little over 10% in the world GDP and less than 4% in the world trade (1990), BRICS (with inclusion of South Africa) now accounts for 25% of the world GDP and 15% of the world trade.

[1] Transnational Corporations – It is a company that operates in at least 2 countries. The Headquarters is generally located in the country that the corporation was founded in while remaining assets, mainly the manufacturing plants are located in LEDC's where labour is cheap and readily available ()

1.2 Introduction to the BRICS

The BRIC acronym, which stands for Brazil, Russia, India and China was originated in a Goldman Sach's Paper (2001) – "Building Better Global Economic" BRICS[2] – as part of an economic modelling exercise to forecast global economic trends over the next half century. The acronym today is much more representative than an investment narrative alone. With the inclusion of South Africa, BRIC became BRICS, giving a pluralist and inclusive veneer to an economic idea. Another paper by Goldman Sach's in 2003- "Dreaming with BRIC's: The Path to 2050- concretised the earlier findings. It predicted that over the next 50 years, the BRIC economies could become a major force in the world economy and that by 2050 the only industrialised / developed economies among the six largest global economies would be the US and Japan in US dollar terms.

As of 2014, the BRICS countries represent that almost 3 billion people which is 40% of the world population, with a combined nominal GDP of US $16.039 trillion (20% world GDP) and an estimated US $4 trillion in combined foreign reserves. This reflected that the BRIC's nation's represented 18% of the world economy.

In addition, all the BRICS countries are now members of major international and multilateral institutions such as World Trade Organisation, The UN, The Group of 20(G-20) and the UN framework Convention on Climate Change and are active participants therein. Various other indicators as trends in inflows and outflows of FDI[3], trade openness, current account balance, forex reserves and economically active labour forces, are important that could make BRICS a formidable force to reckon with in future.

1.2.1 Origin and formalisation

The idea of BRIC was coined by Goldman Sach's in a paper "as part of an economic modelling exercise to forecast global economic trends over the next half century. The main finding was that BRICS would play an increasingly important role in the global economy. In less than 40 years, the BRICS economies together could be larger than the Group of Six (G-6) in US dollar terms. By 2025, their size could be over half the size of the G-6. A study also predicted that by

[2] BRICS – It refers to an acronym that refers to the economies of Brazil, Russia, India, and China which are seen as major developing economies of the world.

[3] FDI – According to the IMF (International Monetary Fund) FDI refers to an "investment made to acquire lasting or long term interest in enterprises operating outside of the economy of the investor".

2050, only the US and Japan of the current industrialised countries could remain among the 6th largest economies in US dollar terms.

The move towards formalisation of the group was concretised when the BRIC leaders held their first summit on 16th June 2009 in Yekaterinburg, Russia calling for a more democratic and multipolar world based on the rule of International law, equality, mutual respect, cooperation, coordinated action and collective decision making of all states. Since then annual summits have been held in each of the remaining BRIC countries with the last one being held in India. The inclusion of South Africa into the group expanded the acronym to BRICS in 2010 and since then the new acronym has symbolised the collective economic power of Brazil, Russia, India, China and South Africa.

TABLE 1: BRICS Summits

Overarching theme: BRICS Partnership for Global Stability, Security and Prosperity

Summit	Participants	Date	Location
1st	BRIC (Brazil, Russia, India and China)	16 June 2009	Yekaterinburg, Russia
2nd	BRIC(Brazil, Russia, India and China)	16 April 2010	Brasilia, Brazil
3rd	BRICS(Brazil, Russia, India and China)	14 April 2011	Sanya, China
4th	BRICS(Brazil, Russia, India and China)	29 March 2012	New Delhi, India
5th	BRICS(Brazil, Russia, India and China)	26-27 March 2013	South Africa
6th	BRICS(Brazil, Russia, India and China)	14-16 July 2014	Brazil
7th	BRICS(Brazil, Russia, India and China)	2015	Russia

Source: New Delhi BRICS 2012, http://www.bricsindia.in

BRICS importance in the world economy

Before carrying out any discussions about the BRICS it is an essential and important requisite to understand, where the BRICS stands in the world economy. The growing importance for the world economy is reflected by various economic and demographic indicators. These include

but are not limited to, their increasing share in world GDP, share in World Trade, Trade openness, and increasing forex reserves; and their FDI inflows and outflows.

Regional/Common market and share in global GDP0

The BRICS economies, if viewed collectively over the last two decades, have emerged as a force to be reckoned with. This is duly reflected by the increasing share of BRICS in the world GDP. From a share of a little over 10% of the world GDP in 1990, BRICS now commands a share of more than 25%. This implies that the economic size of BRICS in terms of its share in world GDP expanded by 150% in the two decade periods.

TABLE 2: Share of global GDP (1991-2014)

COUNTRY	RANK IN WORLD	GDP(PPP bn)	GDP ($ bn)		SHARE IN WORLD GDP (%)		PER CAPITA GDP ($)	
			1990	2010	1990	2010	1990	2010
BRAZIL	8	2,172	508	2,090	3.3	2.9	3,464	10,816
RUSSIA	6	2,223	-	1,465	-	3	-	10,437
INDIA	4	4,060	326	1,538	3.1	5.4	378	1,265
CHINA	2	10,086	390	5,878	3.9	13.6	341	4,382
SOUTH AFRICA	26	524	112	357	0.9	0.7	5,456	7,158

Source: IMF database, adopted from The BRICS Report 2012. India Oxford University Press 2012.

Share in Global Trade

As in the case of their share in world GDP, the BRICS share in world trade has also improved significantly over the last 2 decades from 3.6 % to over 15%. The primary contribution to this in terms of value has come from China whose share has increased from less than 2% to over 9%. This is however not to argue that other BRICS countries have not contributed. Their shares have also increased, with Brazil's share rising from 0.8% to 1.2%; Russia's from 1.5% to 2.3% and India's from 0.5% to 1.8%. South Africa is the only country in the group whose share in world trade has remained constant over the last two decades.

Trade appears to have played a significant role in boosting the economic growth prospects of these countries. There is evidence to suggest that trade liberalisation has been seen and used as a tool for promoting economic growth and facilitating development in all the BRIC's countries.

In relation to a better understanding of the relation of BRICS economies with the rest of the world we construct a table that shows the global integration of BRICS economies with the rest of the world (in figures).

TABLE 3: GLOBAL INTEGRATION OF BRICS ECONOMIES

INDICATORS	YEAR	BRICS countries				
		BRAZIL	RUSSIA	INDIA	CHINA	SOUTH AFRICA
Trade Openness	1991	6.9	-	6.9	17.4	24.3
	2014	11.2	30.3	21.7	29.5	27.9
Current Account Balance (% OF GDP)	1991	0.8	-	-1.2	1.3	1.4
	2014	-2.3	4.9	-3.2	5.2	-2.8
Forex Reserves (% OF GDP)	1991	1.5	0	0.5	7.6	0.9
	2014	13.7	30.4	18	48.8	10.7
External Debt ($ bn)	1991	119.7	-	85.7	55.3	23.3
	2014	276.9	381.3	237.7	428.4	42.1
Debt service ratio	1991	22.5	4.4	34.9	11.7	-
	2014	23.4	17.7	5.9	2.9	9.3

Source: IMF, UNCTAD & World Bank, adapted from The BRICS Report 2012, India Oxford University Press 2012.

Importance of trade and investment in BRICS development - A Preliminary View

BRIC creation and subsequent accession of South Africa (2011) forming the new BRICS generated both quantitative and qualitative research. Most researchers believe that there is a close relationship between trade and FDI. Moreover empirical studies have confined each time that FDI and foreign trade are complementary. In other words, a significant increase of the international investment flows often leads to an ascending trend of the trade flows. These two defining components were at the foundation of progress and economic growth of "Asian tigers" and the BRICS economies too. According to recent estimates referring to the five emerging powers, the positive relationship between FDI and trade volume

implies that countries which wanted more FDI flows have created the necessary condition to attract them and in the same time, have increased commercial flows with the rest of the world.

Considering the above mentioned, we judge that FDI and trade are two key components of global growth engine for the five economic poles. Moreover their different national and international priorities determine to manage their divergences in a constructive way, avoiding any misunderstanding.

Financial crises and response of the BRICS nations:

In our study, the time period between 2008-2012 is considered so that we can explain how BRICS economies respond to trade and FDI flows with the rest of the world. There has been significant results of BRICS economies with the rest of the world.

The global financial meltdown of 2008 has not left the economies of Brazil, Russia, India and China, known as the BRIC club, unscathed. As the developed world faces recession, BRIC growth is inevitably set to slow.

