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CAUSAL RELATIONSHIP BETWEEN FOREIGN DIRECT INVESTMENT, EXPORTS, STOCK MARKET INDEX AND ECONOMIC GROWTH THROUGH NONPARAMETRIC WAVELET GRANGER CAUSALITY METHOD IN EMERGING MARKETS: EVIDENCE FROM FRAGILE FIVE ECONOMIES

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APPROVAL PAGE

DECLARATION

I hereby declare that this Master's Thesis titled as "**Causal Relationship between Foreign Direct Investment, Exports, Stock Market Index and Economic Growth through Nonparametric Wavelet Granger Causality Method in Emerging Markets: Evidence from Fragile Five Economies**" has been written by myself in accordance with the academic rules and ethical conduct. I also declare that all materials benefited in this thesis consist of the mentioned resources in the reference list. I verify all these with my honor.

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ABSTRACT

Master's Thesis

Causal Relationship between Foreign Direct Investment, Exports, Stock Market Index and Economic Growth through Nonparametric Wavelet Granger Causality Method in Emerging Markets: Evidence from Fragile Five Economies

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This study examines the causal relationship between foreign direct investment, exports, stock market index and economic growth in emerging markets particularly on Fragile Five economies through Nonparametric Wavelet Granger causality method. Methodology used in this study is a new approach of nonparametric Granger causality based on Wavelet transformation as it is an advanced causality method. This study uses quarterly data of Fragile Five economies: Indonesia, Turkey, India, Brazil and South Africa for the period 1991-2015. The findings suggest a bidirectional causality between economic growth, FDI, export and stock market index in Fragile Five economies however the direction and the magnitude of causality are different for each country. Therefore, there are some important policy implications to be encouraged through the integration of FDI, export and stockmarket together as the most important engine of the economy development with the global economy system.

Keywords: Nonparametric Granger Causality, Wavelet Analysis, Fragile Five Economies, FDI, Export, Stock Market Index, Economic Growth

ÖZET

Yükses Lisans Tezi

Gelişmekte Olan Piyasalarda Parametrik Olmayan Wavelet Granger Nedensellik Yöntemi ile Doğrudan Yabancı Yatırımlar, İhracat, Borsa Piyasa Endeksi ve Ekonomik Büyüme Arasındaki Nedensel İlişki: Kırılgan Beşli Ekonomilerinden Kanıtlar

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Bu çalışmada, özellikle kırılgan beşli olarak adlandırılan gelişmekte olan ülke ekonomilerindeki doğrudan yabancı yatırımlar, ihracat, borsa piyasa endeksi ve ekonomik büyüme arasındaki nedensellik ilişkileri parametrik olmayan Wavelet Granger nedensellik yöntemi kullanılarak incelenmektedir. Bu çalışmada gelişmiş bir yöntem olan parametrik dalgacık Granger causality kullanılarak nedensellik ilişkisine dair yeni bulgular elde edilmesi amaçlanmıştır. Bu çalışma, 1991-2015 dönemi Endonezya, Türkiye, Hindistan, Brezilya ve Güney Afrika gibi Kırılgan Beşli ekonomilerinin üç aylık verileri kullanmaktadır. Bulgular, Kırılgan Beşli ekonomilerde ekonomik büyüme, doğrudan yabancı yatırımlar, ihracat ve borsa endeksi arasında çift yönlü bir nedensellik olduğunu, ancak nedenselliğin yönü ve büyüklüğünün her ülke için farklı olduğununa dair bulgular elde edilmiştir. Ayrıca, küresel ekonomik sistem ile yerel ekonomik gelişiminin önemli itici güçlerdinden olan doğrudan yabancı yatırımlar, ihracat ve borsa piyasa endeksi ile birlikte entegrasyonu yoluyla teşvik edilmesine ilişkin politika önermelerinde bulunulmuştur.

Anahtar Kelimeler: Parametrik Olmayan Granger Nedensellik, Wavelet Analizi, Kırılgan Beşli Ekonomileri, Doğrudan Yabancı Yatırımlar, İhracat, Borsa Piyasa Endeksi, Ekonomik Büyüme

CAUSAL RELATIONSHIP BETWEEN FOREIGN DIRECT INVESTMENT, EXPORTS, STOCK MARKET INDEX AND ECONOMIC GROWTH THROUGH NONPARAMETRIC WAVELET GRANGER CAUSALITY METHOD IN EMERGING MARKETS: EVIDENCE FROM FRAGILE FIVE ECONOMIES

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ABBREVIATIONS

ADF	Augmented Dickey Fuller
BOVESPA	Brazilian Stock Market
BSE	Bombay Stock Exchange
ECM	Error Correction Model
ELG	Export-Led Growth
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GLE	Growth Led Export
IMF	International Monetary Fund
ISE	Istanbul Stock Exchange
JSX	Jakarta Composite Index
MDGs	Millenium Development Goals
MNEs	Multinational Enterprises
MSCI	Morgan Stanley Capital International
NSE	National Stock Exchange
NICs	Newly Indurtrialised Countries
PLC	Product Life Cycle
PP	Philip Perron
SDGs	Sustainable Development Goals
US	Unites States
VECMs	Vector Error Correction Models

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INTRODUCTION

Emerging markets is an economic term describing nations with low to middle per capita income economy in which the economy has been evolving become more advanced. Countries that considered as emerging markets because of rapid development, fast growth and reform program. Based on Morgan Stanley Capital International (MSCI) index, the 23 emerging markets are India, South Africa, Greece, Indonesia, Turkey, Malaysia, Thailand, Russia, Philippines, Taiwan, Korea, Chile, Colombia, Poland, Hungary, China, Czech Republic, Peru, Brazil, Mexico, Qatar, Egypt and United Arab Emirates. Those countries represents 10% of world market capitalization. The top ten emerging markets according to MSCI emerging markets index performance are China, South Korea, Taiwan, India, Brazil, South Africa, Russia, Mexico, Indonesia and Turkey (AGF, 2016). Some countries have witnessed economic turmoil in recent years and have become too dependant on huge flow of foreign investment to finance their growth ambitions. Furthermore Morgan Stanley have coined the term of Fragile Five economies to those countries such as Indonesia, Brazil, Turkey, South Africa and India (Thomas, 2014).

There is a need for Fragile Five economies to make tangible improvement to the lives of citizens as calling by The Sustainable Development Goals (SDGs) which the goals encompass environmental, social and economic aspects (OECD, 2016). Sustainable Development Goals as the new concept of Millenium Development Goals (MDGs) has the main goal to eradicate poverty everywhere permanently by 2030. The SDGs is expected to accomplish the job that MDGs started. An end to poverty, achieve zero hunger, decent work, sustainable economic growth worldwide are the ambitious agenda of the SDGs. To achieve those goals, countries should encourage sustained economic growth by creating higher levels of productivity and technological innovation. Sustainable development to boost sustainable economic growth is needed in Fragile Five economies.

Fragile Five economies should set up particular strategies and policies to achieve SDGs by 2030. Investment through Foreign Direct Investment (FDI) and exports promotion are the proposed strategies to achieve sustainable economic growth in Fragile Five economies. The nexus between FDI, exports, stock market

index and economic growth/Gross Domestic Product (GDP) has been intensively the subject of debates for decades in Fragile Five economies both in theoretical and empirical literature by diverse econometric methods. Large empirical studies evaluated the role of FDI, exports and stock market index in stimulating economic growth in Fragile Five economies over the last two decades. Yet, no consensus was made concerning the direction of causality between FDI, exports, stock market index and economic growth.

The point to this debate is the matter of exports led growth or growth-driven exports, FDI led growth or growth driven FDI and stock market index led growth or growth driven stock market index which influence the performance of high economic growth. This question is very crucial because understanding the causality between export, FDI, stock market index and growth has critical implications for government, investors and researchers to determine strategic policies to apply especially in these selected Fragile Five economies.

For Fragile Five economies, there has been an obvious lack of studies that explore the causal link between exports, foreign direct investment, stock market index and economic growth by using the latest time series technique. The general purpose of this research is to analyze how FDI, exports, stock market index and economic growth interrelate in fragile five economies. The study is aimed at searching for direction of causality between FDI, exports, stock market index and economic growth in fragile five economies. This study is able to contribute to the existing literature by offering empirical evidence for all fragile five economies through an advanced causality method which is a new approach of nonparametric Granger causality based on wavelet transformation. To the best of authors' knowledge, this research will be the first that using nonparametric wavelet Granger causality to unearthen the dynamic causality patterns in the Fragile Five economies.

FDI is crucial for Fragile Five economies because it offers best practices management, accounting or assured market from their investors. Fragile Five economies as recipient can incorporate the sophisticated technology, learn the latest financing tools and also innovations in operational practices. The value added can be obtained in these sectors is a positive impact to foreign exchange earnings and GDP.

Hence FDI benefits to the creation of job, foreign exchange earnings, and increment in GDP, particularly of skilled and semi-skilled employees needed in these sectors.

Exports is widely believed to be a prominent factor for development of Fragile Five economies and there is proof of strong empirical relationship between economic growth and exports. The high economic growth rates of Fragile Five economies generated by exports may lead to an increase in incomes and decrement in poverty (Thelle et al, 2015).

Stock markets in Fragile Five economies are supposed to play significant role in accelerating economic growth through elevating financial assets liquidity, aggregating and mobilising capital, promoting wiser investment decisions, observing managers and exerting corporate control and making global risk diversification easier for investors (Angko, 2013).

The FDI and economic growth debate is whether promoting FDI to accelerate the economic growth called as FDI led growth or whether promoting economic growth to captivate FDI called as growth driven FDI hypothesis.

The causal link between economic growth and exports has become the scholars debate as well for decades. Some advocate that promoting exports can boost economic growth known as exports led growth hypothesis while others agree that the causal relationship stemming from economic growth to exports known as growth driven exports hypothesis.

The causality between economic growth and the performance of stock market becomes the scholars debate for decades. The debate is growing up whether the performance of stock market helps in boosting economic growth or economic growth influences stock price movements.

This study was conducted using secondary data for FDI, exports, stock market indices and economic growth of Fragile Five economies i.e. Indonesia, Turkey, India, Brazil and South Africa for period 1991-2015 obtained from International Monetary Fund (IMF) database with regard lack of data and missing values. Therefore, the finding of this study is expected to contribute to recent literature in figuring out the causality between FDI, exports, stock market index and economic growth in Fragile Five economies. This study findings indicate a bidirectional causality between GDP-FDI nexus, GDP-net export nexus and GDP-stock market

index nexus in Indonesia, Turkey, India, Brazil and South Africa however the the magnitude of causality through frequency domain are different for each nexus. Higher FDI, exports and stock markets will influence to higher economic growth which may lead to sustained economic growth. The results show that the causalities are getting stronger at low frequencies which is long run and then become weaker continously at the intermediate frequencies and high frequencies (low run). It exhibits that causalities show significant downtrend pattern from lower frequencies (long run) to higher frequencies (short run).

Sustained economic growth as one of the objective of SDGs in addressing economic issues especially in Fragile Five economies will be the single most important factor affecting poverty. Understanding the causal link direction between FDI, stock market index, exports and economic growth of this study will be helpful and important to policymakers in Fragile Five economies. Thus, it will offer policymakers a clear direction for policy development by considering the causality relationship of those hypothesis. Moreover, from the methodological point of view, techniques used in this study could contibute to the development of research in the future. The results derived from this study have some important policy implications. The most important impact obtained by this study in term of econometric issue for the existing literature is the findings give another insight to researchers to uncover the causality between variables at different time period on a frequency domain whether the causality occurs in the long run (low frequencies), the intermediate/medium run and/or the short run (high frequencies) while other standards Granger causality method cannot distinguish between the short run, medium run and long run. Government and investors may decide policy in terms of short run, intermediate run or long run. For instance, distinguishing short run causality and long run causality between exports and the GDP provides important policy implication for government because the demand and supply of exports tend to be different from short run period to long run period. If exports increase in the short run then it will shift aggregate demand to the right and it may create inflation and appreciation of exchange rate. If exports increase in the long run, the aggregare suppy will shift to the right and it may create productivity and economies of scale. Hence, government should adjust their policy in the short run and long run.

The organization of this thesis is as follows: chapter one of the study presents notable information regarding an overview of Fragile Five economies. Chapter two presents literature, theoretical and empirical studies about the causal link between FDI, stock market index, exports and economic growth. Chapter three reviews data and methodology applied in this study. Chapter four reviews the result and last but not least at the end will be reviewed about summary, policy implication, limitation and recommendation for further studies.

CHAPTER ONE
AN OVERVIEW OF FRAGILE FIVE ECONOMIES

Morgan Stanley's August 2013 report confirmed that the currencies condition of emerging markets of, the Indonesian rupiah, the Turkish lira, the Indian rupee, the Brazilian real and the South African rand became a fragile structure under the most pressure against the U.S. dollar. Therefore, these five emerging markets has been called as the troubled emerging market currencies or Fragile Five economies. Based on the report, those Fragile Five economies has adverse conditions such as large external deficits, weakening growth potential, high inflation and high dependence on fixed income inflows that leave these Fragile Five economies currencies vulnerable. Those countries become too dependent on unreliable foreign investment to finance their growth ambitions (Lord, 2013).

