Prajnan, Vol. XLIX, No. 2, 2020-21

Stock Markets, Macroeconomics and Financial Structure of BRICS Countries and USA

Pradiptarathi Panda
M Thiripalraju

Received: 22/10/2019
Accepted: 22/06/2020

Financial institutions, financial intermediaries, market microstructure, macroeconomic pictures, financial market regulators and financial instruments are the different important components of the financial environment of a country. An efficient and effective financial environment requires smooth functioning of the whole financial system of an economy. This study provides a broad overview of financial environment of BRICS countries and USA with investment opportunities in BRICS countries. We have considered the market depth, market microstructure, portfolio weights, CAGR and several macroeconomic indicators to assess the investment climate. For data analysis, daily, monthly and yearly data have been considered in this study. Our detailed analysis finds that BRICS countries are a good destination for investors.

Keywords: BRICS Stock Markets, Macroeconomic variables, Investment Opportunities, Portfolio Weights

JEL Classification: G11, G15

Section I
Introduction

In the present global scenario, several countries have formed groups to meet specific objectives. Investors diversify their investment within the country (by investing in several companies of a number of industries) or in a group of countries (by investing in several companies of several countries). Some of these groups of countries are G7 Countries, G8 Countries, G20 Countries, South Asian Association for Regional Cooperation (SAARC); India, Brazil and South Africa (IBSA), Brazil, Russia, India, China and South Africa (BRICS); Association of Southeast Asian Nations (ASEAN); Organisation for Economic

Pradiptarathi Panda (pradipta.mfc@gmail.com), Assistant Professor, National Institute of Securities Markets (NISM), Patalganga, Rasayani, Raigad, Maharashtra.

M Thiripalraju (mtraju56@gmail.com), former Director, Indian Institute of Capital Markets (IICM), Navi Mumbai.

Cooperation and Development (OECD); Organisation of Petroleum Exporting Countries (OPEC); Cambodia, Laos, Myanmar & Vietnam (CLMV); Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka and Thailand (BIMSTEC); Colombia, Indonesia, Vietnam, Egypt, Turkey, South Africa (CIVETS); and so on. Among all these groups of countries, the attention of the world since 2000 is on BRICS countries. The term BRIC (Brazil, Russia, India, and China) was coined by O' Neill (2001) in his Goldman Sachs Global economics paper "Building Better Global Economic BRICs." Wilson and Purushothamn (2003) in Goldman Sachs Global Economic paper "Dreaming with BRICs: The Path to 2050" depict that BRICs nations will outperform developed countries by 2050. The first official meeting of BRICS countries was started in 2008. The brain child of O'Neill's BRIC turned into BRICS by including South Africa in 2010.

A geographic picture of BRICS countries is provided in Table 1. This Table provides details of capital city, administrative regions, local currency, population and total area of each of the BRICS nations. South Africa is the smallest country in terms of total area (1.2 million km2) of administrative regions as well as size of population. Russia happens to be the largest country in terms of total area (17.1 million km^2), the second largest country is China, followed by Brazil and India. India has the highest population among the rest of the BRICS countries other than China.

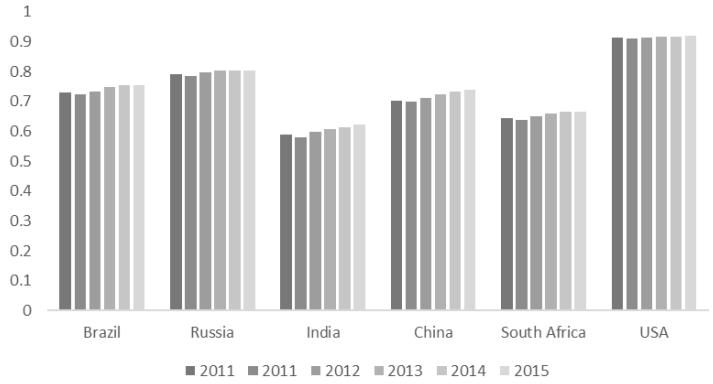
Table 1
Geographic Data for BRICS Countries

Country	*Total Area (km^2)*	*Capital City*	*Administrative Regions*	*Currency*	*Population (Million persons)*
Brazil	8,514,877	Brasilia	26 states and 1 federal districts	Real	206
Russia	17,098,242	Moscow	46 provinces, 21 republics	Rubble	147
India	3,287,263	New Delhi	29 states and 7 Union territories	Rupee	1269
China	9,596,961	Beijing	23 provinces and 5 Autonomous regions	Yuan	1379
South Africa	1,219,090	Pretoria	9 provinces	Rand	56

Source: Central Intelligence Unit and BRICS joint statistical publication-2017.

The Human Development Index (HDI) measures achievement of human development in three dimensions such as: *(i)* a long and healthy life, *(ii)* knowledge and *(iii)* a decent standard of living. HDI (from 2011-2015) value of 1 shows a high level of development and 0 indicates no development. The historical HDI for BRICS and USA is given in Figure 1. The HDI for Russia is high and for India it is the lowest among all the BRICS countries. HDI for USA has reached more than 90 per cent over the years. This indicates that HDI of developed countries is more and also that HDI is associated with development.

Figure 1
Human Development Index BRICS and USA



Source: Bloomberg

Many foreign investors are attracted to investing in emerging markets to derive the benefit of diversification (Bekaert and Harvey, 2000). The growth in aggregate investment increases due to financial and economic liberalisation (Henry, 2000). One of the objectives of internationalization of securities markets is cross-border listing and trading in several exchanges in several countries (Kubler, 2002). Table 2 presents details of official liberalisation of BRICS countries. The official liberalisation of BRICS countries has commenced in 1991; Brazil (1991), Russia (1994), India (1992), China (1993) and South Africa (1996).

Table 2
Official Liberalization of BRICS Countries

Country	*Year of Official Liberalisation*
Brazil	1991
Russia	1994
India	1992
China	1993
South Africa	1996*

Note: * indicates ministry of finance, South Africa.
Source: Bekaert and Harvey (2000 & 2003)

Table 3 and Figures 2 & 3 present Global Financial Stress Index (GFSI) and SENTIX global index (SGI). GFSI measures risk, hedging demands, and investment flows into global financial sectors. A higher GFSI value indicates higher risk and lower GFSI value indicates lower risk. Stock price and GFSI are negatively correlated. It is observed from this table and graph that financial stress was highest during the 2008 global financial crisis and started coming

down in a later period. Presently, the index is quite low which gives a clear picture for investors to invest in this period. SGI provides information about the sentiment of investors to invest in financial markets. It measures the investors' confidence. During the financial crisis, investors' sentiment was abnormally low; but during the normal period, investors' sentiment was high. Based on the sentiment, the index moves up or down. Conceptually, a positive relation exists between SGI and stock price, and negative relation exists between GFSI and SGI.

Table 3
Global Financial Stress Index and SENTIX Global Index

Date	*Global Financial Stress Index*	*SENTIX Index Global*
31-12-2003	-0.2	34.9446
31-12-2004	-0.26	24.2049
30-12-2005	-0.43	30.7452
29-12-2006	-0.37	22.2673
31-12-2007	0.43	11.1316
31-12-2008	2.28	-37.9327
31-12-2009	0.21	2.1248
31-12-2010	0.26	19.055
30-12-2011	0.84	-7.3014
31-12-2012	-0.26	8.452
31-12-2013	-0.33	18.9206
31-12-2014	0.05	12.7646
31-12-2015	0.33	8.5261
30-12-2016	0.25	17.8975
29-12-2017	-0.25	25.9599

Source: Bloomberg

Figure 2
Global Financial Stress Index

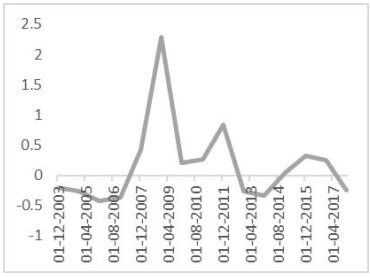
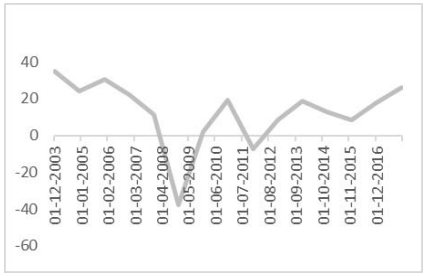


Figure 3
Sentix Global Index



Source: Bloomberg

The objective of this study is to identify the growth and development of the financial structure and the opportunity for investment in BRICS countries. Further the study calculates the portfolio weights among the BRICS countries stock markets. The rest of the sections of this study is organised in the following manner. Section II reviews related literature on BRICS countries' financial markets; Section III describes data and methods; Section IV presents results and disusses the implications; Section V provides concluding remarks of the study.

Section II
Review of Literature

This section reviews literature related to the financial structure of BRICS countries. The review of the base literature provides a fundamental understanding of the financial condition as well as the existing literature in this area.