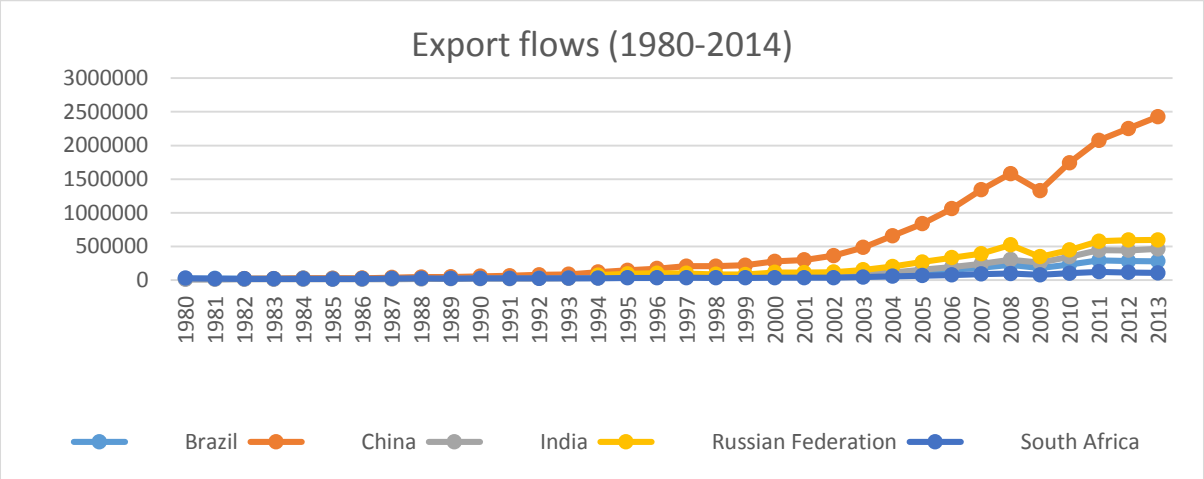
The Period of Crises:

- The financial meltdown of October 2008 sent stock markets in BRIC economies tumbling as foreign investors fled. The notion that emerging economies were decoupled from the crisis in the developed world has proved wrong;
- As the global economy is set to slow in 2009, BRIC economies will feel the consequences. China and Brazil will see weaker demand from the USA and Europe for their exports, while India's services sector, oriented towards developed economies, could suffer. Russia is the most vulnerable of the BRIC countries as it is heavily reliant on the hydrocarbon sector, which will be hit by falling energy prices;
- However, unlike other emerging economies, BRIC have large trade surpluses and foreign exchange reserves that make them more resilient to the crisis. Governments are set to use the reserves to increase spending and boost consumer demand;
- Growing consumer spending in BRIC countries will help them to withstand the crisis. While the pace of growth is excepted to slow, BRIC will remain a huge and growing consumer market;
- The crisis is expected to remove the danger of inflation making life easier for BRIC consumers and allowing governments to ease interest rates, fuelling further growth.

1.2.2 Trend and pattern of major variables in the BRICS (1980-2014)

1.2.2.1 Pattern of trade flows in the BRICS (Export and Import)

Figure 1: Pattern of export flows in the BRICS



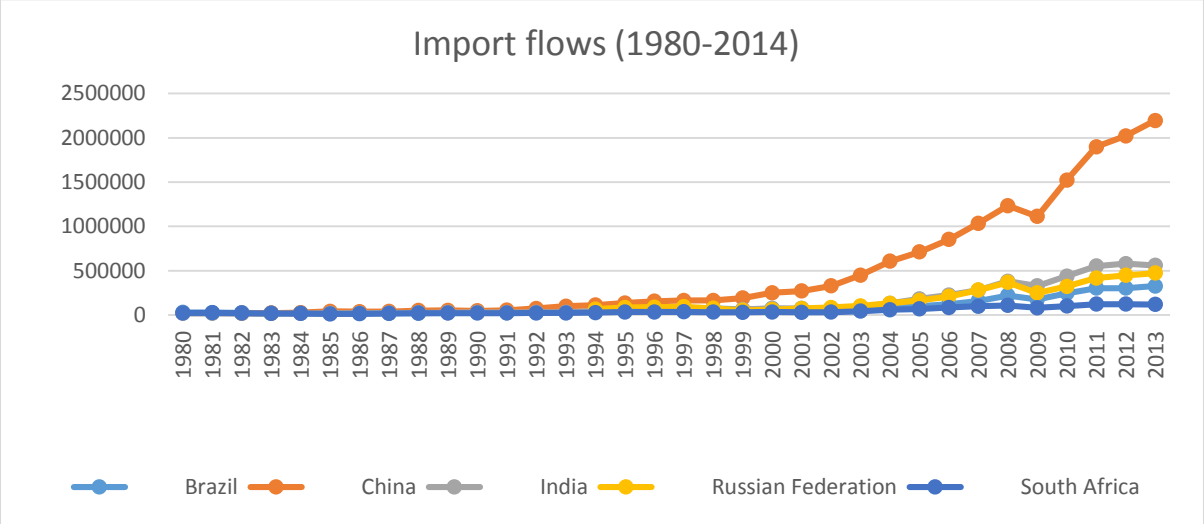
Source: Author's Calculation.

Trade appears to play a significant role in enhancing the economic growth of the emerging nations of BRICS. It is one of the most important indicator of how harmonization and cooperation among these countries are evolving. The figure above, shows how export flows of the BRICS countries are developing and changing over a period of time (1980-2014); and the major reasons behind such variations in the export flows.

In the figure, the export figures of the BRICS countries are designed in the X axis and corresponding to this the time period is designed in the Y axis. During the period from 1980 to 1993, it is seen that there has been no change in the export flow variations of the BRICS economies. After this period, from the year 1996 the export flows of China is seen to be dominating the growth process of Russia, India, Brazil and South Africa. In the period between 1997-2008 the export flows of China touches the topmost level of 16million (US $) in the growth process, followed by Russia, India, Brazil and South Africa. Simultaneously, in the period (2008-2013), the growth pattern of China declined for about a year and reached the top level i.e. 25million (US $).

From the above figure it has become clear that China has the strongest growth rate followed by Russia, India, Brazil and South Africa in the period between 1980-2014. The main motives behind this being that China is the largest growing exporter nation of the world and a global hub for largest manufacturing sector as compared to the other BRICS nations.

Figure 2: Pattern of export flows in the BRICS



Source: Author's Calculation.

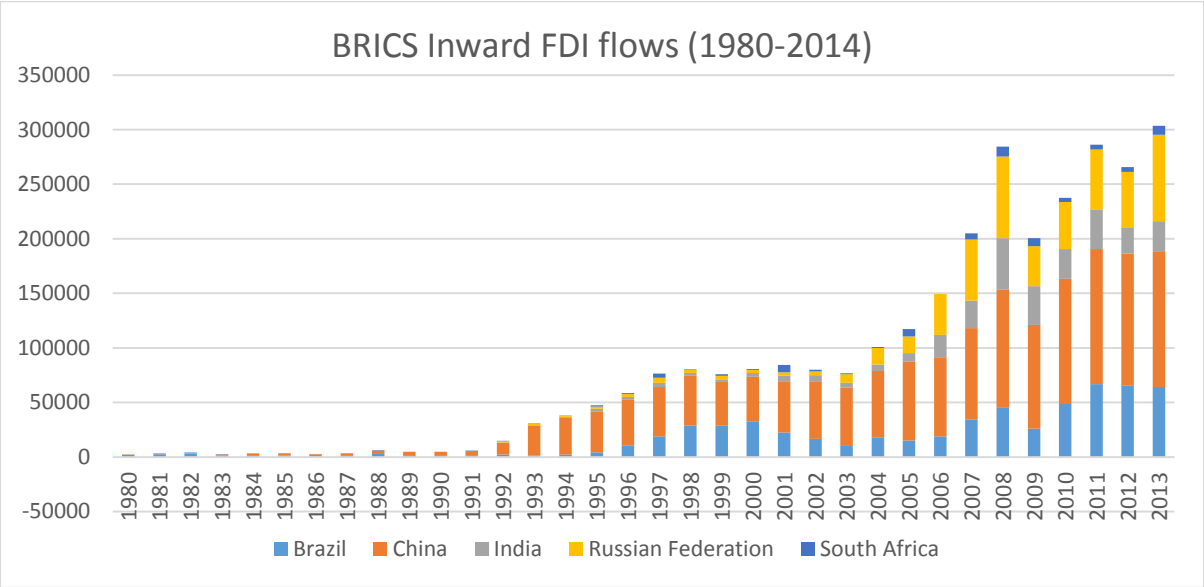
The figure above, illustrates how the import flows of the BRICS countries are developing and changing over a period of time (1980-2014); and the major reasons behind such variations in the import flows.