Table 1. Macroeconomic Data from Fragile Five Economies

Unit	Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Economic growth (%)	Indonesia	5.69	5.50	6.35	6.01	4.63	6.22	6.17	6.03	5.56	5.02	4.79
	Turkey	8.40	6.89	4.67	0.66	-4.83	9.16	8.77	2.13	4.19	3.02	3.97
	India	9.28	9.26	8.61	3.89	8.48	10.26	6.64	5.62	6.64	7.24	7.56
	Brazil	3.20	3.96	6.07	5.09	-0.13	7.53	3.91	1.92	3.02	0.10	-3.85
	South Africa	5.28	5.59	5.36	3.19	-1.54	3.04	3.28	2.21	2.33	1.63	1.26
GDP per capita ($)	Indonesia	1,263	1,590	1,861	2,168	2,263	3,125	3,648	3,701	3,632	3,500	3,346
	Turkey	7,117	7,727	9,309	10,382	8,624	10,111	10,539	10,539	10,801	10,304	9,126
	India	729	817	1,018	992	1,090	1,346	1,461	1,447	1,456	1,577	1,598
	Brazil	4,731	5,808	7,247	8,707	8,475	11,121	13,039	12,157	12,072	11,729	8,539
	South Africa	5,453	5,668	6,161	5,817	5,916	7,393	8,078	7,570	6,911	6,499	5,724
Inflation (%)	Indonesia	10.45	13.11	6.41	9.78	4.81	5.13	5.36	4.28	6.41	6.39	6.36
	Turkey	10.14	9.60	8.76	10.44	6.25	8.57	6.47	8.89	7.49	8.85	7.67
	India	4.25	6.15	6.37	8.35	10.88	11.99	8.86	9.31	10.91	6.35	5.87
	Brazil	6.87	4.18	3.64	5.66	4.89	5.04	6.64	5.40	6.20	6.33	9.03
	South Africa	3.40	4.64	7.10	11.54	7.13	4.26	5.00	5.65	5.45	6.38	4.59
Current Account Balance (Billion $)	Indonesia	0.28	10.86	10.49	0.13	10.63	5.14	1.69	-24.42	-29.11	-27.51	-17.70
	Turkey	-20.98	-31.17	-36.95	-39.43	-11.36	-44.62	-74.40	-47.96	-63.61	-43.55	-32.23
	India	-10.28	-9.30	-8.08	-30.97	-26.19	-54.52	-62.52	-91.47	-49.12	-27.31	-22.46
	Brazil	13.98	13.62	1.55	-28.19	-24.31	-75.76	-76.97	-74.06	-74.79	-104.18	-58.88
	South Africa	-8.02	-12.08	-16.17	-16.41	-7.91	-5.49	-9.32	-20.31	-21.64	-18.63	-13.64
Current Account Balance (% of GDP)	Indonesia	0.10	2.98	2.43	0.02	1.97	0.68	0.19	-2.66	-3.19	-3.09	-2.05
	Turkey	-4.34	-5.87	-5.71	-5.40	-1.85	-6.10	-9.60	-6.08	-7.73	-5.45	-4.49
	India	-1.23	-0.98	-0.67	-2.61	-1.98	-3.29	-3.43	-5.00	-2.64	-1.34	-1.07
	Brazil	1.57	1.23	0.11	-1.66	-1.46	-3.43	-2.94	-3.01	-3.03	-4.31	-3.32
	South Africa	-3.11	-4.45	-5.40	-5.72	-2.67	-1.46	-2.24	-5.13	-5.89	-5.30	-4.34

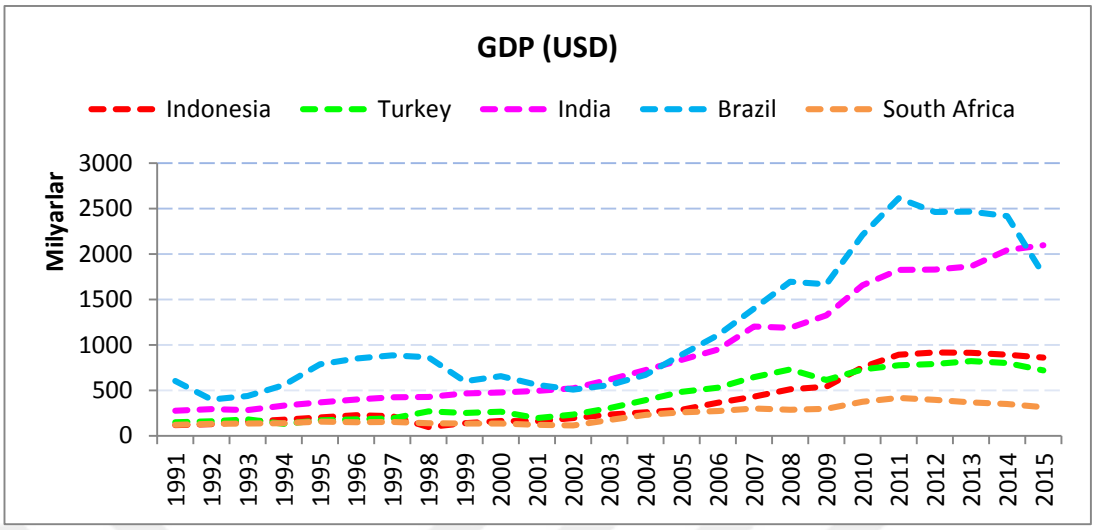
Source: www.data.worldbank.org

Apart from the weakening currency value, Fragile Five also has similar characteristic in their macroeconomic conditions. As shown in Table 1, Fragile Five has economic slowdown in term of economic growth, inflation and current account balance. When considering the economic growth rate, it shows stable fluctuation during period of 2005-2011 but it suddenly shows a serious slowdown on 2012. Moreover the economic growth in Brazil and South Africa are extremly going down year by year even Brazil economic growth on 2015 is negative. Looking the figures of gross domestic product per capita, Turkey and Brazil have the highest GDP per capita compared to others while South Africa and Indonesia have the medium level of income per capita and India is the only one who has the lowest income per capita. High inflation occurs in all Fragile Five economies since 2013 however Turkey and Brazil have experienced the highest inflation. The figures also indicate that all countries face negative value in current account balance and Turkey is in serious problem by the lowest current account balance.

1.1. ECONOMIC GROWTH IN FRAGILE FIVE ECONOMIES

Figure 1 presents the differences in size of economies of Fragile Five countries, measured by the Gross Domestic Product at current USD for period of 1991-2015. Brazil is by far the largest economy of Fragile Five countries and it’s GDP is significantly increasing year by year and reaching the highest GDP of all time of 2015 USD billion and it remains higher until 2014 eventhough it is slightly decreasing on 2015 to be 1775 USD billion. The figure shows that Brazil and India have the highest GDP while South Africa is the only country of Fragile Five that has lowest GDP of all time. Across the year GDP of Indonesia and Turkey are in the medium level.

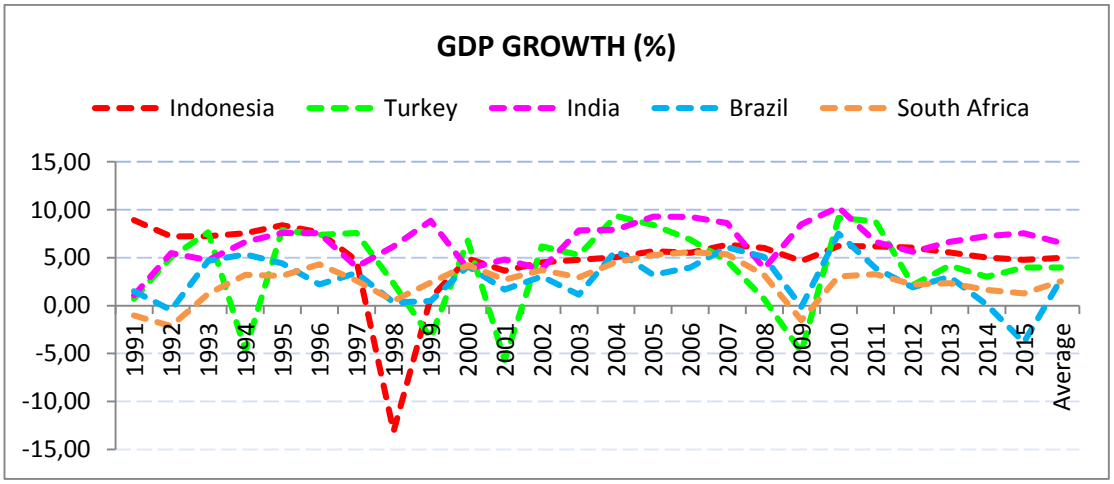
Figure 1. GDP (USD) in Fragile Five Economies



Source: www.data.worldbank.org

The GDP growth performance of Fragile Five Economies is presented in Figure 2. On average, India grown consistently year by year until 2015. Just like India, Indonesia is also stable but having serious slowdown on 1998 as the result of financial crisis. Brazil and South Africa are the weakest countries with the lowest average of GDP growth performance. The performances of GDP growth for over 25 years for each country are India (6.56%), Indonesia (4.97%), Turkey (3.98%), Brazil (2.74%) and South Africa (2.56%).

Figure 2. GDP Growth (%) in Fragile Five Economies

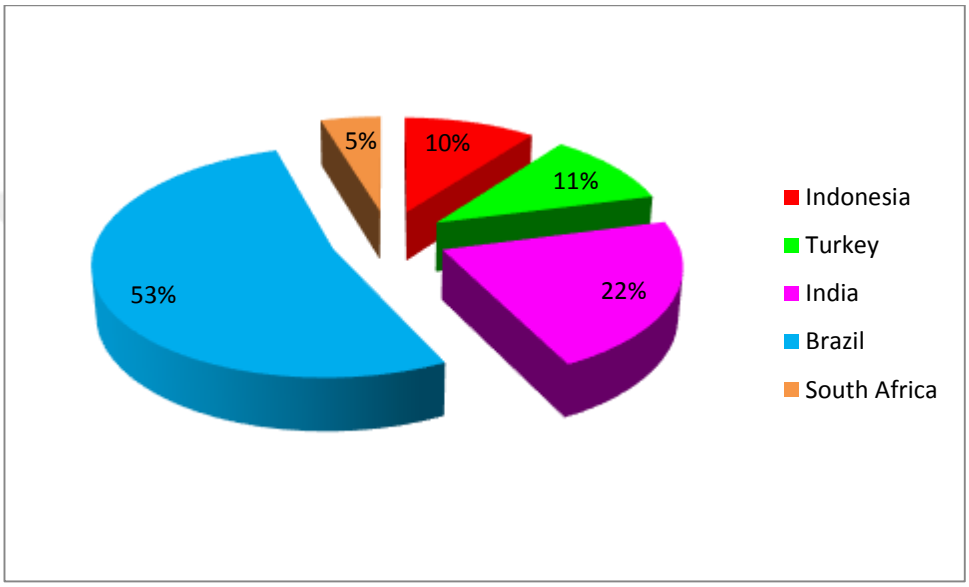


Source: www.data.worldbank.org

1.2. FOREIGN DIRECT INVESTMENT IN FRAGILE FIVE ECONOMIES

It can be seen from Figure 3 that Brazil attracted FDI 53% which makes it the biggest recipient of FDI in Fragile Five economies during period of 1991-2015. It is followed by India (22%), Turkey (11%) and Indonesia (10%). While South Africa is the smallest country on Fragile Five which attracts FDI only 5%.

Figure 3. Share in Total Fragile Five's FDI Inflows (%), 1991-2015

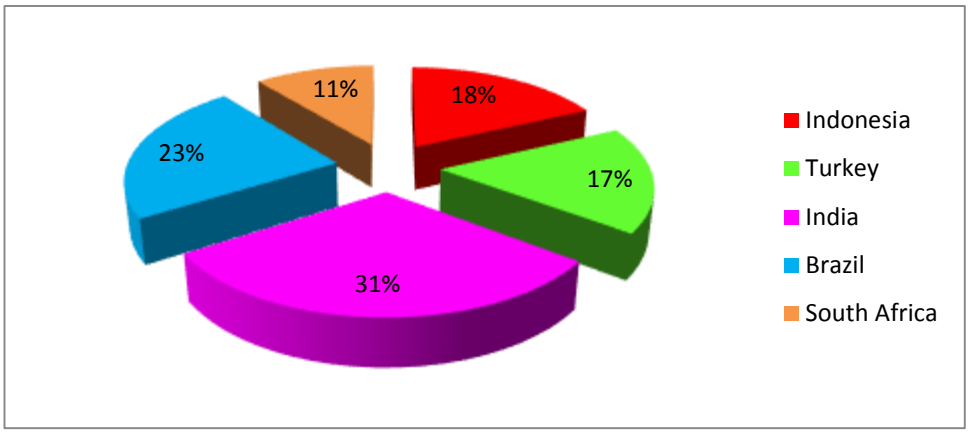


Source: www.data.worldbank.org

1.3. EXPORTS IN FRAGILE FIVE ECONOMIES

Without considering the difference in economic size of the countries, the share of each country in the Fragile Five export for period of 1991-2015 is shown in Figure 4. It indicates that India by far is the biggest exporter of the Fragile Five economies with the share of 31%. It is followed by Brazil (23%), Indonesia (18%) and Turkey (17%). The smallest exporter of the region is South Africa (11%).

Figure 4. Share in Total Fragile Five's Export (%), 1991-2015



Source: www.data.worldbank.org

Exports value from Indonesia amounted to US$150.3 billion in 2015 but down 26.1% since 2011 and down 14.6% from 2014 to 2015. Indonesia's top 10 exports value accounted for almost two-thirds (64.1%) of its entire exports to the world. In 2015, GDP of Indonesia amounted to $3.011 trillion. Exports of Indonesia contribute 5% of the overall output of Indonesian economic. The best trading partner of Indonesia is Asian countries because $103.6 billion or 68.9% of Indonesian exports were delivered to Asian countries and 11.9% were sold to North American importers. Indonesia shipped another 9.9% worth of goods to European Union members with 3.2% going to customers in Africa.

The highest value of Indonesian exports during 2015 come from coal and oil-related products (US$34.6 billion, 23% of total exports), animal/vegetable fats, oils ($18.7 billion, 12.4%), electronic equipment ($8.6 billion, 5.7%), rubber ($5.9 billion, 3.9%), Gems, precious metals ($5.5 billion, 3.7%), vehicles ($5.4 billion, 3.6%), machines, engines, pumps ($5.2 billion, 3.5%), footwear ($4.5 billion, 3%), wood ($4 billion, 2.7%) and clothing (not knit or crochet) ($3.98 billion, 2.6%). The fastest growing exports products is jewelry and precious metal scrap, gems and precious metals up 111.9% for the 5-year period since 2011. Followed by vehicles (cars and automotive parts) which rose in value by 62.8% led and the third fastest growing is Indonesian footwear at 36.5%.

In 2016 Turkey exported goods for US$142.6 billion around the world, it has increased 39.6% from 2009 to 2016. Turkey's top 10 exports value accounted for

61% of its global shipments. It's exports accounted for around 8.5% of total Turkish economic output. 54.8% of Turkish exports is shipped to European countries while 28.8% are delivered to Asian from a continental perspective. Turkey exported another 8% to Africa and 5.5% to North American importers.

During 2016 the biggest value of exports are coming from vehicles on the first rank (US$19.8 billion, 13.9%), followed by machinery on the second biggest rank ($12.4 billion, 8.7%) and on the third rank are gems, precious metals categories ($12.2 billion, 8.5%).