O'Neil (2001) studies the state of the world economy with specific emphasis on the relationship between G7 and other larger emerging economies. Based on yearly data of nominal GDP, real GDP and CPI for a decade (from the year 2001), the study concludes that it is an opportunity for BRICs to rise as a power bloc like the G7 countries. Desai (2007) highlights India's growth transition as a BRICs nation. The study projects the progress of the Indian economy in the upcoming years considering factors like dependency on developed economies and competition from similar economies. Cheng *et al*. (2007) study the BRICs economies to identify country-specific hindrances to growth and justify growth forecasts using certain features. Inequality, urban migration, and poverty have remained common problems across all the BRICs countries over the years. Apart from social pressures; legislative pressures make it difficult to conduct business in a country. However, a growing importance of BRICs nations to the global economy has been observed. Naude *et al*. (2013) present a comparative study of the nature of the economic development for BRICS nations. The authors study the patterns of structural changes in these economies during the period from 1980 to 2010. De-industrialisation of BRICS countries like Brazil, Russia, and South Africa and dominance of the manufacturing sector for China's GDP are the highlights of the study. Impact of FDI in the manufacturing sector was positive only in case of China. Radulescu *et al*. (2014) analyse the evolution of developing nations and their contribution to the global economy. Among BRICS nations, each country has different drivers of growth; for example, Brazil and Russia are mineral-rich countries and possess high degree of speculative activity in the international market; and India and China have cheap labour and resources. All countries have high rates of investment except Brazil. However, corruption, political turmoil and large exposure to commodities are considered as a threat to growth. Griffith (2014) identifies the level of unachieved needs of the fund

in the areas of infrastructure and sustainable development of emerging economies of the world. It also projects the likely impact of a BRICS development bank which will take care of such needs. Institutions like BRICS bank can drive the growth of emerging economies with quality lending and by maintaining a balanced lending portfolio. Singh and Dube (2014) study the increasing importance of BRICS in the world economy and conclude that BRICS countries have more scope to become a power bloc by overcoming their differences. Diallo and Tapsoba (2014) study the extent to which Sub-Saharan Africa's (SSA) business cycle is in synchronisation with the rest of the world. The study considers business cycles and trade intensity of 44 SSA countries and their trading partners for the period from 1970 to 2010. Employing regression analysis, this study concludes that growing trade links among the BRIC nations have led to the alignment of SSA's business cycle more towards the BRIC nations. Laeven (2014) undertakes a cost-benefit analysis of developing local capital markets and the challenges faced in its development. The study considers the role of macroeconomic conditions, institutional quality and banking sector development for development of local capital markets.

Alessandria *et al.* (2017) study China's growth and integration in terms of trade and finance and find that bilateral trade barriers in China have declined after the great recession. The trade barriers to China's import have been increasing and the same have been decreasing for exports. Rasoulinezhad and Jabalameli (2018) depict that China dominates total trade flows in BRICS countries. Geographical distance negatively impacts the trade of manufactured goods and raw materials for China and India than other countries. This creates dissimilarity of the trade pattern among BRICS countries.

Section III
Data and Methods

One of the variables considered under this study are daily index data of each of the BRICS countries like IBOVESPA (Brazil), MICEX (Russia), NIFTY (India), SHCOMP (China) and FTSE/JSE (South Africa). The macroeconomic variables considered in this study are Human Development Index (HDI), Global Financial Stress Index, Sentix Global Index, market timings, clearing and settlement process, number of listed companies, price earnings ratio, Gross Domestic Product (GDP) and GDP growth rate, exchange rate, economic policy uncertainty index, Consumer Price Index (CPI), market capitalisation, market capitalisation as a percentage of GDP, money supply, gross national savings as a percentage of GDP, investment as percentage of GDP, control of corruption, global competitiveness index, and trade relations for each of the BRICS countries.

The sources for data are Bloomberg, Thomson Reuters; International Financial Statistics published by IMF, World Bank, International Institute of Finance (IIF) and BRICS joint statistical publications. The overall period of study is

from 22 September 1997 to 28 December 2017. The study period is divided into pre (September 1997 to November 2007), during (December 2007 to June 2009) and post (July 2009 to December 2017) subprime global financial crisis periods[1].

Methods

The study used the comparative analysis methods based on the percentage and ratios of the macroeconomic variables. Further, the study calculated natural log return of each of the indices under consideration using the formula:

$$Return = \ln\left(\frac{P_t}{P_{t-1}}\right) * 100, \quad (1)$$

where

P_t = index price of the current year

P_{t-1}= index price for the previous year.

After calculating yearly return, we calculate annual average return (AAR) for 20, 15, 10 and 5 years. This is presented in Table 12. In the same table, we present Compounded Average Growth Rate (CAGR) calculated as follows:

$$CAGR = \{\left(\frac{End\ Value}{Beginning\ Value}\right)^{\frac{1}{Number\ of\ Years}} - 1\} \quad (2)$$

Optimal Portfolio Weights

The objective of an investor is to optimally allocate funds in his portfolio to minimize the risk for a given level of expected return or to maximise the expected return at a pre-specified level of risk. The optimal weights have been computed as follows using the methodology described in Kroner and Ng (1998):

$$w_t^i = \frac{h_t^j - h_t^{ij}}{h_t^i - 2\,h_t^{ij} + h_t^j}, \quad (3)$$

where w_t^i is the optimal weight of asset i at time t, h_t^i *and* h_t^j are the conditional variances at time t for asset i and asset j, respectively, h_t^{ij} is the conditional covariance between asset i and asset j at time t. The optimal portfolio weights

1. Division of sub-periods is based on NBER business cycle, and the same structural breaks have been confirmed through Chow Test.

indicate the optimal proportion of an asset in an investor's portfolio *vis-à-vis* other assets at any given point in time.

The weights in equation 3; once above one or below zero do not make any sense in reality. Hence, the study imposes restrictions on weights that cannot exceed one or deceed zero as given in equation 4.

$$w_{ij,t} = \begin{cases} 0 & if\, w_{ij,t} < 0 \\ w_{ij,t} & if\ 0, \leq w_{ij,t} \leq 1 \\ 1 & if\ w_{ij,t} > 1 \end{cases} \quad (4)$$

Here, $w_{ij,t}$ is the weight of stock index i and j at time t.

Section IV
Results

Financial Regulatory System of BRICS Countries

Reforms in financial system emphasise on regulating financial markets and making them more attractive for market participants. Financial regulation focuses on domestic regulation as well as international regulation. Greater regulatory cooperation is required to manage cross-border markets for the United States, European Union, and other jurisdictions. At present, regulations are required for raising international capital, trading in securities and derivatives and lending practices (Ogus, 2004). A regulatory system is optimal when it carries four major characteristics such as efficiency, accountability, competency, and legitimacy. The two goals of financial regulation are to maintain safety and soundness of the financial system and foster the growth and development of the financial markets. Safety and soundness of a financial system depends on three functions like prudential regulation, business conduct regulation, and market stability measures. Regulations and regulatory activities applicable to banks, securities firms and insurance companies to ensure that they are financially sound and capable of meeting their market obligations are known as a prudential obligation. These activities identify potential problems before they becomes serious. Business conduct regulation protects customers of financial products and entrusts funds to financial institutions. The regulatory body needs to maintain market stability, especially intervening at the time of crisis and provide liquidity when failure of the financial institution severely affects the financial system.

Table 4
Financial Regulatory Authorities of BRICS Countries

Country	*Segment*	*Regulatory Authority*	*Year of Establishment*
Brazil	Money Markets	Brazilian Central Bank (BCB)	1964
	Capital Markets	Brazilian Securities and Exchange Commission (CVM), Brazil	1976
	Insurance	Superintendence of Private Insurance (SUSEP)	1966
	Pension Funds	The national superintendence of complementary social security (PERVIC)	2009
	All Financial Sectors	National Monetary Council (CMN)	1964
Russia	Capital Markets	The Federal Service for Financial Markets (FFMC)	2004
	All Segments of Financial Markets	Central Bank of Russia (CBR)#	1860
	Insurance	Federal Insurance Supervisory Authority	1992
India	Money Markets	Reserve Bank of India (RBI)	1935
	Capital Markets	Securities and Exchange Board of India (SEBI)	1988
	Insurance	Insurance Regulatory and Development Authority of India (IRDAI)	1999
	Pension Funds	Pension Fund Regulatory Development Authority (PFRDA)	2003
	Commodity Futures Markets	Forward Market Commission (FMC)	1953*
China	Capital Markets	China Securities Regulatory Commission (CSRC)	1998
	Money Markets	China Banking Regulatory Commission (CBRC)	2003
		Peoples Bank of China (PBOC, the Central Bank)	1948
	Insurance	China Insurance Regulatory Commission (CIRC)	1998
South Africa	Capital Markets	Financial Services Board (FSB)	1990
	Credit Industry	National Credit Regulator	2005
	Money Markets	South African Reserve Bank	1921

Source: Different ministries of BRICS countries; * FMC has merged with SEBI with effect from 28th September2015. **September 2013 (FFMC abolished, and Bank of Russia took all financial markets charge). # act as a mega financial regulator from September 1, 2013.

Different countries follow different regulatory systems based on their institutional framework (Ogus, 2004). Single regulatory system and multiple regulatory system (umbrella regulatory system) are the two types of regulatory systems which regulate the financial sectors of an economy. The single regulatory system regulates all segments of financial sectors like banking, securities, and insurance. On the other hand, multiple regulatory system

separately regulates all three important segments of the financial system. However, there is also a twin regulatory system where banking and securities markets perform all regulatory activities within the nation.

All the BRICS countries follow multiple regulatory systems except Russia. Russia was following the multiple regulatory system, but from 2013 onwards, the Central Bank of Russia has been acting as a mega financial regulator (Table 4). Both the single regulatory system and multiple regulatory system consist of their own cost and benefits. Single regulatory system helps achieve economies of scale, accountability and transparency, reduced overlaps and duplication; at the same time, it causes less innovation, lacks regulatory competition and specialization. On the other hand, multiple regulatory system performs effective regulation through regulatory competition, creates innovations in financial system and avoids adjustment and organisational cost. At the same time, it causes lack of economies of scale and the chances of overlaps and duplication increase.