In the figure, the import figures of the BRICS countries are designed in the Y axis and corresponding to this the time period is designed in the X axis. During the period from 1980 to 1993, it is seen that there has been no change in the import flow variations of the BRICS economies. After this period, from the year 1996 the import flows of China is seen to be dominating the growth process of Russia, India, Brazil and South Africa. In the period between 1997-2008 the import flows of China touches the topmost level of 12million (US $), followed by India, Russia, Brazil and South Africa. After 2008, the import flows of China has declined for over a year till 2009. In the period from 2009 China's import flows are restored back as it continues to advance more and reach the peak level of import flows. This is followed by other BRICS nations India, Russia, Brazil and South Africa.

From the above figure it has become clear that China has the strongest growth rate followed by India, Russia, Brazil and South Africa in the period between 1980-2014. During that period till now both China and India contributes to the highest amount of gold importer as compared to the rest of the world. China is becoming the most important centre for physical gold trade in the coming years.

1.2.2.2 Pattern on FDI flows in the BRICS (Inward and Outward inflows)

Figure 3: Pattern of inward FDI flows (1980-2014)



Source: Author's Calculation.

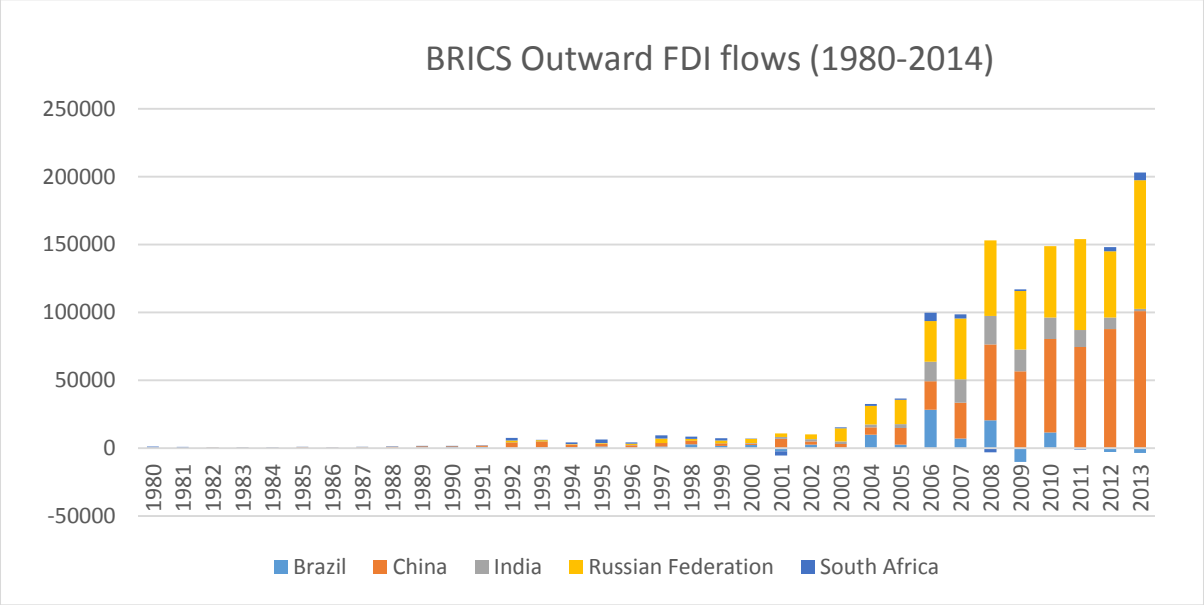
Since the early 1980's and 2000's, the sustained economic activities supported by and coupled with growth oriented strategy have resulted in significant infrastructural and other favourable changes in the BRICS economies. All these have together led the countries to increase market price of goods and services which transformed the BRICS economies into attractive destinations for FDI flows.

The FDI inflows of the BRICS countries are designed in the Y axis and corresponding to this the time period is designed in the X axis.

Data from the figures have shown that the import trend from 1980 to 1991 is in an increasing, constant and decreasing trend. From year 1991, the import trend is seen increasing upto 7 years i.e. till 1998. South Africa receives the highest number of FDI inflows following the rest of the economies of Russia, India, China and Brazil. From the period 2007-2014 it is found that the economy receiving the highest FDI inflows has been South Africa followed by Russia, India, China and Brazil.

Increase in FDI inflows means that the economies of South Africa will receive the highest amount of capital inflows between the period from 1980-2014. This will lead to an increase in global competition among the rest of the world with the BRICS.

Figure 4: Pattern of inward FDI flows (1980-2014)



Source: Author's Calculation.

The FDI outflows of the BRICS countries are designed in the Y axis and corresponding to this the time period (1980-2014) is designed in the X axis.

Data from the figures have shown that the outflow trend from 1980 to 1991 is constant. From year 1991, the FDI outflow trend is seen increasing upto 17 years i.e. till 2008. Russian Federation provides with the highest number of FDI outflows following the rest of the economies of India, China, Brazil and South Africa. From the period 2009-2011, it is found that the economy is receiving the highest FDI outflows from Russian Federation which is followed by India, China and Brazil. The FDI outflow trend is seen to be decreasing in 2012 from 2 million to 1 million. By 2014 South Africa gains the highest amount of FDI outflows dominating the economies of Russia, India, China and Brazil.

1.3 Objectives of the study

Foreign direct investment (FDI) and Trade flows are considered to be significant drivers of economic growth in the emerging and developing countries of BRICS. The increase in production activities helps to exploit the benefits of enterprises and countries, increase competitive pressure in international markets and stimulate technology transfer and innovative activity resulting in improved economic growth. In the BRICS countries, both trade and FDI flows are considered to be stimulating factors of the host nation's development strategies. Policies and guidelines are designed accordingly in order to facilitate flows of trade and FDI, which will create employment and lead to poverty reduction. A strong motivation for this is

the possible existence of FDI productivity gain and determinants that would affect the entry strategy of multinational corporations (MNCs) towards investing in a particular country. Essentially, both trade and FDI performs an important role in the development of an economy as well as to promote opportunities in employment and production of industries.

The purpose of the study are:

(a) To investigate the determinants of Trade flows in the BRICS countries.

(b) To investigate the determinants of FDI flows in the BRICS countries.

The determinants of the FDI and Trade flows that are taken into study were GDP, GDP growth rate, Distance between the host and source countries, common language, common border and population.

1.4 Data and Methodology

The study is based on secondary data and the major source of information from where the database were made available for empirical analysis are stated. An augmented gravity model was constructed, and the Trade and FDI equation includes GDP per capita, GDP growth rate, Distance, Common language, Common border, and Population database, FDI and Trade flows. The GDP per capita (Gross domestic product divided by mid-year population) and GDP growth rate (Gross Domestic Product Growth Rate used often as proxies for size and growth of market demand and supply) was taken from World Bank and World Development indicators. Bilateral Trade flows are obtained from Comrade. Bilateral FDI flows are taken from UNCTAD database. Distance, Common language and Common border between the two countries are taken from CEPII database. Population statistics is taken from World Development indicators. Exports (total exports of a country reported) and Imports (total imports of a country reported) are taken from UNCTAD and World Bank.

The whole study was done through Panel Data Analysis of 15 countries for a period of five years (2008-2012) .Out of 15 countries selected, 5 countries were taken as the host economies i.e. Brazil, India, Russian Federation, China and South Africa (BRICS) and 10 countries were taken as the source countries namely Belgium, Canada, France, Germany, Italy, Japan, Netherlands, USA, UK and Republic of Korea. Bilateral Trade and FDI flows between the host and source economies were investigated employing Panel regression with the Fixed Effects and Random Effects Model. In case of the Bilateral Trade flows equation it was observed that The Fixed Effects model was supported and The Random Effects model was rejected in the analysis based on the Haussmann specification test (1978), a test that assists in making choices

between Random effects. Since Fixed Effects model was supported it was observed that some variables were rejected (Comp, Comb and LNpopln) and in order to capture the values of the variables rejected we needed to conduct the FEVD model also known as.

The values of the omitted variables were captured after performing the FEVD model and the results found were highly significant. Under the FDI equation both Fixed and Random effects model was conducted and the Random effects model supported the equation so there was no necessity of performing the FEVD model. After performing the panel data analysis of the FDI and Trade flows equation it was found out that the Gravity model showed significant results in case of Trade flows i.e. Bilateral trade flows between two countries are more reactive then FDI flows in period (2008-2012).