India exports value around the world is US$261 billion in 2016, it has 47.7% significant increment from 2009 to 2016. 59.4% of the whole exports are coming from the top ten exports category. Contribution of exports to economic output is just 3% because it's GDP on 2016 amounted to $8.721 trillion. From a continental perspective, the biggest exports partners of India are Asian countries by 49.1% of Indian exports, shipped to European for 19.5%, shipped to North American for 18.1% and shipped to Africa for 8.7%.

The highest value of India exports during 2016 is gems, precious metals ($43 billion, 16.5% of total exports). The second highest value is mineral fuels including oil ($27.7 billion, 10.6%), the third highest value is vehicles ($15 billion, 5.7%) and the following highest value is machinery including computers ($13.6 billion, 5.2%).

Since 2009 Brazil exports value is US$185.2 billion, up by 21.1%. Exports from the top ten category contribute to 60.4% of all shipments. The contribution of exports to economic output is 5.9%. Brazil exports to Asian countries for 39.8% and exports to european around 20.7%.

The biggest Brazilian global exports during 2016 are oil seed ($19.6 billion, 10.6% of total exports), followed by ores, slag, ash in the second rank ($15.8 billion, 8.5%), and followed by meat in the third rank ($12.7 billion, 6.8%).

South Africa exports value is US$74.1 billion in 2016, up by 37.6% since 2009 and up by 6.4% from 2015 to 2016. Top 10 exports of South Africa contributed for almost three-quarters (72.5%) of the overall shipments. As of October 2016, contribution of exports to economic output is is about 10.1%. South African exported to Asian importers more less 30.1%, shipped to other African countries for 28.8%,

delivered to Europe countries for around 24.4% and shipped small amount of exports to North America for 8.1%.

The first category of exports that represent the highest dollar value during 2016 in South Africa is gems, precious metals ($12 billion, 16.2% of total exports), while vehicles represents as the second highest exports ($9.2 billion, 12.4%) and followed on the third rank is exports category of ores, slag, ash ($7.6 billion, 10.3%) (Worldtopexports,2017).

1.4. STOCK MARKET INDEX IN FRAGILE FIVE ECONOMIES

The Indonesia Stock Exchange consist of more than 400 companies registered on it with a large number of sectors. There has been a notable phase of development since the 1990s in the stock market and the system is totally electronic and automated making it easy to use and convenient for investors over the world. The biggest areas on the market are in banking, telecoms, finance and construction. A lot of the larger companies to this market are state owned. Even the greatest stock is also state owned (Telkom) (Thenewsavvy, 2015).

The only exchange market in Turkey is Borsa Istanbul, it is built to combine the former Istanbul Stock Exchange (ISE), the Derivatives Exchange of Turkey and the Istanbul Gold Exchange. There are more than 300 firms listed at the BIST. The underlying economy has developed impressively through the last decade. There has been a remarkable 80% growth of GDP during the last ten years in Turkey. There are possible risks that are associated with investments in Turkey should be carefully considered before making any investment such as political risk, external conflicts (ISIS, civil war in Syria), internal turmoil and currency risk (Gilcher, 2014).

The most popular stock exchange in India stock market are The Bombay Stock Exchange callled as BSE and the National Stock Exchange called as NSE. The BSE was founded in 1875 and the NSE has been in existance since 1992 but both BSE and NSE take the same trading regulation, settlement process, and trading hours. 4,700 listed firms can be found in the BSE while the NSE consist of 1,200 listed firms. The two important Indian market indices are Sensex and Nifty. India is growing fast for future growth with annual GDP growth around 7-8% and stable financial maket makes India a promising market to invest money (Singh, 2017).

As the leading economy in Latin America region, Brazil financial market plays a very importance role in its development. After passing high inflation rate and general economic instability, Brazil shows good pattern on growth since 2003 especially on the financial market. Brazilian stock market (BOVESPA) is the fifth bourse in the world in foreign investors' participation and consist of more than 450 listed firms. Since then foreign investors regard Brazil as an important market to invest. Moreover on 2011 foreign investors were responsible more of the Bovespa's trade volume and it brings many advantages to the country (Padmanabhan at al, 2015).

South Africa is economically the powerhouse of the African continent and is one of the promising Fragile Five economies in the world. South Africa creates a vibrant investment and solid entrepreneurial environment by offering a huge emergent market economy with a sophisticated economic infrastructure. The biggest stock exchange in Africa is JSE Limited and has listed 472 companies in 2003. JSE is running funds into economy and gives dividents to investors. South Africa financial markets were affected by financial crises in the past but try to recover soon to ensure thier investor. The South African government has organized the establishment of a Single Financial market bill to make sure the stability of financial system in the future (Padmanabhan at al, 2015).

CHAPTER TWO
LITERATURE REVIEW

2.1. GENERAL INTODUCTION

The relationship between FDI, exports, stock market index and economic growth has been intensively the matter of debates by scholars and international economics for decades in Fragile Five economies both in theoretical and empirical literature by diverse econometric methods. In the last two decades large research studies conducted to understand the role of FDI, exports and stock market index in stimulating economic growth in Fragile Five economies. Yet, no consensus until now concerning the direction of causality between FDI, exports, stock market index and economic growth. Therefore there is an important issue for upcoming research on understanding the causality between FDI, exports, stock market index and economic growth in Fragile Five economies through conventional and contemporary methods to reveal new information which is useful for policy makers and market participants. Hence, this is what this study strives to do and this study will be the first study that uses two methods to understand the causality relationship between FDI, exports, stock market index and economic growth.

2.2. THEORETICAL LITERATURE

2.2.1. FDI-Growth Nexus

The theoretical basis for empirical studies on FDI and growth nexus are derived from neo-classical and endogenous growth models. In the neo-classical growth model, labor growth and technological progress are considered as exogenous factor, foreign direct investment (FDI) merely raises the investment rate in the host country, causing a transitional increament in per capita income growth however it does not have long-run growth effect. Technological progress is an endogenous factor based on the new growth theory in the 1980s and FDI has been assumed to drive growth effect in the development of the host country via technology transfer (Hsiao & Hsiao, 2006).

Since the mid 80s, in the endogenous growth theory, the function of FDI has been approached from a new perspective. The theory of endogenous growth has emphasised the benefit of technological change for the growth of the economic. Considering the endogenous growth theory, a set of factors like the creation of technological knowledge and its transmission, and views innovation and imitation efforts are considered as important factors for economic growth. Thus, it focuses on human capital accumulation, the function of research and development, and externalities on economic growth (Romer, 1990). In this case, the extent to which developing countries can apply new technologies will influence the growth rate. FDI is the important channel might be taken place by developing countries for adopting and implementing of new technologies and ideas.

Some theoretical literatures indicate that FDI might potentially enhance economic growth in the receiving country. FDI can take into consideration as one of the major transmission engines of sophisticated technology from home countries to host countries (Borensztein et al, 1998). Most of developing countries are weak in innovation hence these countries should adopt technology that is produced elsewhere and FDI is the way whereby advanced technology may expand to developing countries. International firms that come to host country by bringing technological advances could spillover to host countries and eventually boosting domestic firms.

The Solow-type standard neoclassical growth models was applied by Brems (1970) and he advised that FDI can increase the capital stock and accordingly growth in a host countries through financing capital formation. In the type of neoclassical growth models with declining returns to capital the impact of FDI on growth is only a short run due to countries are evolving toward a new steady state. Thus, identical effect of FDI on growth is depending on domestic investment in the host countries.

In type of endogenous growth models, conversely, FDI is often believed to be more productive than domestic investment. The reason of this assumption is because the production function in the host economy can be boosted as encouraged by FDI toward the incorporation of new technologies (Borensztein et al, 1998).

FDI-related technological spillovers could balance the impact of diminishing returns to capital and it is expected to hold the economy condition on a long-term growth path. Even, in endogenous growth models, increasing of the existing stock of

knowledge through channel of skill and labour training application in the host economy could promote growth in a long run path. Alternative management practices and organizational arrangements carried by FDI also increase national growth (de Mello 1997).

Kose et al. (2006), mentioned that influence of foreign direct investment to economic growth is depending on a host economy's conditions. For countries that meet a set of appropriate conditions such as enough level of financial market development, good governance and appropriate macro policies are supposed to achieve better growth and stability benefits, or it is called as "collateral benefits" from FDI. Hence Kose found that the difference condition in initial economic in the host economy would significantly affect the macroeconomic outcomes of capital inflows.

Lee and Rana (1986) noted that the causality between economic growth and foreign direct investment may run in either direction. FDI can promote further growth and it is expected to enhance and boost economic growth by boosting the incorporation of foreign technologies and new inputs in the production sector of the recipient economy. The causality of FDI and growth could also possibly move the opposite direction where fast GDP growth could raise FDI. Through this process, the fast GDP growth will generally produce a high level of requirement for needed capital in the receiving countries and hence the receiving countries will demand more FDI by offering attractive, preferential or profitable terms to attract overseas investors in order to enhance more FDI. Thus, fast economic growth in the receiving countries will create the confidence of potential overseas investors who are attracted for investment in the receiving countries. Moreover, fast economic growth, supported by an increased higher per capital income, will create large opportunities for FDI to invest in other sectors which is in the consumption sectors as apart of the productive industrial sectors, it could be utility sectors, infrastucture sectors and consumers' durable goods sectors in the host country. Furthermore both economic growth and FDI are positively interdependant and may lead to a bidirectional causal relationship.

2.2.2. Exports-Growth Nexus

The causal link between economic growth and exports has been one of the most debated issue in the recent years but no consensus decided on the direction of causality whether exports-led growth or growth driven exports. It is very prominent for policy makers to make decision regarding the appropriate growth strategies to implement and to adopt by considering the direction of exports and growth. Scholars gived different reason whether the supported exports-led growth or growth-driven exports hypothesis.

According to Awokuse (2012), export expansion could be a catalyst for output growth both directly, as a component of aggregate output, as well as indirectly through, exploitation of economies of scale, greater capacity utilization, stimulation of technological improvement and efficient resource allocation due to foreign market competition. Exports yield foreign exchange which allows for gaining levels of imports of capital goods and intermediate goods that in turn increase the growth of capital formation and accordingly will stimulate output. Thus, export growth through expanded market point will allow for the exploitation of economies of scale for open economies and can promote the transfer of technical knowledge for the long run path.

The development of exports of goods and services denote as one of the most important sources of foreign exchange income that ease the pressure on the balance of payments and produce employment chances. An export-led growth hypothesis purposes to provide producers with incentives to export their goods by various economic and governmental policies. It also leads up to raise the capability of producing goods and services that are able to fight in world market, to use advanced technology, and to yield exchange needed to finance imports. Exports of goods and services can raise intra industry trade, assist the country to integrate in the world economy and diminish the impact of external shocks on the domestic economy. Experiences of Asian and Latin American economies from the past decade give the right information that the exports is very crucial to economic growth improvement, which led policy makers and economists to emphasize the dynamic function of exports as the primary key of economic growth (Abou-Stait, 2005).

Sharma and Panagiotidis (2004) noted that export growth is one of the key driver of output growth. Export growth can influence output growth through positive externalities on non-exports, by the creation of more efficient management styles, improved production methods, increased scale economies, improved allocative efficiency and better capability to create dynamic comparative advantage. If there are incentives to improve technology and rise investment, this would affect a productivity differential in favour of the export sector. Therefore it is debated that an expansion of exports, even at the cost of other sectors, will reap a net positive impact on the economy and may also remove the foreign exchange constraint.

Konya (2004) noted that the possible relationship between exports and economic growth has been interest research for policy makers and scholars since 1960s. Export activity leads economic growth through to the so called export-led growth hypothesis. Trade theory provides several possible explanations in favour of this idea. Moreover the positive influence of an outward oriented trade policy on technological change, labour productivity, capital efficiency and, eventually, on production can be addressed. According to the growth-driven exports hypothesis, reveals a reverse relationship through the concept that economic growth can boost trade flows. It can also generate comparative advantages in certain areas leading to specialisation and facilitating exports. These two approaches do not exclude each other; therefore there is a feedback relationship between exports and economic growth.

Wong Hock Tsen (2006) advocated that there are many reasons to describe the export-led growth hypothesis. An increment in exports may imply that the demand of the country has grown and this could serve to rise output. An increase in exports can promote specialization in the production of export products which in turn, can increase the productivity of the export that leads resources reallocation from inefficient non-trade segment to the higher productive export segment. The productivity change can also lead to economic growth. Exports can lead to raise economic growth. An increase in exports can boost more foreign exchange that makes it easier to import to fullfil domestic production and exporting the output. Exports may also provide the way to advanced technologies, learning-by-doing gains

and good management practices which in turn, will encourage stimulate technological diffusion into the economy and may lead to economic growth.

2.2.3. Stock Market Index-Growth Nexus

A numerous research interest has been conducted on identifying the causality between economic growth and financial sector development (Schumpeter, 1911; McKinnon, 1973; Shaw, 1973). Financial market has been well recognized as one of crucial indicator for economic growth as it is a prominent engine for activating savings in the economy and changing then into meaningful and productive capital. However, when the economy of the country grows significantly and it yields a surplus which can encourage financial sector growth. Furthermore, the causal link between economic growth and financial market is still remaining unclear and interesting for further research. Moreover the clear direction of this causal relationship will have significant policy implications.

The growth of financial sector cannot be measured by using a single factor as financial factor is very wide hence economist have finally concentrated on the link between economic growth and stock market as financial sector indicator.

There is a large amount of literature looking at the causality between the economic growth and stock market. The study of the economic growth and the movement of stock market has been interesting topic for decades. This issue is growing up whether the movements of stock market are triggered by changes in economic condition or the performance of stock market will encourage economic growth. The empirical research by Korajczyk (1996), Levine and Zervos (1998) reported positive interaction between economic growth and stock market. However not all studies are supportive of the positive relationship between stock markets and real economy. Pan and Mishra (2006) explored the causality between real economy and stock market to find out the various channels through which financial markets drive economic growth in China using unit root testing and ARDL model. Their findings indicate that Shanghai A share market has a long run negative causal relationship with the real economy but the effect is very small however the magnitude of impact is tiny and could be neglected. It exhibits that no evidence of causality between stock market and real economy of China in the short run.

2.3. EMPIRICAL LITERATURE

2.3.1. Introduction

Under this section, “FDI-led growth”, “export-led growth” and and “Stock market index-led growth” hypothesis will be reviewed through the empirical literature of studies in various countries.