BRICS Countries Stock Markets

Details of stock exchanges, major indices, number of members in each indices and year of index formation for BRICS countries is provided in Table 5. The market leaders of the stock markets as measured by the sensitive indices are IBOVESPA, MICEX, NIFTY, SHCOMP and JSE.

Table 5
Major Stock Indices for BRICS Countries

Country Name	*Exchange*	*Index Name*	*No of Companies*	*Year of Index Formation*
Brazil	BM & F BOVESPA	IBOVESPA	64	1988
Russia	MICEX-RTS/MOSCOW Stock Exchange	MICEX	50	1997
India	National Stock Exchange of India Ltd.	NIFTY	50	1996
China	Shanghai Stock Exchange	SHCOMP	1274	1990
South Africa	Johannesburg Stock Exchange	JSE all shares	170	1995

Source: Bloomberg.

Table 6 provides details of sessions of the markets for BRICS countries and USA. Trading in stock markets involves buying and selling of securities. The market is a platform where investors/traders can buy and sell different financial instruments. Sessions in an equity market differ among countries. Most of the countries follow pre-open session for price discovery (deciding a fair price in which more number of shares can be traded) followed by the normal trading hours, closing sessions and post-closing sessions. An interesting thing here is that there is a lunch break during market hours in stock markets of China.

There are very few markets all over the world having a lunch break (for example Japan). There are two different types of deals prevalent in a market, called as block deal and bulk deal. While block deals cannot be seen in the normal trading window, bulk orders are shown in the normal trading window. The closing session calculates the closing price for the day. The closing price is not the last traded price. It is the weighted average price for the last 15 minutes or half an hour, depending on the market practice. In the post-closing session, if some positions are still open, they are allowed to be squared-off in a single price (i.e., closing price).

Table 6
Timings of the Markets

	Pre-Open	*Normal Trading*	*Closing*	*Post-Closing*
Brazil*	18:15-18:30	18:30-02:25	02:25-02:30	–
Russia	12:15-12:30	12:30-21:15	21:15-21:30	–
India	9:00-9:15(9:00-9:08; 9:08-9:12; 9:12-9:15)	9:15-3:30	15:30-15:40	15:40-16:00
China	06:45-06:55	7:00-9:00 and 10:30-12:30	–	–
South Africa**	10:30-12:00	12:30-20:20	20:20-20:30#	20:30-21:45##
USA	7:00-9:30	9:30-15:45	15:45-16:00	16:00

Note: * 18.30-02.25 is odd-lot timing, ** opening match auction-12.00-12.30, # closing auction call phase for South Africa, ## closing match auction. There is a lunch break from 9:00-10:30 in China market, all timings are as per Indian Standard Time(IST).

Source: Bloomberg.

Table 7 presents clearing and settlement process of BRICS and USA. Clearing and settlement is a post-market activity. Most of the countries follow T+2 rolling settlement process, whereas South Africa follows T+5 and Brazil follows T+3. In a T+2 rolling settlement process, shares/funds will be credited or debited after two trading days. If we purchase shares on Monday, it will be credited to our account on Wednesday. Similarly, if we purchase shares on Friday, it will be credited to our account on Tuesday because Saturday and Sunday are holidays. In securities market, clearing corporations play a key role in safeguarding an investor's interest. They examine whether members on the stock exchange meet their obligations to deliver funds or securities. These corporations act as a legal counter-party to all trades and guarantee settlement of all transactions on the stock exchanges. Depository is an institution that holds securities (like shares, debentures, bonds, etc.) of investors in an electronic form otherwise called as DEMAT form.

Table 7
Clearing and Settlement Cycle

Country	*Exchange*	*Equity*
Brazil	BM&FBOVESPA	T+3
Russia	MICEX	T+2
India	BSE	T+2
	NSE	T+2
China	Shanghai Stock Exchange	Varies security to security
South Africa	JSE	T+5
USA	Various, vide SEC Rule	T+2, w.e.f. Sep. 5, 2017

Source: Bloomberg.

Details of the clearing corporations and depositories for BRICS countries with year of establishment of each of the BRICS countries are presented in Table 8. Each of the BRICS countries has one clearing and depository except India. India has one clearing and depository for each of the stock exchanges and totally it has five clearing corporations and two depository houses.

Table 8
Clearing Corporations and Depositories for BRICS Countries

Country	*Clearing*	*Depository*
Brazil	Brazilian Clearing & Depository Corporation (CBLC) (1997)	Brazilian Clearing & Depository Corporation (CBLC) (1997)
Russia	National Clearing Centre	National Settlement Depository (1996)
India	(a). India International Clearing Corporation (IFSC) Limited (2017)-BSE	Central Depository Services Ltd. (CDSL) (1999)
	(b). Indian Clearing Corporation Ltd.	National Securities Depository Ltd.
	(c). National Securities Clearing Corporation Ltd. (1995)	(NSDL) (1996)
	(d). NSE IFSC Clearing Corporation Ltd. (2017)	CDSL and NSDL
	(e). Metropolitan Clearing Corporation of India Ltd. (2008)- XMSE	
China	China Securities Depository and Clearing Corp. Ltd. (2001)	China Securities Depository and Clearing Corp. Ltd. (2001)
South Africa	Strate Ltd (1999)	Strate Ltd (1999)

Sources: Capital market regulators of BRICS countries; numbers in parenthesis are year of establishment.

Table 9
Percentage of Listed Companies to World Listed Companies

(in per cent)

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*	*BRICS*
1993	2	0	11	0	2	24	16
1994	2	0	14	1	2	23	18
1995	2	1	16	1	2	22	21
1996	2	1	16	1	2	22	22
1997	1	0	15	2	2	21	21
1998	1	0	15	2	2	19	20
1999	1	0	15	2	2	19	20
2000	1	0	15	3	2	17	20
2001	1	0	14	3	1	15	20
2002	1	0	14	3	1	15	20
2003	1	1	14	3	1	13	19
2004	1	1	12	4	1	13	18
2005	1	1	12	3	1	13	18
2006	1	1	11	3	1	12	17
2007	1	1	11	3	1	11	17
2008	1	1	11	4	1	10	18
2009	1	1	11	4	1	10	18
2010	1	1	11	5	1	10	19
2011	1	2	11	5	1	9	20
2012	1	1	12	6	1	9	20
2013	1	1	12	6	1	9	20
2014	1	1	12	6	1	10	20
2015	1	1	13	6	1	10	22

Source: Authors calculation.

Appendix I presents the total number of listed companies and Table 9 presents percentage of listed companies in the world since 1993 to 2016 for BRICS and USA. The company that wants to go public to raise funds through issuing shares or bonds is required to get listed in a stock exchange. The process starts with initial public offers (IPO) and then the shares go to the secondary market for trading. Up to 2016, all over the world, 43,192 companies have been listed, out of which India has the highest number of listed companies (5820), comprising 13 per cent share of the total number of listed companies all over the world. Combined BRICS countries contribute 22 per cent of listed

companies to the world's listed companies, whereas USA contributes only 10 per cent to the world's listed companies. Brazil and Russia have the least number of listed companies on their stock exchanges in comparison to other BRICS countries' stock markets. The number of listed companies are increasing every year in each of the BRICS countries and the same is decreasing for USA.

PE ratio is the ratio of current price per share to its earning per share. The stock is expensive in case of high PE ratio and cheaper in case of low PE ratio. Investors prefer low PE as compared to high PE. The PE ratio ranges from 7.22 to 26.57 for BRICS countries. This ratio is low in case of Russia and high in case of India among all the countries under consideration. Based on PE ratio, investment in India is expensive and cheap in Russia among the stock markets of the BRICS countries. The PE ratio of MSCI BRIC is low in comparison to the world as a whole as well as USA. Hence, it provides a good indication to invest in these countries. This is presented in Table 10.

Table 10
PE Ratio for BRICS and USA Stock Indices

Country Year	*Brazil IBOV*	*Russia INDEXCF*	*India Nifty*	*China SHCOMP*	*South Africa Top40*	*USA S&P 500*	*World MSCI World*	*BRIC MSCI BRIC*
2003	13.19	9.48	15.79	33.48	18.86	20.56	23.00	–
2004	11.13	7.34	13.62	21.42	11.3	18.47	17.66	–
2005	9.8	9.19	17.01	19.09	13.37	16.91	16.22	–
2006	12.22	11.7	17.52	27.67	11.82	16.62	16.79	–
2007	13.61	11.69	22.51	39.65	14.55	17.45	16.29	–
2008	11.08	4.9	11.38	17.30	10.98	16.66	16.02	–
2009	15.52	11.18	23.52	26.05	20.44	19.17	21.74	17.26
2010	12.06	8.09	19.96	15.97	14.25	15.42	14.86	12.04
2011	11.12	5.22	13.79	11.78	11.68	13.43	13.65	8.49
2012	58.64	5.88	16.13	12.36	18.93	14.38	15.87	10.86
2013	28.89	6.83	16.2	10.36	17.88	17.44	19.32	9.96
2014	20.24	7.93	19.36	15.47	20.07	18.33	17.87	9.82
2015	19.69	7.01	20.73	18.08	32.93	18.85	20.07	12.26
2016	19.15	8.01	20.11	17.24	18.81	20.59	20.63	14.81
2017	18.94	7.22	26.57	16.78	19.09	21.65	20.39	16.58

Source: Bloomberg.

To examine the returns stock markets, we calculate yearly compound annual growth rate (CAGR) and annual average return (AAR). In this stdudy we have calculated the AAR and CAGR for 20, 15, 10 and 5 years for each of the BRICS

countries along with USA and MSCI World, MSCI BRIC; to provide status of each of the stock market returns over several years.