1.4 Organisation of Chapters

This thesis is organised into five chapters. Chapter 1 presents the introduction, the motivation of the study, origin and formalisation of the BRICS countries and trend and pattern of trade and FDI flows in BRICS countries from period (2008-2014) along with it also includes the objectives of the study, data sources and method. Chapter 2 describes the review of literature of BRICS trade and FDI flows. Chapter 3 describes the data collected and methodology used in the study. Chapter 4 presents the results of the study and summarises the research findings. Chapter 5 discusses the policy implications and discussions.

CHAPTER - II
REVIEW OF LITERATURE

In this section, we provide concise literature review which investigates the Bilateral Trade and FDI flows in the BRICS countries.

Narayanamurthy Vijayakumar et al (2010) in the paper *"Determinants of FDI in BRICS countries – A panel data analysis"* tried to determine the factors affecting FDI inflows in BRICS countries using annual dataset from the period (1997-2007). The study employs Panel data analysis and finds that the selected variables Market size, Labour cost, Infrastructure, Currency value and Gross Capital formation as the potential determinants of FDI inflows of BRICS countries. This study made an attempt to identify the factors determining the FDI inflows of BRICS countries from the period 1975 to 2007. The study finds that other than Economic Stability and Growth prospects (measured by inflation rate and Industrial production respectively), Trade openness (measured by the ratio of total trade to GDP) all other factors seem to be the potential determinants of FDI inflows in BRICS countries. The empirical results are robust in general for alternative variables determining FDI flows.

Pravin (2010) tried to explore the role of economics, institutional and political factors in attracting FDI inflows in BRICS (Brazil, India, China, and South Africa) economy. In his paper *"Determinants of FDI in BRICS economies : Analysis of economic, institutional and political factors "*panel data was employed for a period of ten years (2000-2009) in order to examine the significant determinants of FDI inflows in the BRICS countries. The results concluded that most of the economic determinants are more important than the political and institutional factors affecting FDI inflows. Most of the FDI in BRICS are motivated by Market seeking purpose, and not natural resource seeking purpose. The study shows that market size which is determined by GDP is one of the most significant determinant of FDI inflows in BRICS countries. Market size and Trade open-ness have a positive effect on inward FDI inflows. Natural resource have a negative effect on inward FDI inflows.

Duan (2009) in his paper *"FDI in BRICS – A Sector level analysis"* investigated the overall trend and industrial patterns of Inward FDI in BRIC's from period (1995-1997) and explain the determinants. Three main determinants are taken into account through which industrial patterns of Inward FDI can be found out in BRIC's: develop course, resources and business environment. The overall trend of the inward FDI in the BRICs is increasing. Nevertheless, the

industrial patterns of inward FDI are different from each other. In Brazil, Russia and India, the tertiary sector receives the most inward FDI on average, while the primary sector receives the least and the secondary sector is in the middle. But China has a special industrial patterns of inward FDI, the secondary sector dominant the majority of the inward FDI and the primary and tertiary sectors receive only a bit. However, the study of the determinants of the industrial patterns of inward foreign direct investment in the BRICs still belongs to theoretical analysis. No data was found to do an empirical analysis and further research needed to be done.

Agarwal (2015) in his paper *"FDI and economic growth in BRICS economics: A panel data analysis* "examines the relationship between FDI and Economic growth in the five most emerging economies namely Brazil, India, Russia, China and South Africa over the period 1989-2012. A panel data analysis was constructed to analyse the FDI flows that led to growth in the emerging economies. In order to analyse the FDI led growth hypothesis three following steps were performed: (a) test for stationarity or the order of integration, (b) test for integration and (c) test for direction of causality. The study suggests that FDI-economic growth share long run relationships or are integrated in long run at group (panel) level as confirmed through Pedroni's panel cointegration test results. Hence, if economic growth is likely to attract more FDI inflows, then various policies to attract inward FDI could become unnecessary. Therefore, efforts should also be made to encourage the other potential sources of economic development, that would in-turn simulate and enhance foreign investments.

Thangami et al (2010) in *"Determinants and Growth effect on FDI in South Asian Economies – A Panel data analysis"* examines the determinants and the growth effect of FDI in the four South Asian Countries from period (1995-2000). In this study, South Asian refers to India, Bangladesh, Pakistan and Sri Lanka.The data set drawn from two different sources comprises time series data of four countries for the period of 1995-2008.This study basically comprises of two major analysis: Firstly, using Gravity model analysis of the determinants of FDI is done and secondly, using the Growth model, the growth effect of FDI is analysed. After the analysis was done, all the explanatory variables are found to have expected results that FDI is positively influenced by economic growth of host and home countries and the distance variable has negative association with FDI. Human development index, population and electricity consumption per capita are also found to have positive association with FDI. In specification, exchange rate is also positively associated with FDI, but human development index is reported as insignificant.

Medvedev (2012) in *"BEYOND TRADE: The impact of Preferential Trade Agreements on FDI inflows"* investigates the effects of Preferential Trade Agreements (PTA's) on FDI inflows of member countries using a comprehensive database of PTA'S in a panel setting. It estimates an empirical relationship between preferential trade liberalization and net FDI inflows using a panel of 153 countries over the 1980–2004 period. The choice of the dependent variable is driven by both theory and data considerations. The choice of net FDI inflows as the dependent variable precludes the estimation of bilateral flows. A potential concern here is the possibility that GDP and openness may be collinear because smaller countries tend to have larger trade-to-GDP ratios. The empirical results found were that, firstly the FDI benefits of preferential liberalization are increasing in the size of PTA partners and their proximity to the host country. Second, this relationship is driven by the developing countries; and third, the link between preferential liberalization and FDI is only found in the late 1990s and early 2000s, a period when most deep integration agreements have been signed but also a time of a global boom in FDI flows.

Kayam (2010) in paper "*Determinants of Turkish FDI abroad"* examines the determinants of Turkish outward FDI employing a Gravity Model. A basic specification of Gravity model is used to investigate the determinants of outward FDI flows. The variables used in the study are grouped as gravity variables namely relative income, distance and population and as other explanatory variables. All are included in multiplicative form into the traditional gravity model. The findings of the paper was that (a) Turkish outward FDI is market seeking, (b) Foreign markets are used as substitutes for domestic markets by Turkish firms, (c) Turkish FDI produces low quality goods of high domestic markets by Turkish firms, (d) Turkish FDI produces low quality goods of high products in the host countries so as income of the host countries increases outward FDI of Turkish firm's decreases. Attention paid to FDI outflows from developing and transition countries by UNCTAD (2006) needs to be followed by empirical research.

Coupet et al 2007 "*Institutional determinants of Foreign Direct Investment"* tried to investigate the determinants of FDI in developing nations and re-evaluate the role of the quality of institutions on FDI using panel data regression. Firstly, the role of governance infrastructure is re-examined in the host and in the source country by estimating a gravity equation for bilateral FDI stocks that includes governance indicators for the two countries. Secondly, multicollinearity and endogeneity bias are tackled by systematically comparing estimations with and without GDP per capita and by instrumenting governance variables when necessary. Finally, the impact of institutional distance on bilateral FDI is studied. It is found that

institutions matter independently of GDP per capita. The results point out public efficiency in a broad sense as a major determinant of inward FDI. While "good" institutions almost always increase the amount of FDI received, no general result applies to outward FDI. Finally, panel data regressions show that institutional distance tends to reduce bilateral FDI, although the results are much more mixed in the cross section dimension. These results are encouraging in the sense that efforts towards raising the quality of institutions and making them converge towards those of source countries may help developing countries to receive more FDI, hence help them to catch up, independently of the indirect impact of higher GDP per capita.

Kristjansdottir (2005) in his paper *"Determinants of FDI in Iceland"* tried to investigate whether the low FDI in Iceland can be explained through locational factors or market size through the use of Gravity Model. This paper also analyses fixed source country effects and sector specific effects. The research is based on unique data on FDI in Iceland, covering both source countries and sectors of allocation over time. The data dimensions also allow for simultaneous estimates for sectors and trade blocs. The results indicate that FDI is negatively affected by distance, and generally negatively affected population of the host and source country, but positively affected by their gross domestic products (GDPs).

Diana Popa and Lenuța Carp (2013) in paper *"The influence of foreign trade and foreign direct investment on BRICS economic growth"* proposed to focus on the influence of foreign trade and FDI inflows on their economic growth and prosperous development, based on a quantitative and comparative analysis. An analysis of current foreign trade and FDI flows in the region is constructed taking database from the UNCTAD, WTO etc. Birth of BRICS (concept launched by Jim O′Neill) occurred amid a needs of developing countries to get out of the shadow of industrialized nations (G7). Dominated by skepticism at first, the five emerging economies had become, for a decade, a symbol of change of power in the global economy and an important representative of the developing world in the development and cooperation relations at bilateral, regional and even multilateral level. BRICS states are increasingly dependent on foreign trade. The analysis of data from the period 2001-2007 reflects the best the characteristics and national trade level in the BRICS. In these years, the five countries have seen the flowering stage through a high growth trend, especially in living standards (India), meaning a strong development momentum.