2.3.2. Empirical Literature on FDI-led Growth Hypothesis

Zakaria (2009) analysed the causality between FDI and economic growth in 37 developing countries including Indonesia, India, Brazil and South Africa using multivariate framework. Empirical findinds show that the bivariate causality tests between foreign direct investment and economic growth created mixed results. FDI causes economic growth only in some countries and there is strong proof that causality stemming from economic growth to FDI in some countries. It is found bidirectional causality for South Africa. However for Brazil and India the causality is significantly one direction stemming from FDI to GDP and not vice versa. Meanwhile the causality for Indonesia is running from GDP to FDI.

Herzer et al (2008) investigated FDI-led growth in Indonesia, India and Brazil employing cointegration techniques on acountry by country basis. The results exhibit evidence of an unidirectional causality in Indonesia stemming from GDP to FDI, for India causality is stemming from FDI to GDP and interestingly GDP and FDI do not Granger cause each other in Brazil.

Roy (2012) using Granger causality test explored causality between economic growth and FDI for selected Asian countries including Indonesia and India during time span 1981-2008. The research obtained a proof of one way causality stemming from economic growth to FDI.

The causality between FDI and economic growth was evaluated by Hossain and Hossain (2012) in India from 1972 to 2008 and an unidirectional causality was found in India, in other words FDI Granger caused economic growth in India. While Miankhel et al. (2009) also tested the causality pattern between growth and FDI in India from 1970 to 2005 applying VECM either in the short or long term. Their findings denote that economic growth in India attracts FDI in the long run.

Bakir and Eryilmaz (2015) utilizing the Granger causality method to investigate the causality between economic growth and FDI in Turkey from 1974 to 2012. A bidirectional causality was found between foreign direct investment and economic growth in Turkey. Dogan (2013) found two directions causality as well when he tested the causality between foreign direct investment and economic growth in Turkey from 1979 to 2011 through time series technique. However, Afsar (2007) evaluated causality between FDI and economic growth in Turkey employing quarterly data on 1992-2006 by employing Granger causality test as well. The findings exhibit a proof of one direction causality stemming from FDI to economic growth.

Gunaydin and Tatoglu (2005) examined the causality between economic growth and FDI in Turkey during 1968-2002 through cointegration, error correction models (ECM), the augmented vector autoregressive (VAR) methods developed by Toda and Yamamoto. Their outcomes show that there exists proof of bidirectional Granger causality between thoses variables, supporting the feedback hypothesis for Turkey over this sample period. As the study of causality between FDI and economic growth is conducted based on a single country base, hence the result could not be generalized to other emerging countries.

Kaur et al (2013) used Toda Yamamoto Granger causality technique to understand the causality between economic growth and FDI for the period of 1974-2009 in India. Their results suggest that there is integration between GDP and FDI in the long run. There is bidirectional causality between FDI and economic growth in India in post liberalization period and during the pre liberalization period is founded proof of FDI led growth.

Naveed-Shabbir (2006) tested the hypothesis of FDI led growth and Growth driven FDI in 23 developed countries over the time span 1971-2000 using fixed effect and control set of variable method. They found no causality between these variables.

Gursoy and Kalyoncu (2012) has explored the causality between economic growth and FDI in Georgia during the time span 1997-2010 by applying Engle Granger cointegration and Granger causality method. The findings indicate cointegration between economic growth and FDI. It confirms that causality direction

stemming from FDI to GDP. It is very prominent for policy makers to build decisions which support and ease private investors.

Olusanya (2013) evaluated the influence of FDI inflow on economic growth in the pre-deregulatin era and the post-deregulation era in Nigeria from 1970 to 2010. Employing Granger causality method, the empirical findings show causality stemming from gross domestic product to FDI during pre-deregulation (1970-1986) era however during post-deregulation era (1986-2010), the results confirm no causality relationship.

Raki et al. (2012) used the endogenous growth model, TFP transmission mechanism and panel data methods to evaluate the influence of FDI on economic growth during 1999-2008 in Turkey, Iran, Bangladesh, Pakistan, Malaysia, Indonesia, Egypt and Nigeria. The empirical outcomes denote that FDI has negative influence on economic growth. It indicates that although FDI can boost the level of investment in host countriest however it can be lowering the rate of growth due to price distortion factor or misallocation of resources.

Cicak and Soric (2015) also tested causality between FDI and GDP in Croatia and other cosen European transition countries using bivariate VAR models. Their findings indicate that FDI influences economic growth in most countries whereas economic growth influences FDI in Latvia and Slovenia which is corroborating the literature theory that investor are prone to stable macroeconomic conditions.

2.3.3. Empirical Literature on Exports-led Growth Hypothesis

Ekanayake (1999) employed cointegration and error correction models to examine the causality between economic growth and export growth in the selected eight Asian developing countries for the period 1960-1997. The finding is that there is bidirectional causality between exports and economic growth in Sri Lanka, Indonesia, Thailand, Philippines, Korea, Pakistan and India. There is a proof for export-led growth in Malaysia. Thus, it shows strong proof for short run Granger causality stemming from economic growth to export growth in those countries except Sri Lanka however short run causality is not founded in the study that stemming from exports to economic growth.

Sharma and Panagiotidis (2004) investigated the causality between exports and economic growth for the period 1971-2001 for India. The findings denote that no causality between exports and economic growth.

Alici and Ucal (2003) investigated the causal relationship running from exports to economic growth from 1987-2002 in Turkey. An unidirectional causality was resulted from their study and the causality stemming from exports to economic growth and not vice versa.

Miankhel et al (2009) evaluated FDI and GDP relationship in India in time series framework of VECM. The results suggest that GDP growth as the key driver for exports in the long run.

Araujo and Soares (2011) tested both whether exports causes growth or growth causes exports in Brazil after trade liberalization through a causality test between exports and GDP for the period of 1991-2010. The empirical result is favorable for both hypothesis. The openness has positively impacted economic growth in Brazil after the initial phase of disappointment with trade liberalization.

Ajmi et al (2015) using econometrics method to analyze causality pattern between exports and economic growth in South Africa from 1911 to 2011. The outcome of linear Granger causality indicates no causality between economic growth and exports in South Africa. While using Hiemstra and Jones nonlinear Granger causality test, they found one direction causality from economic growth to exports. Yet, using the Diks and Panchenko test which is a strong and less biased nonlinear test, found significant bidirectional causality.

Awokuse (2002) assessed whether export influences growth for Canada by employing Granger causality stemming from exports to economic growth through econometric approach by Toda and Yamamoto (1995). The empirical findings depicts a long run one way direction causality that stemming from exports to economic growth.

Tahir et al. (2015) evaluated the causality between exports and growth Sri Lanka employing annual data over time span 1981 to 2012. The period is selected due to consideration of economy liberalization program where the trade sector plays prominent role in determining national income of Sri Lanka. Using Johansen

cointegration test and Granger causality test indicated that no short or long run causality exist between GDP and exports in Sri Lanka.

Kumari-Malhotra (2014) investigated the causal relationship between exports and economic growth in India using annual time series data for the variables exports and GDP per capita from 1980 to 2012 by applying Johansen cointegration and Granger causality approach. The results show that there is no long run relationship between exports and GDP per capita. The result of Granger causality analysis shows two directions causality from exports to GDP per capita and vice versa in the short run relationship.

Hussain (2014) evaluated causality pattern between exports and economic growth in Pakistan from 1976 to 2011. Emplyoying Phillip Perron (PP) and Augmented Dickey-Fuller (ADF) tests, the outcomes uncover two directions of causality between exports and economic growths.

Silaghi (2009) investigated the export-led growth and growth-led export hypothesis for Slovakia, Lithuania, Bulgaria, Poland, Estonia, Hungary, Latvia, Romania, Slovenia and the Czech Republic using cointegration and causality tests from 1990 to 2006. He found causality from exports to GDP for Estonia, Bulgaria, the Czech Republic, Latvia and Lithuania however it is also found that there is existence of causality running from GDP to exports for Slovenia, the Czech Republic, Bulgaria, Lithuania, Romania, Estonia and Hungary.

Hameed et al. (2012) studied Granger causality analysis between exports and economic growth of Pakistan from 1960 to 2009, through econometric analysis on exports, GDP and trade of Pakistan. The finding clearly advocates the export-led growth hypothesis and found that there exists one direction causality stemming from GDP to exports.

Amiri and Gerdtham (2012) investigated Granger causality between exports and economic growth in France over the time span 1961-2006 employing geostatistical models (kiriging and inverse distance weighting). Their results show strong evidence of unidirectional causality stemming from economic growth to FDI. This insight corroborates the growth led export (GLE) model in France.

Rahmaddi and Ichihashi (2011) re-examined the relationship of exports and economic growth in Indonesia over the period 1971-2008 by using vector

autoregressive model. Their empirical findings reveal bidirectional causal link between exports and economic growth, where ELG occured in the long run and GLE occured in the short run.

Exports led growth and growth driven exports hypothesis have been investigated by Amiri (2012) in 116 countries from 1990 to 2005 by applying panel data set with a VAR representation. They found bidirectional causality for the sample of 116 countries eventhough it is not homogenous.

Mahroowal et al. (2014) tested exports led growth and growth driven exports hypothesis in Afghanistan over the period 1972-2012. Using Vector Error Correction Models (VECMs) analysis, it indicates an unidirectional causality stemming from exports to economic growth in the short run.

Aydin and Sari (2014) examined the causal link between exports and economic growth in Turkey by using Augmented Dickey Fuller (ADF) test and Granger causality test based on Toda-Yamamoto analysis over the period 1980-2012. They found an unidirectional causality running from GDP to exports. This findings are supposed to give a better knowledge of possible impacts of GDP in Turkey to exports.

Shan and Tian (1998) assessed the export-led growth hypothesis employing monthly data in China over the period 1990-1996 through Granger causality test developed by Toda Yamamoto in a vector autoregression model. They confirmed one way direction of Granger causality stemming from GDP to exports.

Abbas (2012) investigated causality between export and economic growth (GDP) over the time span 1975-2010. Using Johansen test of Cointegration and Granger Causality tests, the findings reveal both short run and long run unidirectional causality stemming from GDP to exports. Thus government is expected to expand production side which is in the long run will promote trade and economy.

2.3.4. Empirical Literature on Stock market index - led growth Hypothesis

Gursoy and Muslumov (1998) used a time series data for the period of 1981-1994 to examine the causal link between stock market and economic growth in Indonesia, Turkey and India. One direction causality stemming from stock market to economic growth is found in Turkey and no causality found in Indonesia and India.

Paramati and Gupta (2011) using monthly data to evaluate whether economic growth influences stock market performance or the opposite direction from 1996 to 2009. Empirical results of their study indicate that the economic growth is key driver in establishing the stock price movements. The economic growth tends to boost stock market development through implementing appropriate reallocation of resources.

Ndako (2010) using quarterly data from 1983 to 2007 and employing VECM to examine the causal relationship between stock market development and economic growth in South Africa. The empirical findings suggest long run bidirectional causality between stock market development and economic growth.

Mun et al. (2008) using annual data on Kuala Lumpur Composite index (KLCI) and real GDP to examine the causal link between stock market and economic activity from 1977 to 2006 in Malaysia. They employed Granger causality test and it showed one direction causality stemming from stock market to economic activity.

Ali (2015) explored the complex relationship between stock market and economic growth by Granger causality method in South Africa, India, Turkey, China, Russia and Brazil. The results show significant causality stemming from stock market to economic growth in Russia, India, Turkey and South Africa whereas for Brazil and China, the causality is found stemming from economic growth to stock market.

A study by Pearce (1983) denoted that stock market prices may help in promoting the economy condition. He found strong evidence that stock market is one of important driver of economic growth.

Alam and Hasan (2003) found that the stock market development variable effects US economic growth. Atje and Jovanovich (1993) indicated that there is causality between economic growth and stock market development.

Selected African countries were analyzed by Agarwal (2001) to understand the pattern of stock market and economic growth employing data from 1992 to 1997. The outcomes yielded causality between economic growth and stock market. In a similar study conducted in developing countries by Filer et al. (1999) found that an active equity market is able to boost economic growth.

CHAPTER THREE
DATA AND METHODOLOGY

3.1. DATA

The study employs quarterly data of Fragile Five economies i.e. Indonesia, Turkey, India, Brazil and South Africa for period 1991-2015 with exception for India (2004-2015) and South Africa (1995-2015) due to lack of data and missing values, obtained from International Monetary Fund (IMF) database.

The variables used in this research are FDI inflows (percentage change), Exports of goods and services (percentage change), GDP (percentage change) which is used as indicator of economic growth in this research and stock market index (percentage change). Data are obtained from IMF database, OECD database and online stock market index database website (i.e. www.investing.com).

All stock market indices of those Fragile Five economies are denominated in local currency units, extracted from online stock market index database. In this study, the stock market index for these markets are calculated from the following sources:

. Indonesia Stock Exchange Composite Index (IDX) for Indonesia;

. Turkey Stock Market Index (XU100/BIST100) for Turkey;

. BSE SENSEX (BSESN) for India;

. Brazil Stock Market Index (BOVESPA) for Brazil; and

. South Africa Stock Market Index (FTSE/JSE) for South Africa.

3.2. METHODOLOGY

3.2.1. Parametric and Nonparametric Granger Causality

Granger causality is a stastitical method that determines predictive ability of one time series on the other through a linear estimation. A time series, is $x_{2,t}$ said to Granger cause another time series , $x_{1,t}$, if the past values of the time series, $x_{2,t}$, helps to predict $x_{1,t}$ (Granger, 1969). The estimation is performed with a vector autoregressive model. For a stationary stochastic process of , $x_{1,t}$ and , $x_{2,t}$, the projection of these series on their own past values can be written as follows:

$$x_{1,t} = \sum_{j=1}^{\infty} a_{11,j} x_{1,(t-j)} + \varepsilon_{1,t} \quad (1a)$$

$$x_{2,t} = \sum_{j=1}^{\infty} a_{21,j} x_{1,(t-j)} + \varepsilon_{2,t} \quad (1b)$$

while the bivariate linear autoregressive model of $x_{1,t}$ and $x_{2,t}$ is:

$$x_{1,t} = \sum_{j=1}^{\infty} a_{11,j} x_{1,(t-j)} + \sum_{j=1}^{\infty} a_{12,j} x_{2,(t-j)} + \varepsilon_{1|2,t} \quad (1c)$$

$$x_{2,t} = \sum_{j=1}^{\infty} a_{21,j} x_{1,(t-j)} + \sum_{j=1}^{\infty} a_{22,j} x_{2,(t-j)} + \varepsilon_{2|2,t} \quad (1d)$$

Here, ε_1 and ε_2 denote prediction errors, the coefficients of lagged observations are represented by "a", and subscript "t" represents the time lags. If the variance of the prediction error ε_1 is reduced with the inclusion of the lagged values of x_2 in the estimation of $x_{1,t}$ (i.e. ($var(\varepsilon_{1|2,t}) < var(\varepsilon_{1,t})$), then $x_{2,t}$ is said to have a causal influence on $x_{1,t}$. This causal influence can be expressed as a logarithmic difference of the variance of the prediction errors by using linear feedback metric as follows:

$$G_{x_{2\to x_1}} = \ln\left(\frac{var(\varepsilon_{1,t})}{var(\varepsilon_{1|2,t)}}\right)$$

$G_{x_{2\to x_1}}$ measures how $x_{2,t}$ predicts $x_{1,t}$. It takes the value zero (ie. $G_{x_{2\to x_1}} \cong 0$) if x_2 does not Granger cause $x_{1,t}$.