We observe that the AAR and CAGR for 15 years have given a higher return than 5, 10 and 20 years for all BRICS countries and regional indices (Table 11). Further, India and Brazil markets have provided the highest, 13 per cent AAR and 14 per cent CAGR in 15 years among the BRICS countries. This justifies that India and Brazil are preferred destinations for investors.

Table 11
CAGR and AAR for BRICS, USA and World

(in per cent)

CAGR	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*	*MSCI World*	*MSCI BRIC*
20 Years	5	5	9	7	8	5	4	5
15 Years	14	9	14	8	10	8	7	12
10 Years	-4	-7	1	-3	1	6	3	-3
5 Years	-5	-5	9	7	1	13	9	2
AAR								
20 years	5	5	9	6	7	5	4	5
15 years	13	9	13	8	10	7	7	11
10 Years	-4	-7	1	-3	1	6	3	-3
5 Years	-5	-6	9	7	1	13	9	2

Source: Authors Calculation.

Macroeconomics Dashboard for BRICS countries, USA and World

This section presents macroeconomic variables for BRICS countries, USA and the world. Table 12 presents data on GDP growth rate for BRICS, USA, and world from 1996 to 2017. The total GDP of China (11.006 trillion USD) is highest among all the BRICS countries. India (2.035 trillion USD) appears to be the second highest in terms of total GDP among all these countries followed by Brazil (1.772 trillion USD), Russia (1.332 trillion USD) and South Africa (0.313 trillion USD) . The world GDP growth rate was 3.3 per cent in 2017 and India's GDP growth rate was 7.1 per cent, followed by China's 6.9 per cent; at the same time, the GDP growth rate of USA was only 2.3 per cent of the annual GDP growth rate. This indicates the strength of the BRICS countries, especially India and China that are the fastest growing economies in the world.

Table 12
GDP Growth Rate for BRICS, USA, and World

	Brazil	*Russia*	*India*	*China*	*South Africa*	*BRICS*	*World*	*USA*
1996	2.16	-3.6	7.3	9.9	4.3	4.26	3.67	3.8
1997	3.42	1.4	8	9.2	2.6	5.33	3.86	4.5
1998	0.37	-5.3	4.3	7.8	0.5	3.02	2.21	4.5
1999	0.5	6.4	6.7	7.6	2.4	5.02	3.50	4.7
2000	4.38	10	7.6	8.4	4.2	7.16	4.55	4.1
2001	1.32	5.1	4.3	8.3	2.7	5.9	2.16	1
2002	3.06	4.7	5.5	9.1	3.7	6.95	2.53	1.8
2003	1.25	7.3	4	10	2.95	7.41	3.44	2.8
2004	5.64	7.2	8.1	10.1	4.55	8.17	5.06	3.8
2005	3.18	6.4	7	11.3	5.28	8.46	4.50	3.3
2006	4	8.2	9.5	12.7	5.6	9.56	4.93	2.7
2007	6.06	8.5	9.6	14.2	5.36	10.71	4.85	1.8
2008	5.13	5.2	9.3	9.7	3.19	7.67	2.20	-0.3
2009	-0.11	-7.8	6.7	9.4	-1.53	4.74	-0.40	-2.8
2010	7.58	4.5	8.6	10.6	3.03	8.8	5.50	2.5
2011	4	4.3	8.9	9.5	3.28	7.35	4.27	1.6
2012	1.92	3.7	6.7	7.9	2.23	5.84	3.33	2.2
2013	3.01	1.8	5.5	7.8	2.48	5.8	3.78	1.7
2014	0.54	0.7	6.4	7.3	1.73	5.35	3.48	2.6
2015	-3.54	-2.5	7.4	6.9	1.35	4.99	3.18	2.9
2016	-3.46	-0.2	8.2	6.7	0.28	5.15	3.05	1.5
2017	0.99	1.5	7.1	6.9	1.33	5.71	3.31	2.3

Source: Bloomberg.

We estimate the percentage contribution of each of the BRICS countries along with that of USA to the world GDP (Table 13). As a developed country, USA contributes 25 per cent to world GDP. At the same time, China contributes 15 per cent to world GDP and stands as the highest contributor among BRICS countries. India appears to be the second highest contributor to the world GDP followed by Brazil and Russia (each 2 per cent). South Africa is the least contributor to the world GDP among all the countries under consideration.

Table 13
Percentage Contribution of GDP to World GDP

(in per cent)

Year	*Brazil*	*Russian Federation*	*India*	*China*	*South Africa*	*United States*
1997	3	1	1	3	0	27
1998	3	1	1	3	0	29
1999	2	1	1	3	0	30
2000	2	1	1	4	0	31
2001	2	1	1	4	0	32
2002	1	1	1	4	0	32
2003	1	1	2	4	0	30
2004	2	1	2	4	1	28
2005	2	2	2	5	1	28
2006	2	2	2	5	1	27
2007	2	2	2	6	1	25
2008	3	3	2	7	0	23
2009	3	2	2	8	0	24
2010	3	2	3	9	1	23
2011	4	3	2	10	1	21
2012	3	3	2	11	1	22
2013	3	3	2	12	0	22
2014	3	3	3	13	0	22
2015	2	2	3	15	0	24
2016	2	2	3	15	0	25

Source: Bloomberg.

The Index Industrial Production (IIP) measures the growth of the secondary sector in an economy and represents the status of production. A high IIP indicates the strength of the manufacturing sector of a country and gives a positive indication for stock markets because investors prefer high IIP countries. If IIP growth rate is more, than the stock price of companies will increase. There is a positive relationship between IIP growth rate and stock price (Abugri, 2008 and Rahman *et al*. 2009). From Table 14, we observe India's IIP growth rate is highest (8.37 per cent) followed by China (6.07 per cent) among BRICS and USA. Russia has the negative IIP (-1.4 per cent). USA and Brazil have 4.8 per cent and 4.7 per cent IIP growth rates, respectively. This may be possible as they both belong to one region.

Table 14
IIP Growth Rate for BRICS and World

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*World*
1997	-	-	7.1	13.2	-	2.1
1998	-	-	4.3	9.6	-2.04	1.1
1999	-	-	8.1	9.77	5.97	1
2000	-	-	3.5	11.2	3.98	2.7
2001	-	-	3	9.9	3.43	1.2
2002	-	-	6.2	12.7	0.26	2.1
2003	4.4	-	7.4	16.7	-2.17	2.8
2004	8.8	-	12.3	16.3	7.42	2.3
2005	2.2	-	5.2	15.9	4.97	0
2006	0.4	-	13.65	15.4	5.54	3.6
2007	6.5	-	13.53	17.1	-0.22	2.2
2008	-14.6	-	-1.62	12.9	-11.18	0.9
2009	18.9	-	9.5	12.3	3.33	4
2010	2.7	0.9	8.14	14.4	2.03	3.6
2011	-0.9	1	2.68	13.8	2.69	4.7
2012	-3.6	1	-0.55	9.98	1.82	3.6
2013	-2.3	-2.1	3.55	9.7	3.47	6.5
2014	-2.6	1.6	3.97	8.26	1.62	2.5
2015	-12	0.5	3.12	6.1	0.21	5.9
2016	0.1	-1.6	2.35	6.07	-2.23	4.8
2017	4.7	-1.4	8.37	–	1.69	4.8

Source: Bloomberg.

Appendix II provides exchange rate of each of the BRICS countries in terms of USD. The Brazilian Real is the strongest currency, and Indian Rupee is the weakest currency among all the BRICS countries. After 2012, exchange rate of all countries under study has started depreciating except China. The yearly percentage change in exchange rate is presented in Table 15. This indicates more or less similar amount of changes of each country's exchange rate over the years.

Table 15
Yearly Percentage Changes of Exchange Rate Against USD

Year	*Real (Brazil)*	*Rubble (Russia)*	*Rupee (India)*	*Yuan (China)*	*Rand (South Africa)*
1994	7.25	2.85	1.00	1.45	1.04
1995	1.15	1.31	1.12	0.98	1.03
1996	1.07	1.19	1.02	1.00	1.28
1997	1.07	1.07	1.09	1.00	1.04
1998	1.08	3.46	1.08	1.00	1.21
1999	1.49	1.34	1.02	1.00	1.05
2000	1.08	1.02	1.07	1.00	1.23
2001	1.18	1.08	1.03	1.00	1.58
2002	1.53	1.05	0.99	1.00	0.72
2003	0.82	0.92	0.95	1.00	0.78
2004	0.92	0.95	0.95	1.00	0.85
2005	0.88	1.04	1.04	0.98	1.12
2006	0.91	0.92	0.98	0.97	1.11
2007	0.83	0.93	0.89	0.94	0.98
2008	1.30	1.20	1.24	0.93	1.39
2009	0.75	1.02	0.95	1.00	0.78
2010	0.95	1.02	0.96	0.97	0.90
2011	1.12	1.05	1.19	0.95	1.22
2012	1.10	0.95	1.04	0.99	1.05
2013	1.15	1.08	1.12	0.97	1.24
2014	1.13	1.77	1.02	1.02	1.10
2015	1.49	1.24	1.05	1.05	1.34
2016	0.82	0.85	1.03	1.07	0.89
2017	1.02	0.94	0.94	0.94	0.90

Source: Authors calculation.

Table 16 provides the Economic Policy Uncertainty Index (EPUI). The EPUI measures policy-related economic uncertainty and is constructed considering the following three underlying factors; information on economic policy uncertainty from the 10 largest newspapers, a compilation of lists of temporary federal tax code provisions and the professional forecasters survey of Federal Reserve Bank of Philadelphia. Conceptually, stock price and economic policy uncertainty indices are negatively correlated. If policy uncertainty reduces, stock price will increase. In this table, we find this index is very low for India

and high for rest of the BRIC countries as well as the world. This indicates India is a better country for investment among all BRICS countries. It may be noted that South Africa does not have EPUI.