Gabor Hunya and Roman Stollinger (2009) in paper *"Foreign Direct Investment flows between the EU and the BRICS"* tries to investigate that whether the FDI flows between the EU and the

BRICS countries are significant and what are the reason behind. The analysis of this paper is based on two important data sources. The first one is the Eurostat Foreign Direct Investment Database (henceforth 'Eurostat') which provides consistent data on aggregate and bilateral FDI flows and stocks. The second major data source tapped for this paper is 'FDI Intelligence from Financial Times Ltd"called the FDI database, which allows for the most up-to-date analysis of FDI flows possible. On a global level, the EU emerges as the most important foreign direct investor, also if considering extra-EU investments only. This reflects the capability and propensity of EU firms to internationalize their business activities. One of the most robust results is that the EU is among the main investors in each of the BRICs and the dominant investor in Brazil and Russia. According to Eurostat the EU provided on average 53% and 57% of the FDI inflows in Brazil and Russia, respectively (2004-2007) average.

Chaudhuri et al (2013) in paper *"Determinants of manufacturing FDI in India – a sectoral analysis"* analyses the determinants of manufacturing sector FDI in India. The study considered the the demand side or internal factors that determine the FDI inflows into a country. Cross country statistics have concentrated on location specific factors related to growth, market size, tax policy, exchange rate, quality of institutions etc. After a brief analysis of the study it was found that in case of India, FDI flows picked up after the significant dose of liberalisation happened in the early 1990's. The flows became significantly higher in the year 2000 and thereafter specifically in service sectors. Results showed that manufacturing FDI in India is significantly negatively affected by tariffs, import intensity and R & D intensity, whereas it is significantly positively impacted by the concentration of market power. FDI inflow has been higher in those sectors where market imperfections give an opportunity to exploit ownership advantages of FDI making companies to increase their margins and hence profits.

Iulia Monica (2011) in her paper "*Trends in Trade and Investment flows between the EU and the BRICS countries* "presented an in-depth comparative analysis of the trade and investment flows between the EU member states and the four strongest emerging countries: Brazil, Russia, India and China (BRIC), during 2004-2009 our study highlights the main trends of the trade and investment flows between the EU and BRIC, in comparison with those of the USA and BRIC or Japan and BRIC. The EU-27, as entity, still keeps the first position, both in the world exports and imports of goods and services, and in the FDI flows and stocks received and generated at global level, taking into account the EU intra and extra flows. But, during the last years, the EU shares in the international trade and investment flows followed a downward trend, contrary to the BRIC countries, whose shares in these flows substantially increased. As

regards the extra community trade in goods, the EU exports are slightly exceeded by the cumulated exports of the four most powerful emerging economies at global level.

Kotenkova et al (2015) in this paper "*Comparative Analysis of FDI determinants in Russia and BRICS countries"* tried to investigate the different economic indicators and variables as a growth of FDI after the economic crises of 2008. A quantitative analysis on the BRICS FDI determinants was done. The methodology used was polynomial regression analysis for Russia's FDI inflows and their dependence on different variables. This paper offers unique classification of determinants of FDI and their qualitative analysis based on BRICS countries i.e. Russia, China, India and Brazil. The initial results of analysis showed that indeed there are many methods and classifications to describe investment climate and potential of the particular region. There is no unified classification for every country even among developing ones. Most of developing countries could be characterized by very high correlation between their FDI inflows and major economic and investment climate indicators such as average wage, tax rates and "doing business" indicators.

Radhika and Ritika (2009) investigated the global scenario in FDI inflows in his paper *"FDI in the BRICS: Changing the investment landscape"* from the time period (2003-2008), presenting a sectoral breakdown of the inward FDI in the BRIC economies, analysing the factors that make the BRIC economies attractive for FDI inflows, examine the relation between economic growth and FDI and also outline relevant policy issues.

There is a need to establish an appropriate OFDI regime that can resolve the dilemma between micro level competitiveness requirements of firms and macro level development constraints of governments. OFDI must not be encouraged at the expense of building domestic productive capacity. Given the relation between FDI and economic growth and the benefits FDI brings in the form of greater capital accumulation and technology spill overs, the maxim for these countries should no longer just be "the more FDI, the better" ; rather emphasis should be on targeting FDI that is important for their economic development.

Catherine in the paper (2010)*"Foreign Direct Investment in Emerging Asian Countries"* investigated the significant determinants of foreign direct investment (FDI) in five ASEAN countries namely Indonesia, Malaysia, the Philippines, Singapore and Thailand from 1975 to 2009. It applies both individual and panel data analyses on these fast emerging countries and findings depict that the rate of economic growth and degree of openness significantly affect FDI flows in the majority of these countries. In Indonesia and the Philippines, employment negatively affects investments, while tourism positively affects FDI in the Philippines and Malaysia. Other significant factors include the level of consumer income, skill and knowledge,

and infrastructure development. Results from this study provide authorities with the latest information in implementing strategies to facilitate foreign investments. This study is imperative in providing strategic commendations to these ASEAN countries who have struggled in their anticipation and encouragement of FDI. The evolution of FDI for these emerging countries in the last few decades is recognized as a potential mean for economic development.

Agarwal and Ranjan (2011) explores Foreign Direct Investment (FDI) inflow determinants in Brazil, Russia Federation, India and China; collectively known as BRIC countries in paper titled *"FDI Inflow Determinants in BRIC countries: A panel data analysis"*. A random effect model is employed on the panel data set consisting of annual frequency data of 35 years ranging from 1975 to 2009 to identify the FDI inflow determinants. The empirical results show that market size, trade openness, labour cost, infrastructure facilities and macroeconomic stability and growth prospects are potential determinants of FDI inflow in BRIC where as gross capital formation and labour force are insignificant, although macroeconomic stability and growth prospects have very little impact. The implications of empirical result seem consistent with the different perceptions of global investors on investment attributes of BRIC countries. The challenge for the BRIC countries are how to sustain their performance and trend in FDI inflow and how to form their policy and optimize their economic condition to attract more FDIs in future. BRIC countries will have promising prospects for FDI inflows as their low labour cost, large market size and growth potential will remain as the key determinants and attractions for years.

Hemkamon (2007) contributed to the analysis of the determinants of bilateral trade and foreign direct investment in ASEAN at the time of establishment of ASEAN Free Trade Area and its enlargement in his paper *"Determinants of Trade and Investment in SouthEast Asia: An application of the Gravity Trade Model"*. The methodology constructed was The Gravity Model that has been used to access ASEAN's trade pattern in both aggregate and disaggregate level. The findings showed that although there is trade diversion regarding its import activities, the positive effect of ASEAN's trade creation is higher than the negative effect of its trade diversion. The results from the model confirms that gravity variables are significant determinants of FDI.

Thanyakhan (2008) in his study "*The Determinants of FDI and FPI in Thailand: A Gravity Model Analysis"* have illustrated the evaluation of determinants of FDI and FPI (Foreign Portfolio Investment) in Thailand using the extended Gravity Model. Panel data is used to

estimate and evaluate the empirical results based on the data for the years 1980 to 2004. The results show that the inflows of FDI in Thailand, which are supply-driven, are significantly influenced by its 21 largest investing partners. The 1997 Asian Financial Crisis has no impact on the determinants of the inflows of FDI into Thailand, but positively influences the inflows of FPI into Thailand. The results suggest that the industry, agricultural products, investment, and real estate categories are promoted as import-substitution FDI. On the other hand, the financial institutions, trade, mining and quarrying, services, and others categories are promoted as export-oriented FDI.

CHAPTER - III
DATA AND METHODOLOGY

The study is based on secondary data and the explanatory variables selected for the study are GDP, GDP growth rate, distance between host and source countries, common language, common border and population. Gravity Model is used to find out the effectiveness of these explanatory variables on the dependent variables i.e the trade and FDI flows. The analysis is conducted for 15 countries out of which there are five host countries and 10 source countries. The host countries are the BRICS i.e (Brazil, India, China, South Africa and Russia) and the source countries includes Belgium, Canada, France, Germany, Italy, Japan, Netherlands, USA, UK and Republic of Korea. Frequency of data is annual and it is from 2008 to 2012. The independent variables i.e the GDP and GDP growth rate are taken from World Development indicators, Common language and border is taken from the comtrade statistics ,population data from World Development indicators and distance from the CEPII.