In economics, over a long time span, it is observed that time series oscillates differently within different time intervals. Hence, the structure of the causal relationship between two long memory economic time series can be very complex. In order to uncover the causal interactions between economic time series with periodicities, using Geweke (1982) spectral decomposition analysis and assess the Granger causality between two series on a frequency domain.

First, the bivariate system equations of Eq. (1c) and Eq. (1d) in frequency domain (f) through the Fourier transformation are written as follows:

$$\begin{pmatrix} A_{11}(f) & A_{12}(f) \\ A_{21}(f) & A_{22}(f) \end{pmatrix} \begin{pmatrix} X_1(f) \\ X_2(f) \end{pmatrix} = \begin{pmatrix} \varepsilon_{1|2}(f) \\ \varepsilon_{2|1}(f) \end{pmatrix} \quad (3)$$

Where the components of the coefficients of the coefficient matrix **A** are $A_{ab}(f) = \delta_{ab} - \sum_{j=1}^{\infty} a_{ab,j} e^{-i2\pi f j}$ for $a = 1,2; b = 1,2$. Then, equation (3) can be rewritten by using transfer matrix:

$$\begin{pmatrix} X_1(f) \\ X_2(f) \end{pmatrix} = \begin{pmatrix} H_{11}(f) & H_{12}(f) \\ H_{21}(f) & H_{22}(f) \end{pmatrix} \begin{pmatrix} \varepsilon_{1|2}(f) \\ \varepsilon_{2|1}(f) \end{pmatrix} \quad (4)$$

In equation (4), the transfer matrix $\mathbf{H}(f)$ is the inverse of coefficient matrix $\mathbf{A}(f)$ and transforms the bivariate system equations in Eq. (6) into the Fourier domain. Hence, the Spectral matrix **S** can be quantified as follows:

$$\boldsymbol{S}(f) = \boldsymbol{H}(f)\boldsymbol{\Sigma}\boldsymbol{H}^{*}(f) \tag{5}$$

where $\boldsymbol{H}^{*}$is the adjoint of matrix $\boldsymbol{H}$ and $\boldsymbol{\Sigma}$ is the covariance matrix of prediction errors in bivariate system equatiobs of equation (1c) and equation (1d). Therefore, the frequency domain representation of spectral Granger causality from $x_{1,t}$ to x_2 can be written as follows:

$$I(f)_{x_2 \to x_1} = \left[\frac{s_{11}(f)}{\left(s_{11}(f) - \left(\Sigma_{22} - \frac{{\Sigma_{12}}^2}{\Sigma_{11}}\right) |H_{12}(f)|^2\right)} \right] \tag{6}$$

In equation (6), $S_{11}(f)$ – the element of spectral matrix **S** – denotes power spectrum of variables x_1 at given frequency f. Analogous to equation (2), if $x_{2,t}$ does not Granger cause $x_{1,t}$ at frequency f, then $I(f)_{x_2 \to x_1} \cong 0$, otherwise $I(f)_{x_2 \to x_1} > 0$.

The estimation of spectral Granger causality as a function of frequency is escpecially effective for long memory time series with periodic oscillations. In order to acquire all the spectral aspects of data, Chen et al. (2006), Dhamala et al. (2008 a,b) and Wen et al. (2003) suggest a nonparametric estimation approach to frequency domain Granger causality and estimate the pectral transfer function and error covariance matrix by Fourier and wavelet transformations. The nonparametric estimation is superior to parametric estimation as it eliminates the need for high order autoregressive modeling and hence, avoids the artificial causality effects that result from the misspecification of the autoregressive order that fits to the model. The details of this novel estimation approach are given in the following subsection.

3.2.2. Nonparametric Granger Causality

Nonparametric estimation of spectral Granger causality combines Geweke (1982)'s spectral causality formula with wavelet analysis and Wilson-Burg factorization method. The estimation can be decomposed into several steps:

First step: The bivariate system of equations (1c) and (1d) are transformed by Wavelet transformations as in equation (4) to obtain spectral density matrix. The wavelet transformation of the time series $x_{1,t}$ and $x_{2,t}$ are denoted as $W_1(f,t)$ and $W_2(f,t)$, respectively. The corresponding spectral density matrix elements for

wavelet transformations are X, where $\langle . \rangle$ is an operator that takes the expected value of multiple realizations, $a = 1,2; b = 1,2$ and * denotes matrix adjoint. The continuous mother wavelet transformation of the time series η in time t with width s, $W_{X_a}(t,s)$, is formulated by using the mother wavelet funcction, $\psi(\eta)$, as follows:

$$W_x(t,s) = |s|^{0.5} \int_{-\infty}^{\infty} x(\eta)\psi^*\left(\frac{\eta - t}{s}\right) d\eta. \quad (7)$$

The value of the scaling factor s determines the width of the wavelet: the long run cycles are measures for values of s greater than one ($ie. |s| > 1$) while the short run cycles are measured for $|s| < 1$. Following Dhamala et al. (2008 a,b), Morlet wavelet is employed as the mother wavelet function. Morlet wavelet is modulated by a Gaussian wave: $\psi^*(\eta) = \pi^{-\frac{1}{4}} \exp(i\omega\eta)\exp(-\eta^2/2)$ with $\omega \geq 6$. The gaussian envelope, exp(/2), pinpoints the wavelet in time and ω is time/frequency resolution. The higher the value of ω, the better (poorer) the frequency (time) resolution. The Morlet wavelet is also advantageous as its parameterization allows for a one to one relationship between frequency and wavelet scale. The frequency and the scaling parameter are inversely proportional.

Second step: The most important stage of nonparametric estimation of Granger causality is the factorization of the spectral density matrix **S**. Dhamala et al. (2008 a) use Wilson-Burg matrix factorization theorem of Wilson (1972, 1978) and represent spectral density matrix **S** as a factor of set of unique minimum phase functions:

$$S = \psi\psi^*, \quad (8)$$

Where * denotes matrix adjoint and ψ is minimum-phase function.

Third step: As the spectral matrices in equation (5) and equation (8) are analogous, ie. $\psi\,\psi^* = H\Sigma H^*$, we obtain the covariance matrix from the minimum-phase spectral factor as follows:

$$\mathbf{\Sigma} = \mathbf{A}_0\mathbf{A}_0^T, \quad (9)$$

Where the superscript T denotes matrix transpose.

Likewise, rewriting equation (8) as $\mathbf{S} = \psi A_0^{-1} A_0 A_0^T A_0^{-T} \psi^*$ and substituting equation (9) in it, yields us the spectral matrix as $\mathbf{S} = \psi A_0^{-1} \mathbf{\Sigma} A_0^{-T} \psi^*$ Therefore, the transfer function is:

$$\boldsymbol{H} = \psi A_0^{-1}. \quad (10)$$

Fourth step: Finally, substituting the noise covariance matrix in equation (9) and transfer functions in equation (10) into spectral Granger causality formula in equation (6) yields the nonparametric estimation of wavelet based Granger causality. The spectral density matrix factorizaton makes the power spectrum (S_{11}), error covariance matrix ($\boldsymbol{\Sigma}$) and transfer function (H) readily available rom time series directly.

Since the analytical solution for the Granger causality structure is not a priori known, the significance of nonparametric Granger causality can be tested via surrogate data.

Following the approach of Detto et al. (2012), the null hypothesis of no causal influence between time series can be tested through iterative amplitude adjusted Fouries transform (IAAFT) of Schreiber and Schmitz (2000). IAAFT is based on synthesizing data with the same probability density function and linear correlation structure as original data while any other form of coupling or nonlinear correlation structure, which is encoded by correlations in the phase angle in Fourier space, is destroyed. IAAFT surrogates new time series thourgh a controlled shuffle of the original series based on the phase-randomized surrogate of rank-ordered Gaussian realizations.

CHAPTER FOUR
EMPIRICAL RESULTS

This chapter presents the nonparametric Wavelet-based Granger Causality results of GDP-FDI nexus, GDP-NXP nexus and GDP-SMI nexus for fragile five economies ie Indonesia, Turkey, India, Brazil and South Africa. The figures that represent the results for each country contain causality direction from related variables. The 90%, 95% and 99% confidence intervals represented by a dashed pink line, dashed red line and dashed green line respectively are attained by an ensemble of 1,000 iterative amplitude adjusted Fourier transform surrogate time series.

The y-axis of the figure shows the magnitude of the oscillation of the causality. The higher the magnitude of the oscillation, the stronger is the causal relationship between two variables. The x-axis presents the frequency domain. As mentioned in the methodology chapter, frequency and scale are inversely proportional, furthermore frequency equals to the inverse of the timescale, or in other words, the cycle length. For example frequency 0.05 corresponds to 20 quarters. In each graph, at the frequency points where the causality lines exceed their corresponding confidence intervals, the null hypothesis of no Granger causality is rejected.

Frequency domain Granger causality analysis is superior than conventional Granger causality because it presents the causality results for all the frequencies that exist (the causalities may either exist in the long run, medium run or short run) while conventional Granger causality technique demands stationary variables and provides only one point result. High frequencies represent to short run periods and low frequencies correspond the long run periods. Hence, the part on the x-axis close to the origin shows the long run findings, the middle part of x-axis shows the medium run and the right side of the x-axis that close to the maximum of frequency range stands for the short run (Celik and Baydan, 2017). In cointegrated systems the definition of causality at frequency zero is equivalent to the concept of long run causality as considered by Toda and Phillips (1993). The previous studies conducted by other studies (Celik and Baydan, 2015, 2017) show that there is no exact cutting point on frequency axis (x-axis) to decide where the short run (high frequencies), intermediate run (medium frequencies) and long run (low frequencies) fall.

Furthermore, they justified the area of long run (close to zero), intermediate run (the middle area of x-axis) and short run (close to the maximum point of x-axis) with respect of the range of x-axis. A justification is also necessary for grouping the frequencies that belong to long run, intermediate run and short run in this study with respect of maximum frequency axis point of 5 from the output of analysis. Here, the long run indicates the part of x-axis that close to the origin (close to zero) or at low frequencies i.e. 0-0.15 frequency (7 quarters cycle or more), the medium run indicates the part of x-axis that close to medium frequencies i.e. 0.175-0.275 frequency (4-6 quarters cycle) and the short run indicates the part of x-axis that close to the high frequencies (close to the maximum point of x-axis i.e. 0.35-0.5 frequency/2-3 quarters cycle).

4.1. GDP-FDI Nexus Results

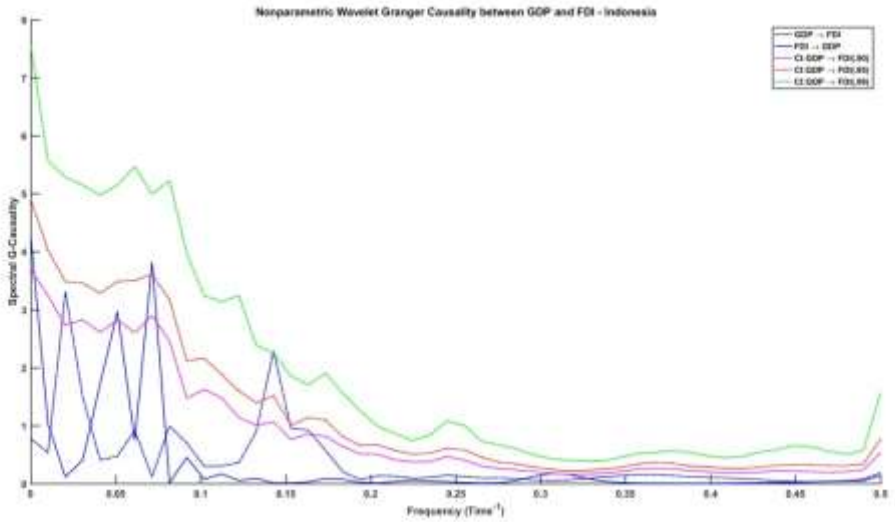
4.1.1. Indonesia

Figure 5 shows the nonparametric Wavelet Granger Causality estimation results between GDP and FDI for Indonesia. It shows a significant causal relationship running from GDP to FDI for lag horizon of 7 quarters at 99%, lag horizon of 7 quarters at 95% and lag horizon of 7 and 49 quarters at 90% level of significance. These results suggest that GDP is a more strong predictor for FDI at a lag horizon of 7 to 49 quarters at 90% level of significance.

It is observed that FDI influences the GDP of Indonesia at frequency of 0.07143 which corresponds to cycle lengths of 14 quarters at 95% level of significance. The same direction of causality is also significant for cycle lengths of 3, 14 and 20 quarters at 90% level of significance and becoms significant again at frequency very close to zero. The causal impact of FDI to GDP becomes significant again at frequencies very close to zero. The influence of FDI to GDP gets stronger for longer lag horizons. The highest significant oscillation magnitude occurs at very low frequencies that correspond to infinite cycle lengths. The significance of causality at such low frequencies is an indicator of a significant average causal effect as the oscillations pass through the average of the data in such long lag horizons. Therefore, FDI can give a good prediction about GDP of Indonesia at low frequencies.

For Indonesia, causality stemming from both directions, GDP to FDI and FDI to GDP. In the low frequencies, the magnitude of the causality stemming from FDI to GDP is larger than the magnitude of the causality stemming from GDP to FDI. The results show significant causal relationship in the high frequencies stemming from FDI to GDP. Yet, there is no proof of any significance causality stemming from GDP to FDI in the high frequencies. Therefore, it takes longer for GDP to cause FDI than FDI causing GDP. The causal effect of FDI to GDP is larger than the causality running from the opposite direction at the low frequencies.