Table 16
Economic Policy Uncertainty Index*

Date	*Global*	*Brazil*	*Russia*	*India*	*China*
1997	107.1	127.46	22.72		20.72
1998	95.18	98.4	88.53		69.67
1999	61.81	49.52	31.1		36.99
2000	104.61	85.99	85.67		112.61
2001	113.48	133.19	55.71		136.85
2002	119.49	128.03	79.6		85.21
2003	74.8	84.6	78.41	42.96	97.14
2004	65.29	46.26	81.48	50.83	96.88
2005	58.98	153.89	96.36	42.35	57.22
2006	54.54	78.51	58.93	63.5	67.68
2007	92.66	189.98	125.65	61.81	93.83
2008	146.14	320.69	143.17	136.16	232.77
2009	93.01	77.76	130.11	78.49	74.86
2010	123.05	78.58	122.26	157.43	110.67
2011	183.13	154.3	151.12	249.34	324.46
2012	164.37	76.77	156.43	153.57	192.77
2013	112.68	116.35	206.56	103.19	137.23
2014	109.54	185.61	321.74	115.65	93.96
2015	111.9	330.61	195.3	77.32	151.61
2016	259.45	422.52	323.78	117.89	646.91
2017	138.77	215.57	250.45	84.01	269.35

Note: * EUPI is not available for South Africa.
Source: Bloomberg.

Table 17 presents the state of inflation indicated through Consumer Price Index (CPI) for BRICS as well as USA. Inflation is the persistent increase in the price level of an economy. In this table, it is very clear that inflation during the 2008 global financial crisis for all countries was high. After that, it started coming down, and now inflation for all BRICS countries and USA is under control; only South Africa's inflation is relatively high. Basically, inflation and stock prices are negatively correlated. High inflation causes a bearish trend in the stock market, and low inflation causes a bullish trend in the stock market. As

inflation is low in most of these countries, all markets are in bullish trend; this is a favourable indication for investors to invest in these countries.

Table 17
CPI for BRICS and USA

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*
1997	5.22	11.00	5.26	0.40	6.21	1.70
1998	1.65	16.49	16.25	-1.00	9.06	1.61
1999	8.94	21.98	0.00	-1.00	2.14	2.68
2000	5.97	20.20	3.23	1.50	6.82	3.39
2001	7.67	18.60	5.21	-0.30	4.67	1.55
2002	12.53	15.10	3.96	-0.40	12.44	2.38
2003	9.30	12.00	2.86	3.20	0.21	1.88
2004	7.60	11.70	4.63	2.40	3.54	3.26
2005	5.69	10.90	5.31	1.60	3.62	3.42
2006	3.14	9.00	6.72	2.80	5.83	2.54
2007	4.46	11.90	5.51	6.50	8.81	4.08
2008	5.90	13.30	9.70	1.20	9.61	0.09
2009	4.31	8.80	14.97	1.90	6.31	2.72
2010	5.91	8.80	9.47	4.60	3.47	1.50
2011	6.50	6.10	6.49	4.10	6.15	2.96
2012	5.84	6.60	11.17	2.50	5.67	1.74
2013	5.91	6.50	9.13	2.50	5.36	1.50
2014	6.41	11.40	5.86	1.50	5.33	0.76
2015	10.67	12.90	6.32	1.60	5.28	0.73
2016	6.29	5.40	2.23	2.08	6.72	2.07
2017	2.95	2.50	2.23	1.80	4.60	2.11

Source: Bloomberg.

Market capitalisation to GDP ratio determines whether a market is undervalued or overvalued (Buffet, 2001). A result of greater than 100 per cent is said to indicate an overvalued market, while a value of around 50 per cent or 50-100 per cent, shows an undervalued market. The following is the formula for the market capitalisation to GDP.

$$Market\ capitalisation\ to\ GDP\ ratio = \frac{Stock\ Market\ Capitalisation}{Market\ GDP} * 100 \quad (3)$$

Table 18 shows that markets of USA and South Africa are overvalued as per their market capitalisation to GDP ratio. Markets of Brazil, Russia, India and China are undervalued as per their market capitalisation to GDP ratio. Rationally, it is cheaper to invest in undervalued markets rather than investing in overvalued markets because undervalued markets have more growth potential than overvalued markets. This indicator is known as Buffet indicator in the financial world. Based on the Buffett indicator, we find stock markets of USA and South Africa to be overvalued as their market capitalszation to GDP ratio is above 1 (1.17 and 1.01, respectively). Markets in Brazil (0.19), Russia (0.19), India (0.74) and China (0.68), on the other hand, are undervalued. The potential to get higher returns in undervalued markets is higher than overvalued markets. India and China are undervalued based on market capitalisation to GDP ratio, at the same time, these countries' GDP growth rate is the highest in the world. Thus, diversification for foreign investors in these countries will give more economic value.

Table 18
Market Capitalisation as a per cent of GDP

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*	*World*
2003	39.09	59.34	45.21	26.99	95.85	117.35	79.13
2004	48	58.08	53.45	20.01	107.44	123.28	82.56
2005	52.1	87.96	65.47	15.37	123.55	119.96	87.11
2006	65.06	143.59	86.02	36.42	141.3	126.06	98.21
2007	102.33	116.46	146.52	110.2	152.25	122.01	104.22
2008	35.59	25.44	52.06	33.91	84.72	72.06	50.64
2009	82.76	61.7	95.3	57.15	135.13	95.29	76.29
2010	67.43	65.53	95.34	54.73	142.66	103.12	79.69
2011	48.23	40.31	54.54	36.93	106.98	96.7	63.65
2012	53.17	39.32	68.61	36.41	130.09	104.28	71.34
2013	43.41	36.52	60.76	36.37	131.31	132.88	82.06
2014	33.82	17.28	83.64	52.32	138.26	145.6	85.41
2015	18.78	19.1	74.24	68.51	101.73	135.72	82.66
2016	39.4	43.34	74.07	58.63	132.84	139.74	89.59

Source: Bloomberg.

Appendix III and Table 19 present total market capitalisation (in million USD) and market capitalisation as a percentage to world market capitaliation for each of the BRICS countries and USA. The BRICS countries contribute 15 per cent to world market capitalisation in which China contributes 10 per cent, India 3 per cent and Brazil, Russia and South Africa each 1 per cent. In 2003,

USA contributed 44 per cent to world market capitalisation and at the same time, BRICS countries contributed only 4 per cent. Over 15 years, this contribution from BRICS countries has increased to 15 per cent, and at the same time, it has come down to 36 per cent for USA. This indicates that investment is flowing from developed markets to emerging and developing markets like BRICS countries.

Table 19
Market Capitalisation as a percentage to World Market Capitalisation

(in per cent)

Date	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*BRICS*	*USA*
2003	1	1	1	1	1	4	44
2004	1	1	1	1	1	5	42
2005	1	2	1	1	1	6	38
2006	1	3	2	2	1	9	35
2007	2	3	3	6	1	15	30
2008	2	1	2	5	1	11	33
2009	3	2	3	6	1	15	30
2010	3	2	3	6	1	15	30
2011	3	2	2	6	1	13	33
2012	2	2	2	6	1	13	32
2013	2	1	2	5	1	11	36
2014	1	1	2	8	1	13	38
2015	1	1	2	11	1	15	37
2016	1	1	2	10	1	15	38
2017	1	1	3	10	1	15	36

Source: Authors calculation.

The yearly percentage of money supply (broad money) from 1998 to 2017 is presented in Table 20. Increase in money supply causes increase in inflation in an economy (Berry *et al.* 2007). For all the BRICS countries as well as USA, the percentage of money supply has decreased by more than half of what it was in 1998, except in the case of Brazil which came down slightly, i.e. from 10.52 per cent to 9.62 per cent as compared to rest of BRICS countries and USA. The percentage of money supply for Russia has reduced to 10.5 per cent in 2017 from 21.3 per cent in 1998; the same has reduced from 19.6 per cent to 10.5 per cent for India, 15.34 per cent to 8.1 per cent for China, 13.38 per cent to 6.42 per cent for South Africa and 8.47 per cent to 4.7 per cent for USA.

Table 20
Percentage of Money Supply

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*
1998	10.53	21.30	19.60	15.34	13.38	8.47
1999	24.66	57.50	17.70	14.70	10.45	5.98
2000	18.74	61.00	15.60	13.99	7.26	6.19
2001	12.30	39.90	13.64	14.40	16.44	10.26
2002	10.11	32.40	16.02	16.80	18.07	6.21
2003	21.81	50.40	13.07	19.60	12.88	5.10
2004	17.92	35.80	13.49	14.63	13.13	5.80
2005	17.99	38.50	17.79	17.57	20.45	4.13
2006	18.11	48.70	19.33	16.94	22.54	5.87
2007	17.41	43.50	22.85	16.70	23.59	5.72
2008	17.96	0.80	19.93	17.82	14.84	9.70
2009	15.62	17.70	18.03	27.68	1.79	3.73
2010	15.49	31.10	16.95	19.72	6.92	3.59
2011	18.93	21.00	16.00	13.61	8.28	9.81
2012	16.11	12.20	11.25	13.83	5.17	8.22
2013	8.69	14.70	14.80	13.59	5.85	5.43
2014	12.95	1.50	10.71	12.20	7.23	5.93
2015	10.18	11.30	10.70	13.30	10.46	5.87
2016	11.01	9.20	6.20	11.30	6.07	7.13
2017	9.63	10.50	10.50	8.10	6.42	4.71

Source: Bloomberg.