The dependent variables in this study included the bilateral trade flows ($Trade_{ijt}$) and the bilateral FDI flows (FDI_{ijt}) in all the five countries and the independent variables that are expected to determine both the bilateral FDI and Trade flows are carefully chosen, based on previous literatures and availability of dataset for the selected period. The independent variables in this estimation are:

- Gross Domestic Product (in Current US$)
- Gross Domestic Product Growth rate
- Distance between the host and source countries
- Common language between the host and source countries
- Common border between the host and source countries
- Population of the host countries

The Trade and FDI equation are given as under:

FDI = f (market size, market growth rate, distance, common language, common border, population) ……(1)

Trade =f (market size, market growth rate, distance, common language, common border, population) …… (2)

Equation (1) can be changed into econometric form as:

$LNFDI_{ijt} = \alpha + \beta_1 LNGDP_{it} + \beta_2 LNGDP_{jt} + \beta_3 LNGDPG_{it} + \beta_4 LNGDPG_{jt} + \beta_5 LNdist_{ij} + \beta_6 comb + \beta_7 coml + \beta_8 LNpopln$. (3)

Equation (2) can be changed into econometric form as:

$LNTrade_{ijt} = \alpha + b_1 LNGDP_{it} + b_2 LNGDP_{jt} + b_3 LNGDPG_{it} + b_4 LNGDPG_{jt} + b_5 LNdist_{ij} + b_6 comb + b_7 coml + b_8 LNpopln$. (4)

Where,

$LNTrade_{ijt}$ = log of bilateral trade flows in current US$ between host (i) and source country(j) at time t.

$LNFDI_{ijt}$ = log of bilateral FDI flows in current US$ between host and source country at time t.

$LNGDP_{it}$ = log of GDP in current US$ for host country i at time t.

$LNGDP_{jt}$ = log of GDP in current US$ for source country j at time t.

$GDPG_{it}$ = GDP growth rate in percentage for host country i at time t.

$GDPG_{jt}$ = GDP growth rate in percentage for source country j at time t.

$LNdist_{ij}$ = distance between the host and source countries.

comb = Common border between the host and source countries.

coml = Common language between the host and source countries.

LNpopln = log of population of the host countries

In this study, both extended gravity model and panel data analysis are employed for analysing the determinants of bilateral Trade and FDI flows in the BRICS.Now before going into the theoretical analysis of the variables it is significant to know about Gravity model and Panel data analysis.

3.1 Data analysis tools:

3.1.1 Gravity model

The gravity equation in international trade is one of the most robust empirical finding in economics: bilateral trade between two countries is proportional to their respective sizes, measured by their GDP, and inversely proportional to the geographic distance between them. They are used in various social sciences to predict and describe certain behaviours that mimic gravitational interaction as described in Isaac Newton's law of gravity. Generally, the social science models contain some elements of mass and distance, which lends them to the metaphor of physical gravity.

Fifty years ago, Jan Tinbergen (1962) used an analogy with Newton's universal law of gravitation to describe the patterns of bilateral aggregate trade flows between two countries A and B as proportional to the gross national products of those countries and inversely proportional to the distance between them. The so called "gravity equation" in international trade has proven surprisingly stable over time and across different samples of countries and methodologies.

The simple Gravity model takes place in the form of:

$$Tij = A\frac{YiYj}{Dij}$$

It relates to trade between any two (or more) countries to the size of their economies. Symbolically:

T_{ij} = value of trade between two countries

A = constant

Y_i=country i's GDP

Y_j=country j's GDP

D_{ij} = Distance between the two countries.

In the our study, we involved the simple gravity equation along with the augmented form of for both bilateral Trade and FDI flows equation that has been provided in the above equations.

The augmented form of gravity equation involved the variables other than then basic gravity model which included the effect of market size and distance over bilateral trade flows between two countries and other factors such as common language, GDP growth rate, common border and population.

An augmented gravity model was constructed, and the Trade and FDI equation includes GDP per capita, GDP growth rate, Distance, Common language, Common border, and Population database, FDI and Trade flows. The GDP per capita (Gross domestic product divided by mid-year population) and GDP growth rate (Gross Domestic Product Growth Rate used often as proxies for size and growth of market demand and supply) was taken from World Bank and World Development indicators. Bilateral Trade flows are obtained from Comrade. Bilateral FDI flows are taken from UNCTAD database. Distance, Common language and Common border between the two countries are taken from CEPII database. Population statistics is taken from World Development indicators. Exports (total exports of a country reported) and Imports (total imports of a country reported) are taken from UNCTAD and World Bank.

3.1.2 Data Analysis

The panel data estimation is employed in the study to capture the dynamic behaviour of the parameters and to provide more efficient estimation and information of the parameters. Panel data techniques are used because of their advantages over cross-section and time series in using all the information available, which are not detectable in pure cross-sections or in pure time series. [Baltagi and Kao (2000)]. Hsiao (1985, 1986) and Baltagi (1995) argued, panel data sets possess several major advantages. Panel data suggest individual heterogeneity to reduce the risk of obtaining biased results and provide a large number of data points (observations) to increase the degrees of freedom and variability and to be able to study the dynamics of adjustment. The Panel data model includes three different methods:

- Random effects method (REM) Model: The Random effects method is an alternative method of estimation which handles the constants for each section as random parameters rather than fixed.
- Fixed effects method (FEM) Model: The Fixed effects method treats the constant as group (section) - specific, i.e. it allows for different constants for each group (section). The fixed effects also called as the Least Squares Dummy Variables (LSDV) estimators. The FEM using dummy variables is known as the least-squares dummy

variable (LSDV) model. FEM is appropriate in situations where the individual specific intercept may be correlated with one or more regressors.

- Hausman Specification Test: The test evaluates the significance of an estimator versus an alternative estimator. It helps one evaluate if a statistical model corresponds to the data. This test compares the fixed versus random effects under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model (Hausman 1978). If correlated (H0 is rejected), a random effect model produces biased estimators, violating one of the Gauss-Markov assumptions; so a fixed effect model is preferred.

The whole estimation of investigating the determinants of bilateral trade and FDI flows was constructed through Panel Data Analysis of 15 countries for a period of five years (2008-2012).Out of 15 countries selected, 5 countries were taken as the host economies i.e. Brazil, India, Russian Federation, China and South Africa (BRICS) and 10 countries were taken as the source countries namely Belgium, Canada, France, Germany, Italy, Japan, Netherlands, USA, UK and Republic of Korea. Bilateral Trade and FDI flows between the host and source economies were investigated employing Panel regression with the Fixed Effects and Random Effects Model. In case of the Bilateral Trade flows[4] equation it was observed that The Fixed Effects model was supported and The Random Effects model was rejected in the analysis based on the Haussmann specification test (1978), a test that assists in making choices between Random effects and Fixed Effects. Since Fixed Effects model was supported it was observed that some variables were rejected (Coml, Comb and LNpopln). In order to capture the values of these variables rejected, we needed to conduct the FEVD model also known as Fixed Effects Vector Decomposition.

The values of the omitted variables were captured after performing the FEVD model and the results found were highly significant. Under the FDI equation, both Fixed and Random effects model was conducted and the Random effects model supported the equation so there was no inevitability of performing the FEVD model. After performing the panel data analysis of the FDI and Trade flows equation it was found out that the Gravity model showed significant results in case of Trade flows i.e. Bilateral trade flows between two countries are more reactive then FDI flows in period (2008-2012).

[4] Trade flows – Trade flows measure the balance of trade (exports – imports). This is the amount of goods that one country sells to other countries minus the amount of goods that a country buys from other countries. This calculation includes all international goods transactions and represents a country's trade balance

CHAPTER - IV
RESULTS AND FINDINGS

The outcomes of the selected variables for BRICS are given in Table4 and Table5 respectively. We have estimated Panel data analysis which includes Random effects model, Fixed effects model and Fixed Effects Vector Decomposition Model respectively for a definite study period (2008-2012).

Table 4 showing the results of Random effects model, Fixed effects model and FEVD model which confirms the significance of the variables (a) GDP of both host and source country (b) GDP growth rate of the source country (c) Distance between the two nations (d) Common border.

Table 5 showing the results of Random effects model and Fixed effects model which confirms the significance of the independent variables (a) GDP of both host and source country (b) GDP growth rate of the source country (c) Distance between the two nations (d) Common border.