Figure 5. Nonparametric Wavelet Granger Causality between GDP-FDI for Indonesia



Notes: GDP and FDI denote gross domestic product and foreign direct investment, respectively. GDP → FDI and FDI → GDP refer to causality directions from GDP to FDI and FDI to GDP, respectively. In each panel, solid blue line denotes the causality running from FDI to GDP and dashed blue line denotes the causality running from GDP to FDI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.1.2. Turkey

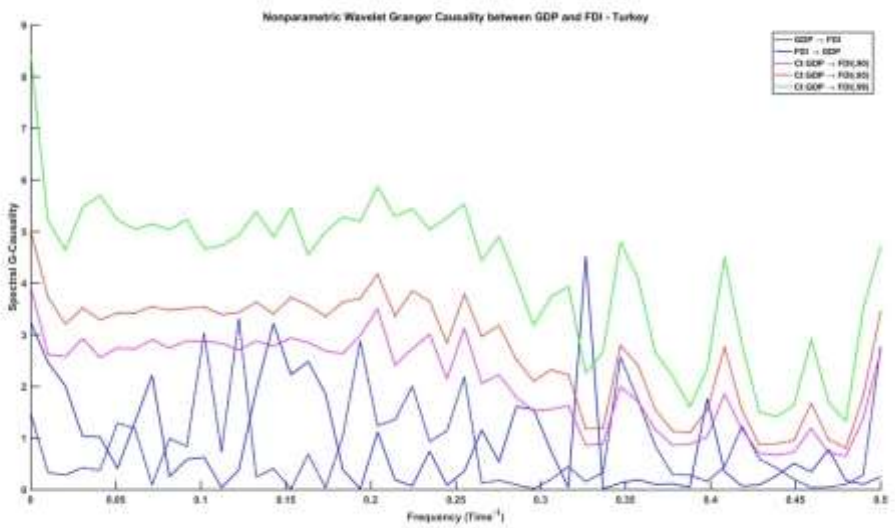
For Turkey, the outcomes exhibit a bidirectional significant causality between GDP and FDI in the high frequencies. The figure indicates that GDP has significant causal effect on FDI at the frequencies of 0.4184 and 0.3469 wich corresponds to

cycle length of 2 and 3 quarters. The same direction of causality is significant at frequencies of 0.1224 and 0.102 which approximately corresponds to 8 and 10 quarters of lag horizon. Those causalities are significant at statistical significance level for 10%.

FDI of Turkey significantly causes GDP for cycle length between 2 and 3 quarters at statistical significance level for 10%, 3 quarters at statistical significance level for 5% and 3 quarters at statistical significance level for 1%. It is observed the same direction of causality at 7 quarters of lag horizon at the high frequencies.

The causal impact of FDI to GDP is larger than the causality running from GDP to FDI at the high frequencies. These results indicate that FDI ia a good predictor for GDP at the high frequencies.

Figure 6. Nonparametric Wavelet-based GDP-FDI Granger Causality results for Turkey



Notes: GDP and FDI denote gross domestic product and foreign direct investment, respectively. GDP → FDI and FDI → GDP refer to causality directions from GDP to FDI and FDI to GDP, respectively. In each panel, solid blue line denotes the causality running from FDI to GDP and dashed blue line denotes the causality running from GDP to FDI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

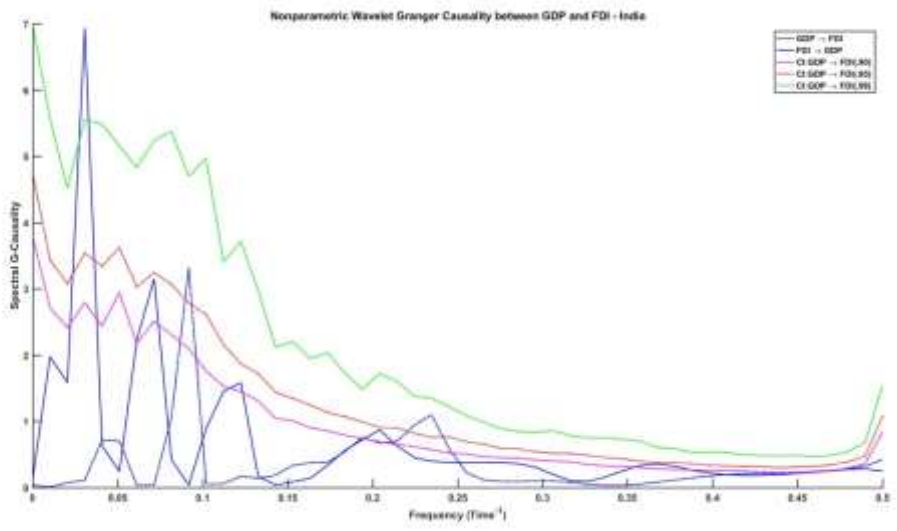
4.1.3. India

There is significant two directions causal relationship between GDP and FDI in India. Considering the causality stemming from FDI to GDP represented by solid blue line of Figure 7, it shows significant causality in the high frequencies and the low frequencies. Tthe initial causal impact is observed at around frequency of 0.3571-0.3776 which is approximately 3 quarters lag horizon at statistical significance level for 10%. This impact is more significant at frequency range of 0.2041, 0.1224 and 0.09184 which corresponds to 5, 8 and 14 quarters of time at statistical significance level for 10%. The most significant causal impact of FDI to GDP is observed with cycle length of 33 quarters at statistical significance level for 1%.

There is a significant causality stemming from GDP to FDI only in the low frequencies as shown in dashed blue line in the Figure 7. GDP Granger causes FDI in India at 4 quarters lag horizon and then again at around 11 quarters time at at statistical significance level for 5% and 10%.

The causal impact of FDI to GDP in India is stronger compared to the causality running from the opposite direction both in the low frequencies and in the high frequencies. At the high frequencies, it is observed a very significant causal impact of FDI to GDP that FDI has a powerful predictability for GDP.

Figure 7. Nonparametric Wavelet Granger Causality between GDP-FDI for India



Notes: GDP and FDI denote gross domestic product and foreign direct investment, respectively. GDP → FDI and FDI → GDP refer to causality directions from GDP to FDI and FDI to GDP, respectively. In each panel, solid blue line denotes the causality running from FDI to GDP and dashed blue line denotes the causality running from GDP to FDI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

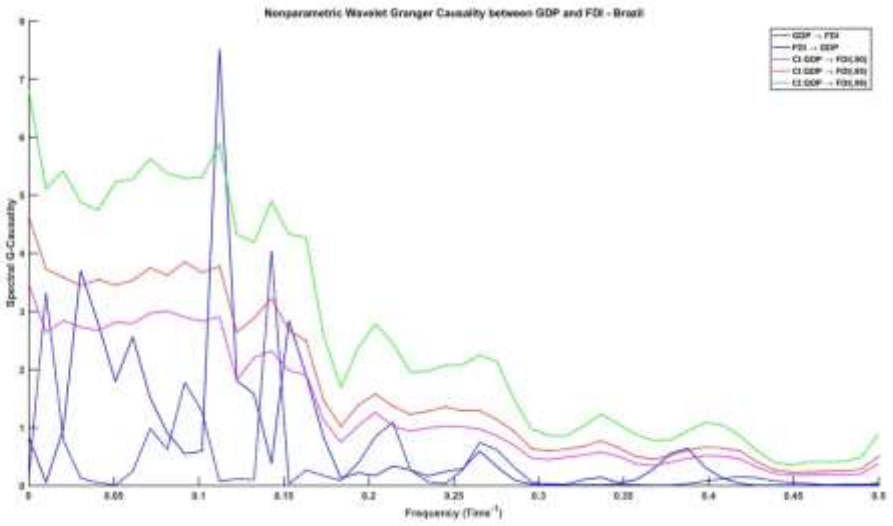
4.1.4. Brazil

According to Nonparametric Wavelet Granger Causality results, there is a significant causal relationship stemming from FDI to GDP and GDP to FDI. GDP Granger causes FDI at frequency range of 0.2143, 0.1429 and 0.0102 at statistical significance level for 10% that corresponds to approximately 5, 7 and 98 quarters of lag horizon and GDP Granger auses FDI at cycle length around 7 quarters at statistical significance level for 5%.

The causal impact of FDI to GDP is significantly observed at frequency range around 0.3878-0.3776 which approximately corresponds to 3 quarters of lag horizon at statistical significance level for 5%. The impact is more significant at cycle length of 7, 9 and 33 quarters at statistical significance level for 5%. The most significant impact of FDI to GDP is observed with cycle length of 9 quarters at statistical significance level for 1%.

The magnitude of the causality stemming from FDI to GDP in Brazil is higher than the magnitude of the causality from gross domestic product to FDI in the low frequencies. GDP has no influence on FDI in the high frequencies, only significant causality is detected stemming from FDI to GDP in the high frequencies.

Figure 8. Nonparametric Wavelet Granger Causality between GDP-FDI for Brazil



Notes: GDP and FDI denote gross domestic product and foreign direct investment, respectively. GDP → FDI and FDI → GDP refer to causality directions from GDP to FDI and FDI to GDP, respectively. In each panel, solid blue line denotes the causality running from FDI to GDP and dashed blue line denotes the causality running from GDP to FDI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.1.5. South Africa

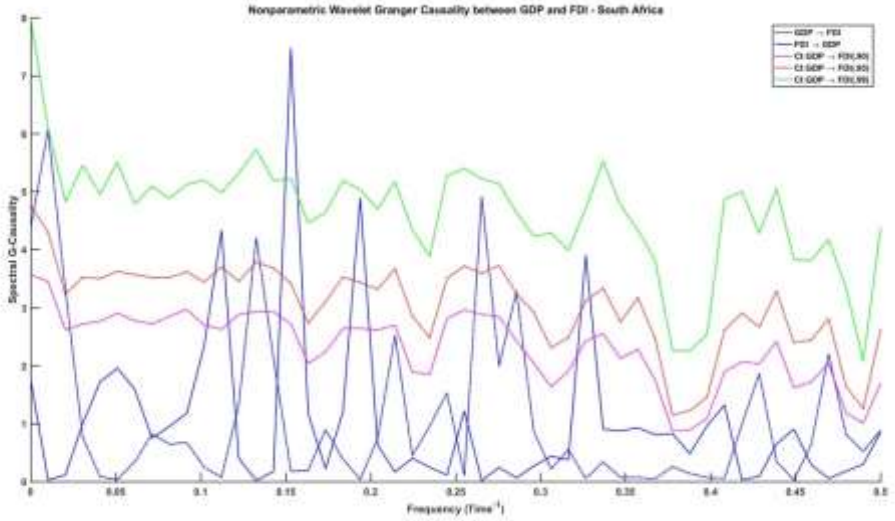
For South Africa, there is significant two directions of causality between GDP and FDI both in the low and high frequencies. The solid blue line of Figure 9 indicates that FDI has causal effect on GDP at frequency range of 0.3265 which corresponds to a cycle length of around 3 quarters at statistical significance level for 5%. The same direction of causality at a frequency range around 0.1939, 0.1531 and 0.1122 that approximately corresponds to 5, 7 and 9 quarters of lag horizon at statistical significance level for 5%. The strongest magnitude of oscillation is at cycle length 7 quarters.

GDP has also impact on FDI as shown on dashed blue line in Firgure 9. In the high frequencies, GDP Granger causes FDI for cycle length around 2 and 4 quarters at statistical significance level for 5%. Again, the impact is more significant at frequency range of 0.1327 which corresponds to 8 quarters of time. In the low

frequencies, the most significant causal impact of GDP to FDI is detected at cycle length of 98 quarters at at statistical significance level for 1%.

Comparing the magnitudes of causality indicates that the causal relationship running from FDI to GDP is more powerful than it is for the opposite direction in the high frequencies however the causal relationship stemming from GDP to FDI in the low frequencies is larger than FDI to GDP implying that GDP of South Africa has a powerful predictability for FDI at the low frequencies.

Figure 9. Nonparametric Wavelet Granger Causality between GDP-FDI for for South Africa



Notes: GDP and FDI denote gross domestic product and foreign direct investment, respectively. GDP → FDI and FDI → GDP refer to causality directions from GDP to FDI and FDI to GDP, respectively. In each panel, solid blue line denotes the causality running from FDI to GDP and dashed blue line denotes the causality running from GDP to FDI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.2. GDP-NXP Nexus Results

4.2.1. Indonesia

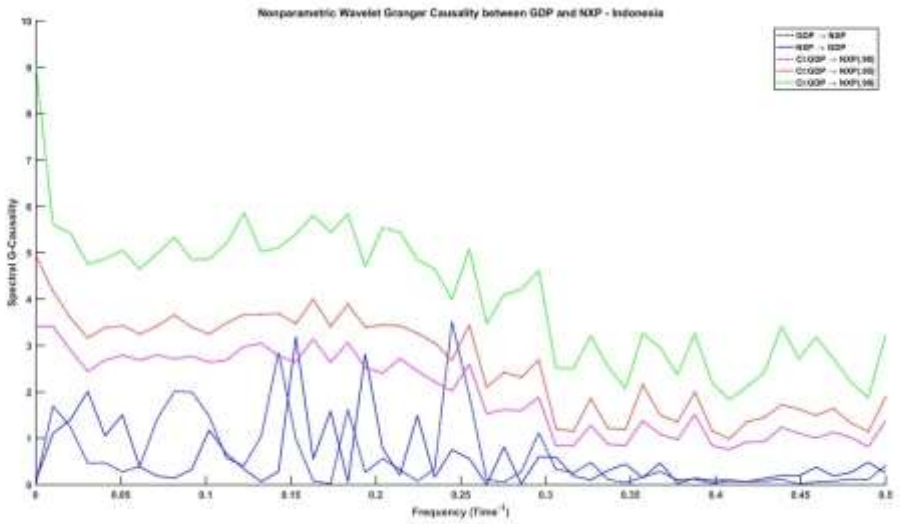
There is two directions of causality between GDP and net export in Indonesia in the intermediate frequencies. At frequencies corresponding roughly to 4 and 7 quarters lag horizon, GDP Granger causes net export at statistical significance level

for 10% and at frequency around 4 quarters GDP Granger causes net export at statistical significance level for 5%.

Considering the causality running from net export to GDP, it is observed that net export Granger causes GDP around 5 and 7 quarters lag horizon GDP Granger causes net export at statistical significance level for 10%.

The magnitude of oscillation from GDP to net export is higher than the opposite direction of causality.