Savings and investment are the key indicators of a country's development. High savings causes high investment and it contributes to economic growth. Table 21 presents gross national savings as percentage of GDP and Table 22 presents gross national investment as a percentage of GDP. China's savings as percentage of GDP has grown from 38.2 per cent in 1992 to 45.4 per cent in 2017. However, for India, China and Russia, savings as percentage of GDP is found to be higher than for the world. The reverse is the case for Brazil, South Africa and USA, i.e. the percentage of savings to GDP is lower than that of the world. Investment as percentage of GDP of China has grown from 39.64 per cent in 1992 to 44.04 per cent in 2017. Investment as percentage of GDP for India and China is higher than that for the world. This indicates India and China have high savings as well as investment as a percentage of GDP. South Africa has lowest saving as well as investment as percentage of GDP among all BRICS countries but it is almost same as that of USA. This indicates that high savings enables high investment and *vice versa*.

Table 21
Gross National Savings as percentage of GDP

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*	*World*
1992	20.51	37.49	21.36	38.19	18.23	17.63	22.53
1993	20.71	29.52	21.78	41.87	17.23	16.98	22.40
1994	21.37	27.88	23.72	43.02	17.73	17.78	22.69
1995	16.80	25.91	23.67	41.61	17.56	18.65	23.19
1996	14.47	25.32	22.56	40.76	16.92	19.52	23.65
1997	14.27	20.22	24.27	40.03	16.26	20.72	23.93
1998	14.24	15.65	23.26	38.61	16.27	21.26	23.67
1999	13.07	25.73	25.63	36.79	16.54	20.74	23.46
2000	15.12	34.65	23.70	36.01	16.24	20.61	24.06
2001	14.51	30.30	24.93	37.59	16.02	19.47	23.18
2002	15.86	26.78	25.96	39.30	17.18	18.13	22.53
2003	17.53	26.15	29.11	42.95	16.28	17.30	22.78
2004	19.61	28.52	32.48	46.16	15.70	17.49	23.67
2005	18.72	28.83	33.46	46.72	15.19	17.86	24.18
2006	18.99	28.82	34.65	48.96	15.71	19.11	25.31
2007	19.85	29.26	36.84	51.13	15.60	17.27	25.48
2008	19.81	28.67	32.03	52.34	17.61	15.41	25.02
2009	17.22	19.40	33.67	51.08	17.98	14.34	23.16
2010	18.37	24.42	33.70	51.80	18.01	15.09	24.68
2011	18.88	29.15	35.40	49.82	17.50	15.69	25.62
2012	18.41	28.00	33.54	49.69	14.84	17.71	25.97
2013	18.95	25.13	32.29	48.79	15.38	18.28	26.01
2014	16.79	25.03	33.25	49.02	15.53	19.26	26.44
2015	15.83	27.18	31.85	47.46	16.31	19.35	26.52
2016	16.22	27.31	29.70	45.93	16.15	18.00	25.84
2017	16.22	26.58	28.56	45.41	16.22	17.48	25.81

Source: Bloomberg.

Table 22
Investment as Percentage of GDP

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*	*World*
1992	18.94	37.54	23.04	39.63	16.77	20.02	24.03
1993	20.85	29.54	22.19	43.96	15.16	20.33	23.74
1994	22.99	25.25	24.73	40.79	17.72	21.22	23.94
1995	19.18	23.84	25.27	39.56	19.17	21.21	24.16
1996	17.27	22.74	23.68	38.22	18.04	21.63	24.02
1997	17.76	20.24	25.57	36.20	17.72	22.36	23.98
1998	18.17	15.58	24.21	35.56	17.99	22.85	23.68
1999	17.39	14.04	26.63	34.87	17.04	23.32	23.64
2000	18.90	18.39	24.26	34.33	16.37	23.57	24.20
2001	18.74	20.57	24.24	36.30	15.75	22.05	23.36
2002	17.45	19.38	24.75	36.90	16.28	21.58	22.68
2003	16.86	18.98	26.83	40.37	17.11	21.66	22.92
2004	17.91	19.30	32.82	42.66	18.47	22.53	23.61
2005	17.21	18.54	34.65	40.98	18.32	23.22	24.01
2006	17.82	20.14	35.66	40.61	20.18	23.33	24.58
2007	19.82	24.09	38.11	41.24	20.99	22.35	25.16
2008	21.62	22.84	34.31	43.21	23.15	20.79	25.11
2009	18.80	15.56	36.48	46.34	20.71	17.51	23.04
2010	21.80	20.30	36.50	47.88	19.51	18.39	24.28
2011	21.83	24.41	39.59	48.01	19.72	18.55	25.09
2012	21.42	24.78	38.35	47.18	19.97	19.35	25.26
2013	21.98	23.67	34.02	47.25	21.26	19.76	25.35
2014	21.03	22.24	34.57	46.78	20.84	20.15	25.64
2015	19.13	22.14	32.90	44.75	20.71	20.43	25.80
2016	17.52	25.32	30.38	44.18	19.41	19.69	25.26
2017	17.61	23.76	29.94	44.05	19.07	19.76	25.38

Source: Bloomberg.

The World Bank group calculates the corruption control index. This index reflects perception of how public power is exercised. The corruption control index ranges from -2.5 to 2.5. If the corruption control index of a country is 2.5, corruption control is strong and if it is -2.5, corruption control is weak. Table 23 presents control of corruption for BRICS and USA. Brazil, Russia, India and China have weak corruption control and USA and South Africa have strong corruption control as per data from 1996 to 2016.

Table 23
Control of Corruption

Year	*USA*	*Brazil*	*Russia*	*India*	*China*	*South Africa*
1996	1.57	-0.02	-1.05	-0.38	-0.25	0.05
1998	1.6	0.08	-0.98	-0.25	-0.28	0.03
2000	1.66	0.04	-1	-0.35	-0.34	-0.06
2002	1.92	0.08	-0.93	-0.52	-0.36	-0.07
2003	1.76	0.09	-0.76	-0.42	-0.44	-0.12
2004	1.83	0.02	-0.8	-0.41	-0.51	0.06
2005	1.55	-0.14	-0.82	-0.36	-0.56	0.13
2006	1.35	-0.11	-0.91	-0.28	-0.51	0.18
2007	1.39	-0.08	-1.01	-0.4	-0.52	0.21
2008	1.45	0.01	-1.11	-0.34	-0.59	0.25
2009	1.29	-0.07	-1.13	-0.45	-0.51	0.45
2010	1.27	0.05	-1.09	-0.47	-0.61	0.57
2011	1.27	0.17	-1.07	-0.54	-0.56	0.46
2012	1.41	-0.04	-1.04	-0.51	-0.36	0.35
2013	1.31	-0.08	-1.01	-0.52	-0.52	0.35
2014	1.38	-0.34	-0.92	-0.43	-0.22	0.63
2015	1.4	-0.4	-0.95	-0.35	-0.27	0.67
2016	1.33	-0.44	-0.86	-0.3	-0.27	0.73

Source: Bloomberg.

The Global Competitiveness Index (GCI) is calculated considering a set of institutions, policies and factors, which provide the level of productivity of an economy. The GCI provides the level of prosperity the economy can achieve and ranks countries based on this index. As per 2017-18 rankings, Switzerland appears as number one and USA number two. Among BRICS countries, China has the highest rank (27th), followed by Russia (38th), India (40th), South Africa (61th) and Brazil (80th). This is presented in Table 24.

Table 24
Ranking as per Global Competitiveness Index

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*
2006	66	59	42	34	35	1
2007	72	58	48	34	44	1
2008	64	51	50	30	45	1
2009	56	63	49	29	45	2
2010	58	63	51	27	54	4
2011	53	66	56	26	50	5
2012	48	67	59	29	52	7
2013	56	64	60	29	53	5
2014	57	53	71	28	56	3
2015	75	45	55	28	49	3
2016	81	43	39	28	47	3
2017	80	38	40	27	61	2

Source: Bloomberg.

Trade Relation

Figures 4 to 8 present the percentage of trade relation of each of the BRICS countries with one another and with USA. Brazil, Russia, India and South Africa have a bigger trade relationship with China (20.29 per cent, 14.65 per cent, 11.94 per cent and 19.99 per cent, respectively) than USA. However, China has a smaller trade relation with the rest of the BRICS countries (6.54 per cent) and more with USA (15.69 per cent). This indicates BRICS countries have bigger trade relationships and interdependencies among each other.