TABLE 4: Panel data results on bilateral trade flows

DEPENDENT VARIABLE: BILATERAL TRADE FLOWS (LNT)			
INDEPENDENT VARIABLES	Random Effects Estimation (REE)	Fixed Effects Estimation (FEE)	Forecast Error Variance Decomposition (FEVD)
GDP host (LNGDPit)	0.700*** (0.000)	0.720*** (0.000)	0.791*** (0.000)
GDP source (LNGDPjt)	0.515*** (0.000)	0.721*** (0.000)	0.355*** (0.000)
GDP Growth host (GDPGit)	0.001 (0.800)	-0.000 (0.911)	0.005 (0.776)
GDP Growth source (GDPGjt)	0.005 (0.186)	0.003 (0.386)	0.065*** (0.001)
Distance between host and source (LNdistij)	-0.321 (0.137)		-0.404*** (0.000)
Common border (Comb)	1.736*** (0.000)		1.008*** (0.000)
Common language (Coml)	0.070 (0.840)		0.152 (0.389)
Population (LNpopln)	0.750*** (0.000)	-0.728 (0.540)	0.824*** (0.000)
Adjusted R^2	0.4827	0.4827	0.4827

Source: Author's Calculation

Note - *, **, *** indicates the *level of significance* at 10%, 5% and 1% level.

The values in the parenthesis represent the probability value (*p-value*)

The empirical results that is obtained from the Random effects model depicts the overall adjusted R^2 of (0.4827) and the value of overall Adjusted R^2 in the Fixed Effects Vector Decomposition model is R^2 (0.5298) which means that the dependent and independent variables of Bilateral Trade flows does not fit well. The value of Adjusted R^2 is seen to be less valuable and significant. The coefficient level of the independent variables that are significant and positive in the bilateral trade flows section are LNGDPi (.791068), LNGDPj (.355970), GDPj (.0655069), LNDIST (-.4048742), comb (1.00825), LNpopln (.8242349) where GDP of both host and source countries, distance, common border and population are significant at high level of 1%, and the other explanatory variables like GDP growth rate of the host country and common language is insignificant. Distance factor is negative and insignificant as expected as it is known that greater distance will lower the trade activities and vice versa. This indicates that the variables (GDP of host and source countries, GDP of the source country, distance, common border and population) are potential determinants of Trade flows in BRICS countries and GDP growth rate and Common language are not significant determinants in determining the trade flows of the BRICS countries.

TABLE 5: Panel data results on FDI flows

DEPENDENT VARIABLE: Bilateral FDI Flows		
INDEPENDENT VARIABLE	REE (Random Effects Estimation)	FEE (Fixed Effects Estimation)
GDP host (LNGDPit)	0.531* (0.078)	0.023 (0.959)
GDP source (LNGDPjt)	1.331*** (0.000)	0.623 (0.482)
GDP Growth host (GDPGit)	-0.029* (0.094)	-0.020 (0.341)
GDP Growth source (GDPGjt)	-0.005 (0.790)	0.000 (0.495)
Distance between host and source (LNdistij)	-0.563* (0.099)	
Common border (Comb)	0.986* (0.181)	
Common language (Coml)	0.149 (0.805)	
Population (LNpopln)	0.163 (0.440)	7.825 (0.285)
Adjusted R^2	0.3683	0.3683

Source: Author's Calculation
Note - *, **, *** indicates the *level of significance* at 10%, 5% and 1% level.
The values in the parenthesis represent the probability value (*p-value*)

The results obtained from Table5 interprets that the value of Adjusted R^2 is 0.3683 in the Random Effects Model, which shows that the independent and dependent variables selected in

the study are not a good fit for FDI flows in the BRICS countries. Lower value of the R^2 indicates that the explanatory variables in the study fail to explain most of the variations in the dependent variable. All the explanatory variables in the study have the right expected signs in accordance to the literature reviews. The GDP of the source country is significant at high level of 1%, while GDP of the host country, GDP growth rate of host country and distance are significant at low level of 10%. The variables that turned out to be less significant are Common language, population, GDP growth rate of the source country and common border. This means that these factors are not at all significant and variations in these variables will not affect the FDI flows[5] of the host and source countries in any manner.

[5] FDI flows – Capital flows represent money sent from overseas in order to invest in foreign markets. Capital flows measure the net amount of a currency that is purchased or sold for capital investments. The key concept behind capital flows is balance. For instance, a country can have either a positive or negative capital flow.

CHAPTER - V
CONCLUSION AND POLICY IMPLICATIONS

The empirical analysis has some policy implications that should be taken into consideration while framing policies especially towards a better improvement of investment climate i.e. to attract higher FDI inflows and increase the trade flows of the BRICS nations which will lead their country to a favourable economic growth. In recent years, the rapidly fast growing countries of BRICS that are endowed with large market potential are expected to raise and attract Trade and FDI flows between the host and source countries. But since less research has been conducted about FDI inflows it has become a difficult task to know the factors that are responsible for attracting FDI flows to these countries. This study made a vigorous attempt to identify the variables determining the trade and FDI flows of BRICS countries from a period between (2008-2012). The explanatory variables in the study included are Market size, GDP growth rate of both host and source countries, distance, common border and language, and population.

In our study, the positive factors that led to a rise in the bilateral trade flows between the BRICS and the rest of the world which includes the GDP of both host and source countries, Distance between two countries, (measured by log of Total Gross Domestic Product i.e. LNGDPi, LNGDPj). Other than these factors influencing bilateral trade and FDI flows (GDPgrowth rate of the host and source countries, population, common language and common border do not contribute to favourable outcomes of trade and FDI flows. In accordance to this findings it has become clear that there is a proportional relation between trade flows and market size i.e. higher the market size higher will be trade flows and vice versa. So one should take policy implications regarding the increase in market size i.e. increasing the demand for goods in a country that will enable people to export more and import less. Government should provide subsidies for goods that are expensive in the source countries. In this way, the host economy, Say for example India will try to consume more of that good from their own country rather than importing from abroad. Incase of distance and border there is no such proper implication that can be implemented. But it is ensured that there should be arranged certain treaties between two nations, eliminating the tariff rates, that will not bridge the distance between the countries but will create a favourable climate for trade and FDI flows.

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APPENDIX – A
Results of Gravity Model Analysis in STATA Software

```
. xtset cid year, yearly
      panel variable:  cid (strongly balanced)
       time variable:  year, 2008 to 2012
               delta:  1 year

.
. quietly regress lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, vce(cluster cid)

. estimates store OLS_rob

. quietly xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, be

. estimates store be

. quietly xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, fe

. estimates store fe

. quietly xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, fe vce(robust)

. estimates store fe_rob

. quietly xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, re

. estimates store re

. quietly xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, re vce(robust)

. estimates store re_rob

. estimates table OLS_rob be fe fe_rob re re_rob, b se stats(N r2 r2_o r2_b r2_w sigma_u sigma_e rho)
```

Variable	OLS_rob	be	fe	fe_rob	re	re_rob
lgdpit	.57437857	.90386668	-.32263895	-.32263895	.24041466	.24041466
	.21133819	.32665692	.53369744	.63676229	.23492906	.23353198
lgdpjt	1.4335735	1.8828222	.40178663	.40178663	1.4376066	1.4376066
	.17772522	.33995747	1.059317	1.4602184	.2377371	.22997347
lgdpgit	-.05050556	1.1594552	-.50432233	-.50432233	-.33761424	-.33761424
	.25638332	.63491867	.18120892	.21246104	.16122828	.15810528
lgdpgjt	.20329871	.97708498	.15617781	.15617781	.13239311	.13239311
	.13214715	.42953087	.09767014	.08078071	.09350509	.06664167
ldistanceij	-.62437228	-.55853767	(omitted)	(omitted)	-.74487229	-.74487229
	.30497733	.37257529			.34702609	.32633961
_cons	-8.3547672	-18.948634	5.207346	5.207346	-4.0959356	-4.0959356
	3.6427685	6.3117354	10.493267	16.076482	4.5843845	3.8236737
N	171	171	171	171	171	171
r2	.42519324	.4939421	.08958294	.08958294		
r2_o		.29321274	.07446389	.07446389	.4071418	.4071418
r2_b		.4939421	.06956402	.06956402	.4079881	.4079881
r2_w		.0057309	.08958294	.08958294	.06561897	.06561897
sigma_u			2.1012886	2.1012886	1.5260685	1.5260685
sigma_e			.79814073	.79814073	.79814073	.79814073
rho			.87391669	.87391669	.78521674	.78521674