Figure 10. Nonparametric Wavelet Granger Causality between GDP-NXP for Indonesia



Notes: GDP and NXP denote gross domestic product and net export, respectively. GDP → NXP and NXP → GDP refer to causality directions from GDP to NXP and NXP to GDP, respectively. In each panel, solid blue line denotes the causality running from NXP to GDP and dashed blue line denotes the causality running from GDP to NXP. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.2.2. Turkey

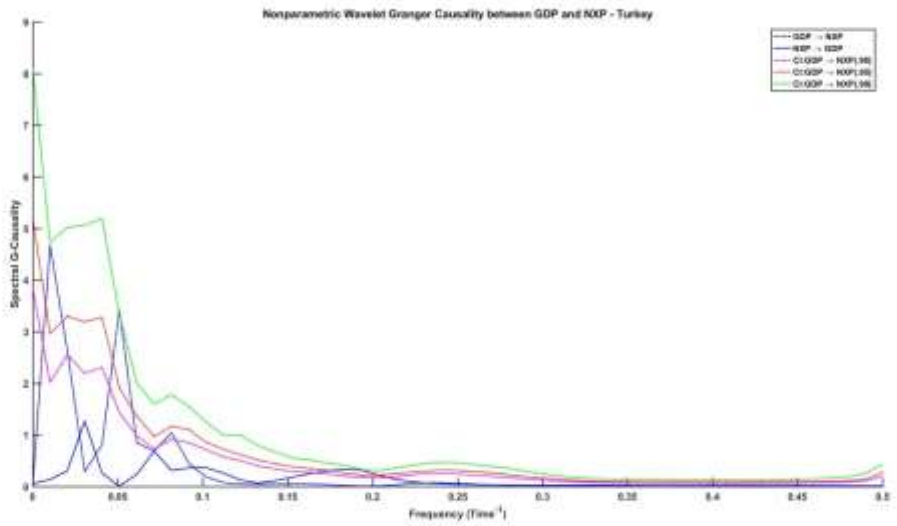
For Turkey, it is observed a bidirectional significant linkage between GDP and net export. The dashed blue line on Figure 11 shows that GDP has significant causal effect on net export in the low frequencies at frequency range of 0.08163 which corresponds to a cycle length of 12 at statistical significance level for 10%, at

frequency range of 0.05102 and 0.0102 corresponding to a cycle length of around 20 and 98 quarters at statistical significance level for 5%.

Considering the causality stemming from net export to GDP, in the high frequencies net export Granger causes net export at frequency range between 0.2041-0.1837 at statistical significance level for 5% that corresponds to cycle length of 5 quarters and net export Granger causes net export at cycle length of 6 quarters at statistical significance level for 10%.

It indicates that net export Granger causes GDP only in the intermediate frequencies while GDP Granger causes net export in the low frequencies and the magnitude of oscillation from GDP to net export in the low frequencies is very high furthermore GDP can give an average prediction about net export at the low frequencies.

Figure 11. Nonparametric Wavelet Granger Causality between GDP-NXP for Turkey



Notes: GDP and NXP denote gross domestic product and net export, respectively. GDP → NXP and NXP → GDP refer to causality directions from GDP to NXP and NXP to GDP, respectively. In each panel, solid blue line denotes the causality running from NXP to GDP and dashed blue line denotes the causality running from GDP to NXP. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

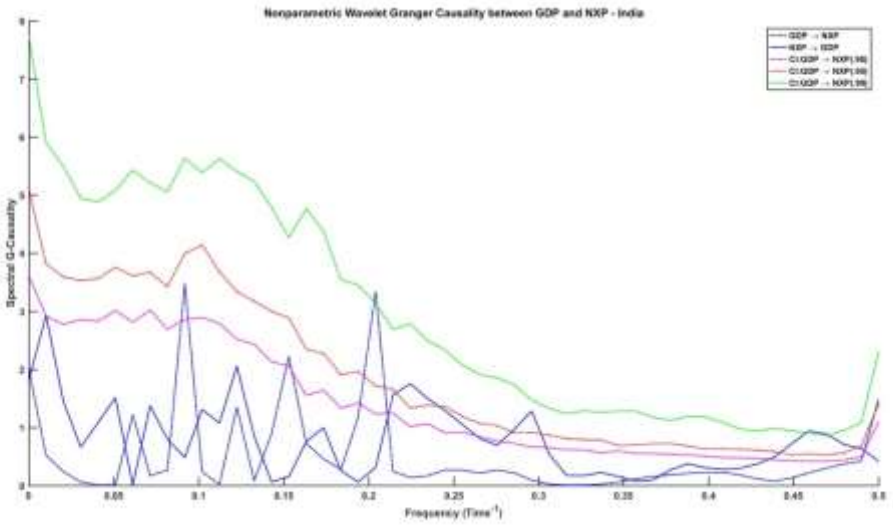
4.2.3. India

For India, according to Nonparametric Wavelet Granger causality results, there is significant two directions of causality between GDP and net export. Considering the causality stemming from net export to GDP represented by the solid blue line in Figure 12, the initial causal impact is observed at around frequency range of 0.4694-0.4592 which is approximately 2 quarters lag horizon at statistical significance level for 5% and at frequency range around 0.4388 which corresponds to cycle length of 2 quarters at statistical significance level for 10%. However the impact is more significant at frequency range of 0.2959-0.2245 which corresponds to 3-5 quarters of time. The most significant causal impact of net export on GDP is observed with cycle length of 98 quarters at statistical significance level for 10%.

It is observed that GDP Granger causes net export in India at frequency range around 0.5, 0.2041, 0.1531 and 0.09184 which corresponds to cycle length between 2, 5, 7 and 11 quarters of time at statistical significance level for 10% but it is also significant at statistical significance level for 5% for cycle length around 5 quarters

The figure shows that causality stemming from GDP to net export is only for the intermediate frequencies while causal relationship stemming from net export to GDP is occuring in the high and intermediate frequencies eventhough the magnitude of causality running from GDP to net export is higher than the magnitude of causality running from net export to GDP.

Figure 12. Nonparametric Wavelet Granger Causality between GDP-NXP for India



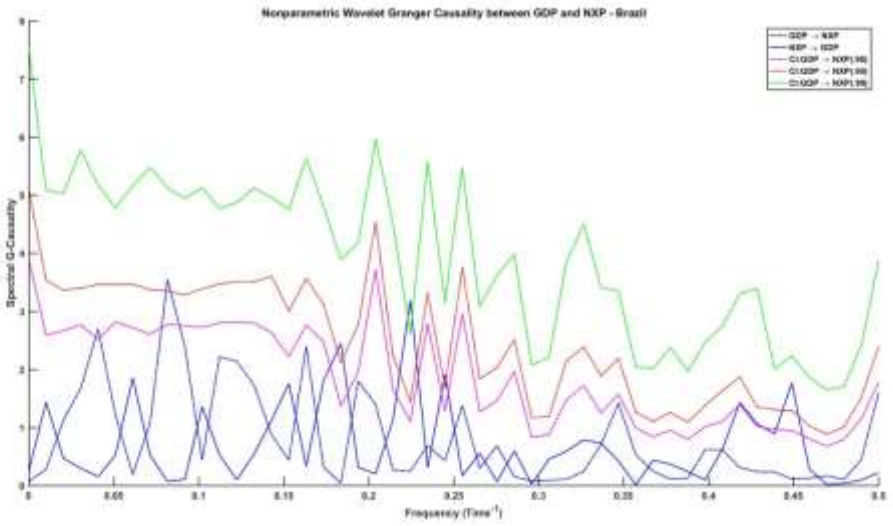
Notes: GDP and NXP denote gross domestic product and net export, respectively. GDP → NXP and NXP → GDP refer to causality directions from GDP to NXP and NXP to GDP, respectively. In each panel, solid blue line denotes the causality running from NXP to GDP and dashed blue line denotes the causality running from GDP to NXP. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.2.4. Brazil

There is a bidirectional causality stemming from GDP to net export and vice versa. At statistical significance level for 5% and 10%, net export Granger causes GDP at cycle length around 2, 4, and 5 quarters. The opposite direction of causlity running from GDP to net export is also significant for cycle length around 12 quarters at statistical significance level for 5% and around 25 quarters at statistical significance level for 10%.

The figure denotes that the causal impact of GDP to net exports is greater than the causality stemming from net export to GDP in Brazil at the low frequencies.

Figure 13. Nonparametric Wavelet Granger Causality between GDP-NXP for Brazil



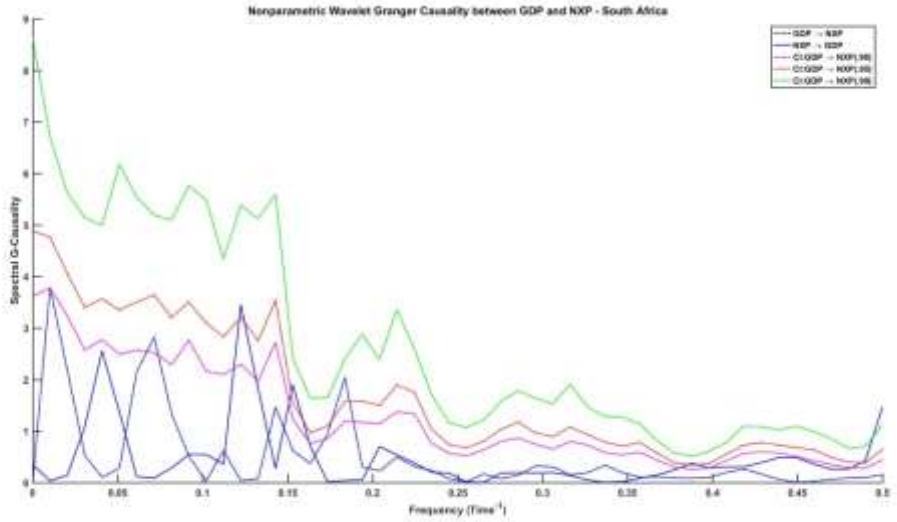
Notes: GDP and NXP denote gross domestic product and net export, respectively. GDP → NXP and NXP → GDP refer to causality directions from GDP to NXP and NXP to GDP, respectively. In each panel, solid blue line denotes the causality running from NXP to GDP and dashed blue line denotes the causality running from GDP to NXP. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.2.5. South Africa

Similar to Brazil, there is bidirectional causality stemming from GDP to net export and vice versa in South Africa. At frequencies corresponding roughly to 2, 3, 7, 8 quarters lag horizon, net export Granger causes GDP at statistical significance level for 5%. On the other hand, GDP Granger causes net export at cycle length around 5 quarters at statistical significance level for 5% and the same direction of causality is also significant at cycle length around 14 and 98 quarters at statistical significance level for 10%.

It indicates that bidirectional causality occurs in the intermediate frequencies at statistical significance level for 5% but causality stemming from GDP to net export is also occuring in the low frequencies at 10% level of significance. As shown on the figure that magnitude of causality running from net export to GDP is larger than the opposite causality.

Figure 14. Nonparametric Wavelet Granger Causality between GDP-NXP for South Africa



Notes: GDP and NXP denote gross domestic product and net export, respectively. GDP → NXP and NXP → GDP refer to causality directions from GDP to NXP and NXP to GDP, respectively. In each panel, solid blue line denotes the causality running from NXP to GDP and dashed blue line denotes the causality running from GDP to NXP. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.3. GDP-SMI Nexus Results

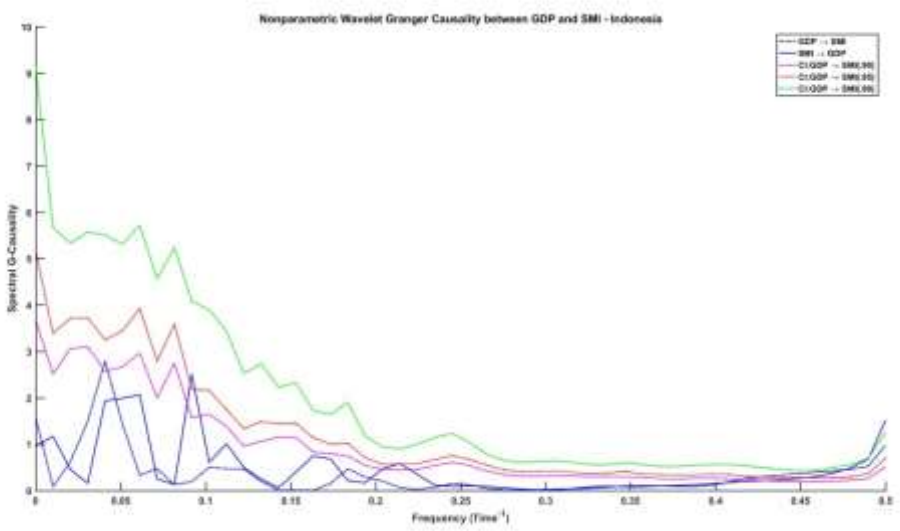
4.3.1. Indonesia

There is bidirectional causality stemming from GDP to stock amrket index and vice versa in the high frequencies as shown in the Figure 15. According to the results, it is observed that stock market index Granger causes GDP at cycle length around 2 quarters of lag horizon and then again at around 5 quarters of time. It is also more significant at cycle length for 11 quarters of lag horizon at the 5% level of statistical significance. In the oposite direction of causality, GDP granger causes stock market index at cycle length for 2 quarters of time at the 5% level of statistical significance but it becomes more significant at cycle length for 25 quarters of time at the 10% level.

The magnitude of causality running from stock market index to GDP is stronger than it is for the opposite direction at the 5% level of statistical significance

however the magnitude of causality running from GDP to stock market index is larger than causality stemming from stock market index at the 10% level of statistical significance.