Figure 4
Trade Relation between Brazil and other Countries

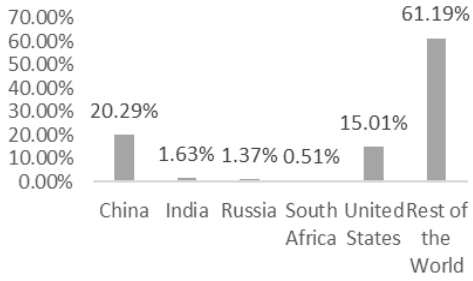


Figure 5
Trade Relation between Russia and other Countries

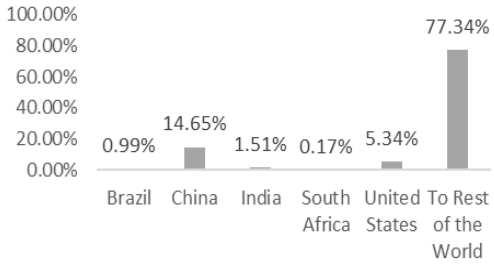


Figure 6
Trade Relation between India and other Countries

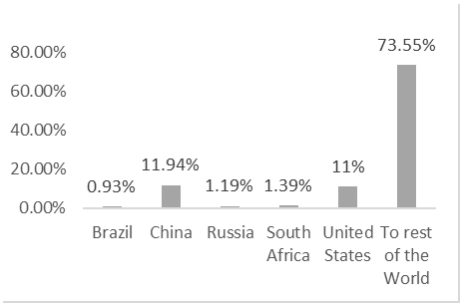


Figure 7
Trade Relation between China and other Countries

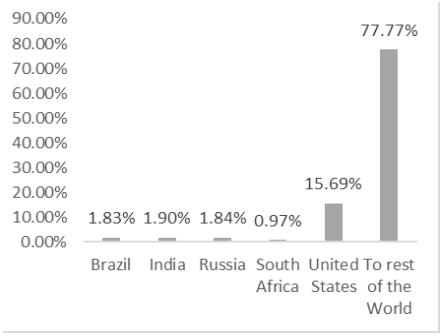
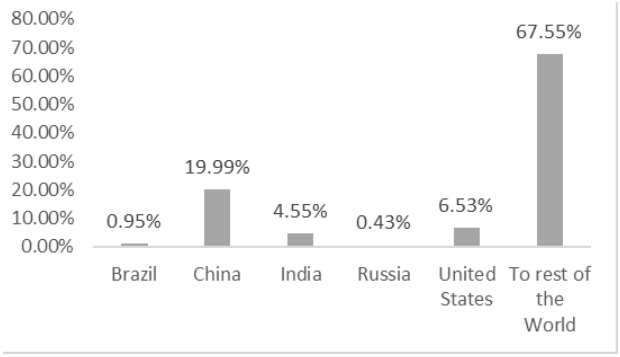


Figure 8
Trade Relation between South Africa and other Countries



Source: Bloomberg.

Optimal Portfolio Weights Among Stock Markets for BRICS Countries

The objective of an investor is to optimally allocate funds in his portfolio to minimise the risk for a given level of expected return or to maximise the expected return at a pre-specified level of risk. To calculate the optimal portfolio weights, first, we run the Dynamic Conditional Correlation GARCH (DCC-GARCH) model to capture the conditional variance and covariance series of all the BRICS countries' stock index returns. Thereafter, we use Kroner and Ng (1998) methodology to calculate the optimal portfolio weights for each of the periods under consideration. The mean of portfolio weights is presented in Table 25 for the full sample and subsamples. The result of the summary statistics of portfolio weights indicates how much percentage of total investment should be distributed between two countries; so that an investor can minimise the risk and maximise the return by diversifying his/her investment between two countries.

Full sample period: The mean weight of Brazil/Russia portfolio is 0.47. This indicates that for a $1 portfolio, on average, an investor should invest 47 cents in Brazil and the remaining 53 cents in Russia. Similarly, the mean weight of Brazil/India portfolio is 0.23 indicates that 23 cents should be invested in Brazil and 77 cents in India. The mean weight for Brazil/China portfolio is 0.26. This implies that an investor should invest 26 cents in Brazil and 74 cents in China. For Brazil/South Africa portfolio, mean weight of 0.12 indicates limited diversification opportunity as compared to other portfolios; 12 cents should be invested in Brazil and 88 cents in South Africa. The mean value of 0.24 for Russia/India portfolio depicts that 24 cents should be invested in Russia and 74 cents in India. In a portfolio of Russia/China, the mean weight is 0.29; this indicates 29 cents should be invested in Russia and 71 cents in China. The mean weight for Russia/South Africa portfolio is 0.17. This indicates that 17 cents should be invested in Russia and 83 cents in South Africa. In the case of India/China portfolio, the mean weight is 0.48. This indicates that 48 cents should be invested in India and 52 cents in China. The mean weight for India/South Africa portfolio is 0.52, which depicts that 52 cents should be invested in India and 48 cents in South Africa. The mean weight of China/ South Africa portfolio is 0.53; this means 53 cents should be invested in China and 47 cents in South Africa.

Table 25
Mean Value of the Portfolio Weights for BRICS Countries

	Full Sample	*Pre-Crisis*	*During Crisis*	*Post Crisis*
Brazil/Russia	0.47	0.52	0.65	0.37
Brazil/India	0.23	0.25	0.35	0.18
Brazil/China	0.26	0.26	0.28	0.26
Brazil/South Africa	0.12	0.18	0.19	0.15
Russia/India	0.24	0.23	0.25	0.23
Russia/China	0.29	0.27	0.25	0.30
Russia/South Africa	0.17	0.19	0.06	0.28
India/China	0.48	0.46	0.37	0.49
India/South Africa	0.52	0.51	0.52	0.67
China/South Africa	0.53	0.54	0.64	0.61

Pre-Crisis Period: The mean weight of Brazil/Russia portfolio is 0.52. This indicates that for a $1 portfolio, on average, an investor should invest 52 cents in Brazil and the remaining 48 cents in Russia. Similarly, the mean weight of Brazil/India portfolio is 0.25 indicates that 25 cents should be invested in Brazil and 75 cents in India. The mean weight for Brazil/China portfolio is 0.26. This implies that an investor should invest 26 cents in Brazil and 74 cents in China. For Brazil/South Africa portfolio, the mean weight of 0.18

indicates limited diversification opportunity as compared to other portfolios; 18 cents should be invested in Brazil and 82 cents in South Africa. The mean value of 0.23 for Russia/India portfolio depicts that 23 cents should be invested in Russia and 77 cents in India. In a portfolio of Russia/China, the mean weight of 0.27 indicates 27 cents should be invested in Russia and 73 cents in China. The mean weight for Russia/South Africa portfolio is 0.19. This indicates that 19 cents should be invested in Russia and 81 cents in South Africa. In the case of India/China portfolio, the mean weight is 0.46. This indicates that 46 cents should be invested in India and 54 cents in China. The mean weight for India/ South Africa portfolio is 0.51, which depicts that 51 cents should be invested in India and 49 cents in South Africa. The mean value of China/South Africa portfolio is 0.54, means 54 cents should be invested in China and 46 cents in South Africa.

During the Crisis Period: The mean weight of Brazil/Russia portfolio is 0.65. This indicates that for a $1 portfolio, on average, an investor should invest 65 cents in Brazil and the remaining 35 cents in Russia. Similarly, the mean weight of Brazil/India portfolio is 0.35 indicates that 35 cents should be invested in Brazil and 65 cents in India. The mean of the weights for Brazil/China portfolio is 0.28. This implies that an investor should invest 28 cents in Brazil and 72 cents in China. For Brazil/South Africa portfolio, the mean weight of 0.19 indicates limited diversification opportunity as compared to other portfolios; 19 cents should be invested in Brazil and 81 cents in South Africa. The mean value of 0.25 for Russia/India portfolio depicts that 25 cents should be invested in Russia and 75 cents in India. In a portfolio of Russia/China, the mean weight of 0.25 indicates that 25 cents should be invested in Russia and 75 cents in China. The mean weight of 0.06 for Russia/South Africa portfolio provides less opportunity for diversification. This indicates that 0.06 cents should be invested in Russia and 94 cents in South Africa. In the case of India/China portfolio, the mean weight is 0.37. This indicates that 37 cents should be invested in India and 63 cents in China. The mean weight for India/South Africa portfolio is 0.52 which depicts that 52 cents should be invested in India and 48 cents in South Africa. The mean value of China/South Africa portfolio is 0.64, means 64 cents should be invested in China and 36 cents in South Africa.

Post-Crisis Period: The mean weight of Brazil/Russia portfolio is 0.37. This indicates that for a $1 portfolio, on average, an investor should invest 37 cents in Brazil and the remaining 63 cents in Russia. Similarly, the mean weight of Brazil/India portfolio is 0.18 indicates that 18 cents should be invested in Brazil and 82 cents in India. The mean weight for Brazil/China portfolio is 0.26 implies that an investor should invest 26 cents in Brazil and 74 cents in China. For Brazil/South Africa portfolio, the mean weight is 0.15 indicates limited diversification opportunity as compared to other portfolios; 15 cents should be invested in Brazil and 85 cents in South Africa. The mean value of 0.23 for Russia/India portfolio depicts that 23 cents should be invested in

Russia and 77 cents in India. In a portfolio of Russia/China, the mean weight is 0.30 indicates 30 cents should be invested in Russia and 70 cents in China. The mean weight for Russia/South Africa portfolio is 0.28 indicates that 28 cents should be invested in Russia and 72 cents in South Africa. In the case of India/China portfolio, the mean weight of 0.49 indicates that 49 cents should be invested in India and 51 cents in China. The mean weight for India/South Africa portfolio is 0.67 which depicts that 67 cents should be invested in India and 33 cents in South Africa. The mean value of China/South Africa portfolio is 0.61, means 61 cents should be invested in China and 39 cents in South Africa.