legend: b/se

```
. xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, fe
note: ldistanceij omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       171
Group variable: cid                             Number of groups   =        60

R-sq:  within  = 0.0896                         Obs per group: min =         1
       between = 0.0696                                        avg =       2.9
       overall = 0.0745                                        max =         5

                                                F(4,107)           =      2.63
corr(u_i, Xb)  = 0.0837                         Prob > F           =    0.0382

------------------------------------------------------------------------------
     lfdiijt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lgdpit |    -.322639   .5336974    -0.60   0.547    -1.380632     .735354
      lgdpjt |    .4017866   1.059317     0.38   0.705    -1.698186    2.501759
     lgdpgit |   -.5043223   .1812089    -2.78   0.006    -.8635479   -.1450968
     lgdpgjt |    .1561778   .0976701     1.60   0.113    -.0374419    .3497975
 ldistanceij |  (omitted)
       _cons |    5.207346   10.49327     0.50   0.621    -15.59433    26.00902
-------------+----------------------------------------------------------------
     sigma_u |  2.1012886
     sigma_e |  .79814073
         rho |  .87391669   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(59, 107) =     9.39                 Prob > F = 0.0000

. estimates store fe

. xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, re

Random-effects GLS regression                   Number of obs      =       171
Group variable: cid                             Number of groups   =        60

R-sq:  within  = 0.0656                         Obs per group: min =         1
       between = 0.4080                                        avg =       2.9
       overall = 0.4071                                        max =         5

Random effects u_i ~ Gaussian                   Wald chi2(5)       =     48.59
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
     lfdiijt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lgdpit |    .2404147   .2349291     1.02   0.306    -.2200378    .7008672
      lgdpjt |   1.437607   .2377371     6.05   0.000     .9716505    1.903563
     lgdpgit |   -.3376142   .1612283    -2.09   0.036    -.6536159   -.0216126
     lgdpgjt |    .1323931   .0935051     1.42   0.157    -.0508735    .3156597
 ldistanceij |   -.7448723   .3470261    -2.15   0.032    -1.425031   -.0647136
       _cons |   -4.095936   4.584384    -0.89   0.372    -13.08116    4.889293
-------------+----------------------------------------------------------------
     sigma_u |  1.5260685
     sigma_e |  .79814073
         rho |  .78521674   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store re

. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re       Difference          S.E.
-------------+----------------------------------------------------------------
      lgdpit |    -.322639    .2404147      -.5630536        .479209
      lgdpjt |    .4017866    1.437607      -1.03582        1.032295
     lgdpgit |   -.5043223   -.3376142      -.1667081        .0827171
     lgdpgjt |    .1561778    .1323931       .0237847        .028218

           b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =   -30.57    chi2<0 ==> model fitted on these
                                      data fails to meet the asymptotic
                                      assumptions of the Hausman test;
                                      see suest for a generalized test

. xtreg  lfdiijt lgdpit lgdpjt lgdpgit lgdpgjt ldistanceij, re vce(robust)

Random-effects GLS regression                   Number of obs      =       171
Group variable: cid                             Number of groups   =        60

R-sq:  within  = 0.0656                         Obs per group: min =         1
       between = 0.4080                                        avg =       2.9
       overall = 0.4071                                        max =         5

Random effects u_i ~ Gaussian                   Wald chi2(5)       =     53.42
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                                    (Std. Err. adjusted for 60 clusters in cid)
------------------------------------------------------------------------------
             |               Robust
     lfdiijt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lgdpit |    .2404147    .233532     1.03   0.303    -.2172996    .6981289
      lgdpjt |   1.437607   .2299735     6.25   0.000     .9868669    1.888346
     lgdpgit |   -.3376142   .1581053    -2.14   0.033    -.6474949   -.0277336
     lgdpgjt |    .1323931   .0666417     1.99   0.047     .0017778    .2630084
 ldistanceij |   -.7448723   .3263396    -2.28   0.022    -1.384486   -.1052584
       _cons |   -4.095936   3.823674    -1.07   0.284     -11.5902    3.398327
-------------+----------------------------------------------------------------
     sigma_u |  1.5260685
     sigma_e |  .79814073
         rho |  .78521674   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. xtreg  lfdiijt lgdpit lgdpjt gdpgit gdpgjt ldistanceij, re vce(robust)

Random-effects GLS regression                   Number of obs      =       246
Group variable: cid                             Number of groups   =        60

R-sq:  within  = 0.0424                         Obs per group: min =         1
       between = 0.4316                                        avg =       4.1
       overall = 0.3811                                        max =         5

Random effects u_i ~ Gaussian                   Wald chi2(5)       =     61.40
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                                               (Std. Err. adjusted for 60 clusters in cid)
------------------------------------------------------------------------------
             |               Robust
    lfdiijt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lgdpit |   .4186271    .218688     1.91   0.056    -.0099934    .8472477
      lgdpjt |   1.401834   .1994806     7.03   0.000     1.01086     1.792809
      gdpgit |  -.0312227   .0162167    -1.93   0.054    -.0630069    .0005615
      gdpgjt |   .0004794   .0196364     0.02   0.981    -.0380072     .038966
ldistanceij |   -.670938   .3331182    -2.01   0.044    -1.323838   -.0180382
       _cons |   -6.20354   3.676553    -1.69   0.092    -13.40945    1.002371
-------------+----------------------------------------------------------------
     sigma_u |  1.5847622
     sigma_e |   .76468332
         rho |   .81114322   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. xtreg  lnt lngdpi lngdpj gdpgi gdpgj lndist, fe
note: lndist omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       336
Group variable: cid                             Number of groups   =        70

R-sq:  within  = 0.6456                         Obs per group: min =         4
       between = 0.0000                                        avg =       4.8
       overall = 0.0004                                        max =         5

                                                F(4,262)           =    119.35
corr(u_i, Xb)  = -0.5215                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         lnt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lngdpi |   .6798875   .0593839    11.45   0.000     .5629571     .796818
      lngdpj |   .7126761   .0901441     7.91   0.000      .535177    .8901753
       gdpgi |   .0006375   .0031451     0.20   0.840    -.0055553    .0068303
       gdpgj |   .0036915   .0037934     0.97   0.331    -.0037778    .0111608
      lndist |  (omitted)
       _cons |   3.401771   .8081455     4.21   0.000     1.810484    4.993058
-------------+----------------------------------------------------------------
     sigma_u |  1.5662972
     sigma_e |  .14456663
         rho |  .99155298   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(69, 262) =   294.41             Prob > F = 0.0000

. estimates store fe

. xtreg  lnt lngdpi lngdpj gdpgi gdpgj lndist, re

Random-effects GLS regression                   Number of obs      =       336
Group variable: cid                             Number of groups   =        70

R-sq:  within  = 0.6355                         Obs per group: min =         4
       between = 0.0332                                        avg =       4.8
       overall = 0.0409                                        max =         5

Random effects u_i ~ Gaussian                   Wald chi2(5)       =    302.16
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         lnt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lngdpi |    .603924   .0622136     9.71   0.000     .4819875    .7258605
      lngdpj |   .5065206   .0789725     6.41   0.000     .3517374    .6613039
       gdpgi |    .003087   .0037485     0.82   0.410    -.0042599     .010434
       gdpgj |   .0087662   .0044747     1.96   0.050    -3.98e-06    .0175364
      lndist |  -.7294069   .1993704    -3.66   0.000    -1.120166   -.3386481
       _cons |   12.64751   1.975732     6.40   0.000     8.775151    16.51988
-------------+----------------------------------------------------------------
     sigma_u |  .81394629
     sigma_e |  .14456663
         rho |  .96941869   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store re

. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re       Difference          S.E.
-------------+----------------------------------------------------------------
      lngdpi |   .6798875     .603924        .0759636                .
      lngdpj |   .7126761    .5065206        .2061555        .0434661
       gdpgi |   .0006375     .003087       -.0024496                .
       gdpgj |   .0036915    .0087662       -.0050747                .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =   -21.01    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test

. xtreg  lnt lngdpi lngdpj gdpgi gdpgj lndist, re vce(robust)

Random-effects GLS regression                   Number of obs      =       336
Group variable: cid                             Number of groups   =        70

R-sq:  within  = 0.6355                         Obs per group: min =         4
       between = 0.0332                                        avg =       4.8
       overall = 0.0409                                        max =         5

Random effects u_i ~ Gaussian                   Wald chi2(5)       =    328.36
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                                    (Std. Err. adjusted for 70 clusters in cid)
------------------------------------------------------------------------------
             |               Robust
         lnt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lngdpi |    .603924   .0625163     9.66   0.000     .4813943    .7264537
      lngdpj |   .5065206   .0772493     6.56   0.000     .3551149    .6579264
       gdpgi |    .003087   .0036339     0.85   0.396    -.0040352    .0102093
       gdpgj |   .0087662   .0043421     2.02   0.043     .0002558    .0172765
      lndist |  -.7294069   .2932776    -2.49   0.013     -1.30422   -.1545934
       _cons |   12.64751   3.048406     4.15   0.000     6.672748    18.62228
-------------+----------------------------------------------------------------
     sigma_u |  .81394629
     sigma_e |  .14456663
         rho |  .96941869   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```