Section V
Concluding Remarks

This study gives an overall picture of financial environment for BRICS countries as well as USA. South Africa is the smallest country and Russia is the largest country among BRICS countries in terms of total area. The HDI for Russia is close to USA and it is low in case of India. The official liberalisation of these countries was started in 1991. The GFSI and SGI indicate that the present time is the right time to invest. All BRICS countries are following the multiple regulatory system, except Russia which is following single regulatory system. The clearing and settlement process varies between two and five days. All countries are following different sessions of the markets from preopen session to post-closing session. China market is an exception in having lunch break during market hours. India has the highest number of listed companies and contributes 13 per cent of listed companies to the sum of listed companies of the world. In total, BRICS countries contribute 22 per cent of listed companies and USA alone contributes 10 per cent of listed companies to the total listed companies of the world. The countries' PE ratio ranges from 7.22 to 26.57 for all the BRICS countries in which the PE for Russia is low and high for India

The financial and macroeconomic indicators for BRICS countries indicate that these countries are good destinations for investors and investors can get more economic value by investing in these markets. Further, this study finds investment is flowing from developed markets to emerging and developing markets like BRICS countries as the share of BRICS countries market capitalisation to world market capitalisation has been increasing every year and the same is decreasing for USA. The EPUI is very low for India in comparison to other BRICS countries, which indicates that India is a good destination for investment. The exchange rate for all the BRICS countries indicates that the currencies are (in terms of USD) depreciating, whereas the inflation of these countries is under control. Market capitalisation as a percentage of GDP reveals that the markets of these countries are undervalued except South Africa. The investment as a percentage of GDP and the savings as a percentage of GDP are high in case of India and China. The corruption control

for Brazil, Russia, India and China is weak and the same is strong for South Africa and USA. All the BRICS countries appear in top-80 position on the global competitiveness index. All BRICS countries enjoy strong trade relationships. Despite several ups and downs, these groups of countries are expected to bring about a dynamic change in the world.

The portfolio weights of three sub-samples and full samples confirm that portfolio diversification gives economic value to these BRICS countries stock markets, except for a few pairs like Brazil/South Africa and Russia/ South Africa in the full sample as well as in all the subsample periods.

References

1. Alessandria, G; Choi, H and Lu, D (2017), "Trade Integration and the Trade Balance in China", *IMF Economic Review,* 65(3), pp 633-674.
2. Bekaert, G and Harvey, C R (2000) "Foreign Speculators and Emerging Equity Markets", *The Journal of Finance,* 55(2), pp 565-613.
3. Bekaert, G; Harvey, C R & Lundblad, C T (2003), "Equity Market Liberalization in Emerging Markets", *Journal of Financial Research,* 26(3), pp 275-299.
4. Cheng, H F; Gutierrez, M; Mahajan, A; Shachmurove, Y and Shahrokhi, M (2007), "A Future Global Economy to be Built by BRICs", *Global Finance Journal,* 18(2), pp 143-156.
5. Desai, R (2007) "Dreaming in Technicolour? India as a BRIC Economy", *International Journal,* 62(4), pp 781-804.
6. Diallo, O and Tapsoba, M S J A (2014), "Rising BRICs and Changes in Sub-Saharan Africa's Business Cycle Patterns", (No. 14-35),International Monetary Fund.
7. Griffith-Jones, S (2014), "A BRICS Development Bank: A Dream Coming True? (No. 215). United Nations Conference on Trade and Development.
8. Henry, P B (2000), "Do Stock Market Liberalizations Cause Investment Booms?", *Journal of Financial Economics,* 58(1), pp 301-334.
9. Kroner, K F & Ng, V K (1998), "Modeling Asymmetric Comovements of Asset Returns", The Review of Financial Studies, 11(4), pp 817-844.
10. Kubler, F (2002), "The Organization of Global Financial Markets", *Journal of Institutional and Theoretical Economics,* 158(2002), pp 5-23.
11. Laeven, M L (2014) "The Development of Local Capital Markets: Rationale and Challenges", (No. 14-234), International Monetary Fund.
12. Naude, W; Szirmai, A &Lavopa, A (2013), "Industrialization lessons from BRICS: A Comparative Analysis", *Institute of Labor Economics (IZA),* discussion paper no-7543, pp 1-47.
13. Ogus, A (2004), "Comparing Regulatory Systems: Institutions, Processes and Legal Forms in Industrialised Countries", *Leading Issues in Competition, Regulation and Development,* pp 146-164.
14. O'neill, J (2001), "Building Better Global Economic BRICs", *Global Economic Papers* (66), pp 1-16.

15. Radulescu, I G; Panait, M and Voica, C (2014) "BRICS Countries Challenge to the World Economy New Trends", *Procedia Economics and Finance,* 8, pp 605-613.

16. Rasoulinezhad, E and Jabalameli, F (2018), "Do BRICS Countries Have Similar Trade Integration Patterns?", *Journal of Economic Integration*, 33(1), pp 1011-1045.

17. Singh, S and Dube, M (2014) "BRICS and the World Order: A Beginner's Guide", Available at SSRN 2443652. Accessed on 17th September 2019.

18. Wilson, D and Purushothaman, R (2003), "Dreaming with BRICs: The Path to 2050", Goldman Sachs Global Economics Paper, 99, pp 1-24.

Appendix I
Total Number of Listed Companies

Year	*Brazil*	*Russian Federation*	*India*	*China*	*South Africa*	*United States*	*World*
1993	550	52	3263	122	615	6912	28967
1994	548	79	4413	203	600	7255	32014
1995	543	340	5398	323	612	7487	34308
1996	550	240	5999	524	599	8090	36637
1997	544	43	5843	799	615	7905	38157
1998	527	41	5724	909	650	7499	38600
1999	478	41	5789	947	652	7229	38705
2000	457	21	5853	1086	604	6917	39979
2001	426	21	5795	1154	510	6177	40255
2002	396	57	5650	1223	429	5685	39067
2003	367	266	5644	1285	390	5295	41550
2004	357	412	4725	1373	369	5226	39201
2005	342	414	4763	1377	348	5145	39906
2006	347	539	4796	1421	359	5133	43949
2007	395	592	4887	1530	374	5109	44875
2008	383	561	4921	1604	367	4666	44728
2009	377	550	4955	1700	353	4401	43363
2010	373	556	5034	2063	352	4279	44042
2011	366	817	5112	2342	347	4171	45178
2012	353	292	5191	2494	338	4102	44312
2013	352	261	5294	2489	322	4180	44476
2014	351	254	5541	2613	322	4369	45020
2015	345	251	5835	2827	316	4381	43539
2016	338	242	5820	3052	303	4331	43192

Source: World Bank.

Appendix II
Yearly Exchange Rates Against USD

Year	*Real (Brazil)*	*Rubble (Russia)*	*Rupee (India)*	*Yuan (China)*	*Rand (South Africa)*
1993	0.1167	1.247	31.5041	5.8245	3.4
1994	0.846	3.55	31.3775	8.4462	3.538
1995	0.9717	4.645	35.1785	8.3174	3.6455
1996	1.0385	5.55	35.85	8.2984	4.6783
1997	1.116	5.958	39.2	8.2795	4.8665
1998	1.2083	20.62	42.49	8.2789	5.8675
1999	1.799	27.55	43.55	8.2795	6.1548
2000	1.95	28.16	46.675	8.2774	7.5788
2001	2.3105	30.505	48.245	8.2765	11.961
2002	3.54	31.955	47.975	8.277	8.5702
2003	2.8915	29.2425	45.625	8.2767	6.6843
2004	2.656	27.72	43.46	8.2765	5.665
2005	2.3355	28.7414	45.05	8.0702	6.3288
2006	2.1364	26.3255	44.27	7.8045	7.006
2007	1.78	24.6006	39.4125	7.3037	6.8625
2008	2.3145	29.4027	48.8025	6.8277	9.525
2009	1.7445	30.035	46.525	6.8271	7.398
2010	1.6613	30.537	44.705	6.607	6.6291
2011	1.8668	32.137	53.065	6.295	8.09
2012	2.0516	30.525	54.995	6.2306	8.4735
2013	2.3621	32.8696	61.8	6.0543	10.4926
2014	2.6576	58.25	63.0437	6.2055	11.5706
2015	3.9608	72.5209	66.1537	6.4937	15.4685
2016	3.2552	61.5375	67.9238	6.945	13.7401
2017	3.3125	57.6889	63.8725	6.5068	12.3828

Source: Bloomberg.

Appendix III
Total Market Capitalisation (Millions USD)

Year	*Brazil*	*Russia*	*India*	*China*	*South Africa*	*USA*	*World*
2003	2,15,982	2,55,369	2,79,585	4,42,862	1,67,990	135,08,352	304,89,676
2004	3,18,578	3,43,270	3,85,653	3,86,514	2,45,605	151,32,191	358,37,204
2005	4,59,598	6,71,993	5,46,126	3,46,950	3,18,474	157,07,695	409,15,044
2006	7,08,397	14,21,487	8,16,476	9,88,124	3,83,838	174,67,300	499,65,576
2007	13,98,721	15,13,644	18,14,994	38,50,608	4,55,875	176,63,488	597,16,480
2008	5,88,478	4,22,586	6,37,281	15,33,162	2,42,942	106,06,275	318,30,864
2009	13,40,868	7,54,409	13,01,152	28,51,973	3,99,894	137,40,063	454,27,568
2010	14,45,114	9,99,325	16,28,869	32,45,876	5,35,455	154,30,850	519,83,640
2011	11,94,582	7,67,751	10,05,091	27,03,716	4,45,689	150,06,018	459,04,776
2012	11,95,621	7,93,294	12,59,532	29,96,161	5,16,949	168,55,636	524,26,840
2013	9,74,885	7,65,643	11,39,365	33,60,478	4,80,686	222,80,664	619,75,208
2014	8,09,030	3,59,203	15,57,202	49,65,322	5,06,109	244,13,722	649,31,520
2015	4,54,036	3,87,889	15,16,302	70,91,934	3,55,923	235,44,144	642,60,996
2016	7,10,650	5,91,945	15,64,174	64,86,903	4,21,651	252,04,456	663,38,932
2017	8,91,558	5,88,405	23,86,342	77,24,010	5,83,437	296,44,398	812,59,696

Source: Bloomberg.