Figure 15. Nonparametric Wavelet Granger Causality between GDP-SMI for Indonesia



Notes: GDP and SMI denote gross domestic product and stock market index, respectively. GDP → SMI and SMI → GDP refer to causality directions from GDP to SMI and SMI to GDP, respectively. In each panel, solid blue line denotes the causality running from SMI to GDP and dashed blue line denotes the causality running from GDP to SMI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

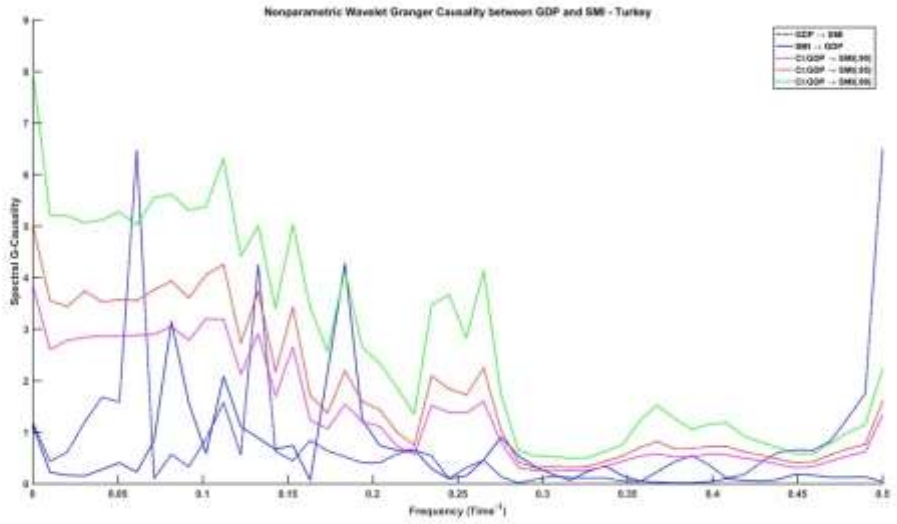
4.3.2. Turkey

According to causality results, there is bidirectional causality between GDP and stock market index in Turkey. GDP Granger causes stock market index as shown in dashed blue line at cycle length around 2 quarters of lag horizon and then again becomes more significant at cycle length around 8 and 16 quarters of time at the 5% level of statistical confidence.

While stock market index Granger causes GDP at cycle length around 3-4 quarters of time and then at cycle length for 5 quarters of time at the 5% level of statistical confidence.

From the Figure 16, it denotes that the magnitude of causality running from GDP to stock market index is bigger than the magnitude of causality running from stock market index to GDP in the low frequencies. It means that GDP can predict the average of stock market index.

Figure 16. Nonparametric Wavelet Granger Causality between GDP-SMI for Turkey



Notes: GDP and SMI denote gross domestic product and stock market index, respectively. GDP → SMI and SMI → GDP refer to causality directions from GDP to SMI and SMI to GDP, respectively. In each panel, solid blue line denotes the causality running from SMI to GDP and dashed blue line denotes the causality running from GDP to SMI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

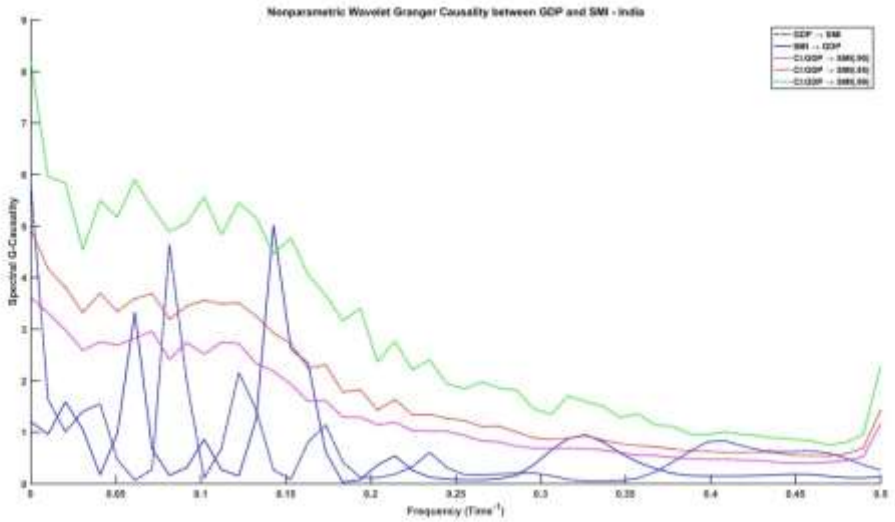
4.3.3. India

For India, similar to Turkey, there is two directions of causality between stock amrket index and GDP. The dashed blue line denotes GDP granger causes stock market index at cycle length around roughly 2 quarters. The same direction of causality is observed at cycle length around 12 quarters of lag horizon. The causal impact of GDP becomes significant again at frequencie very close to zero. These results indicate that in the low frequencies, GDP can be a good predictor for stock market index. In the high frequencies, the causality running from GDP to stock market index is not quite strong and limited.

Considering the causality running from stock market index Granger causes GDP, the figure exhibits that stock market index Granger causes GDP initially around 3 quarters, and then again at around 6-7 quarters of lag horizon.

The comparison of the magnitudes of the causality indicates that for India the casual relationship running from stock market index to GDP is more significant than it is for the opposite direction in the intermediate and high frequencies. Only at the very low frequencies, it is found that a very significant causal impact of GDP to stock market index meaning that GDP has a powerful predictability for stock market index.

Figure 17. Nonparametric Wavelet Granger Causality between GDP-SMI for India



Notes: GDP and SMI denote gross domestic product and stock market index, respectively. GDP → SMI and SMI → GDP refer to causality directions from GDP to SMI and SMI to GDP, respectively. In each panel, solid blue line denotes the causality running from SMI to GDP and dashed blue line denotes the causality running from GDP to SMI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.3.4. Brazil

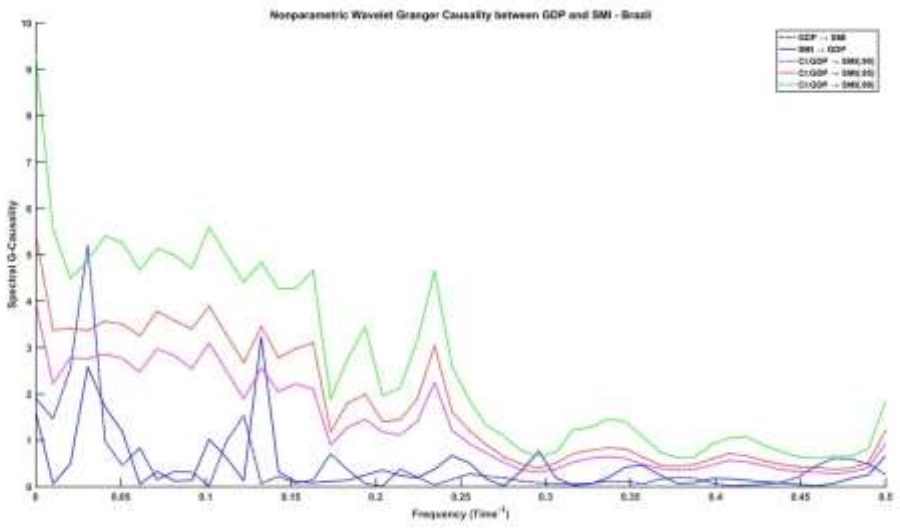
As shown in Figure 18, it shows two directions of causality between stock market index and GDP in Brazil. GDP as shown in dashed blue line Granger causes stock market index at cycle length of approximately 2 quarters in the high

frequencies and again it becomes more significant at cycle length of 33 quarters in the low frequencies.

Considering the opposite path of causality running from stock market index to gross domestic product, stock market index Granger causes GDP at cycle length of 3 quarters and around 8 quarters.

The causality stemming from gross domestic product to stock market index is significant in the low and high frequencies while the opposite causality is only significant in the intermediate frequencies and the magnitude of causality running from GDP to stock market index is stronger than the magnitude of causality running from stock market index to GDP.

Figure 18. Nonparametric Wavelet Granger Causality between GDP-SMI for Brazil



Notes: GDP and SMI denote gross domestic product and stock market index, respectively. GDP → SMI and SMI → GDP refer to causality directions from GDP to SMI and SMI to GDP, respectively. In each panel, solid blue line denotes the causality running from SMI to GDP and dashed blue line denotes the causality running from GDP to SMI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.3.5. South Africa

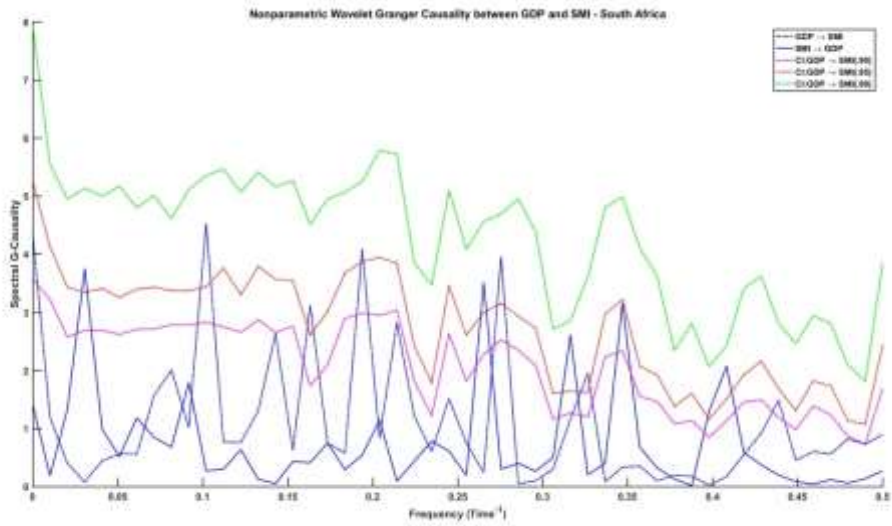
For South Africa, there is proof of two directions of causality between stock market index and GDP. GDP Granger causes stock market index at cycle length

around roughly 3-6 quarters. The same direction of causality is observed at cycle length around 10 quarters of lag horizon. The causal impact of GDP becomes significant again at frequencies very close to zero. These results show that GDP can be a good predictor for stock market index in the low frequencies.

Considering the causality running from stock market index to GDP, the figure exhibits that stock market index Granger causes GDP initially around 2-4 quarters, and then again at around 6-33 quarters of lag horizon.

The comparison of the magnitudes of the causality indicates that for South Africa the casual relationship running from GDP to stock market index is more significant than it is for the opposite direction both in the low and intermediate frequencies. It means that GDP has a powerful long run predictability for stock market index.

Figure 19. Nonparametric Wavelet Granger Causality between GDP-SMI for South Africa



Notes: GDP and SMI denote gross domestic product and stock market index, respectively. GDP → SMI and SMI → GDP refer to causality directions from GDP to SMI and SMI to GDP, respectively. In each panel, solid blue line denotes the causality running from SMI to GDP and dashed blue line denotes the causality running from GDP to SMI. Dashed pink line refers statistical significance level for 10%, dashed red line refers statistical significance level for 5%, dashed green line refers statistical significance level for 1%. At the frequency points where the causality coefficient lines exceed the corresponding significance level line, the null hypothesis of no causality in a given time scale is rejected. Vertical axis shows the value of the causality coefficients. Horizontal axis shows frequency which is resiprocal of given time scale or period (ie. f≅1/s).

4.4. DISCUSSION

The empirical results from nonparametric wavelet Granger causality between GDP-FDI nexus, GDP-NXP nexus and GDP-SMI nexus can be seen on Table 2.

Table 2. Sum up of Wavelet-based Granger Causality Test Results

Nexus	Country	Direction of Causality	Causality Test Result			The Highest Magnitude of Causality
			Low Frequencies	Intermediate Frequencies	High Frequencies	
GDP-FDI	Indonesia	GDP to FDI	Yes (***)	Yes (*, **, ***)	No	FDI to GDP
		FDI to GDP	Yes (**, ***)	Yes (***)	No	
	Turkey	GDP to FDI	Yes (***)	No	Yes (***)	FDI to GDP
		FDI to GDP	Yes (***)	No	Yes (*, **, ***)	
	India	GDP to FDI	Yes (**, ***)	Yes (**, ***)	Yes (***)	FDI to GDP
		FDI to GDP	Yes (*, **, ***)	Yes (***)	Yes (***)	
	Brazil	GDP to FDI	Yes (***)	Yes (*, **, ***)	No	FDI to GDP
		FDI to GDP	Yes (*, **, ***)	Yes (**, ***)	Yes (**, ***)	
	South Africa	GDP to FDI	Yes (*, **, ***)	Yes (**, ***)	Yes (***)	FDI to GDP
		FDI to GDP	Yes (**, ***)	Yes (**, ***)	Yes (**, ***)	
GDP-NXP	Indonesia	GDP to NXP	No	Yes (**, ***)	No	GDP to NXP
		NXP to GDP	No	Yes (***)	No	
	Turkey	GDP to NXP	Yes (**, ***)	No	No	GDP to NXP
		NXP to GDP	No	Yes (**, ***)	No	
	India	GDP to NXP	Yes (***)	Yes (*, **, ***)	Yes (**, ***)	GDP to NXP
		NXP to GDP	Yes (***)	Yes (**, ***)	Yes (*, **, ***)	
	Brazil	GDP to NXP	Yes (**, ***)	No	No	GDP to NXP
		NXP to GDP	No	Yes (*, **, ***)	Yes (**, ***)	
	South Africa	GDP to NXP	Yes (***)	Yes (**, ***)	No	GDP to NXP
		NXP to GDP	Yes (**, ***)	Yes (**, ***)	Yes (**, ***)	
GDP-SMI	Indonesia	GDP to SMI	Yes (***)	No	Yes (**, ***)	GDP to SMI
		SMI to GDP	Yes (**, ***)	Yes (**, ***)	Yes (*, **, ***)	
	Turkey	GDP to SMI	Yes (*, **, ***)	Yes (***)	Yes (*, **, ***)	GDP to SMI
		SMI to GDP	Yes (***)	Yes (**, ***)	Yes (***)	
	India	GDP to SMI	Yes (**, ***)	No	Yes (**, ***)	GDP to SMI
		SMI to GDP	Yes (*, **, ***)	No	Yes (**, ***)	
	Brazil	GDP to SMI	Yes (*, **, ***)	No	Yes (**, ***)	GDP to SMI
		SMI to GDP	Yes (**, ***)	Yes (*, **, ***)	No	
	South Africa	GDP to SMI	Yes (**, ***)	Yes (**, ***)	Yes (**, ***)	GDP to SMI
		SMI to GDP	Yes (**, ***)	Yes (**, ***)	Yes (**, ***)	

Note: *, **, *** indicate the statistical significance at the 1%, 5% and 10% level of significance respectively.

The previous studies conducted by other studies (Celik and Baydan, 2015, 2017) show that there is no exact cutting point on frequency axis (x-axis) to decide where the short run (high frequencies), intermediate run (medium frequencies) and long run (low frequencies) fall. Furthermore, they justified the area of long run (close to zero), intermediate run (the middle area of x-axis) and short run (close to the maximum point of x-axis) with respect of the range of x-axis. A justification is also necessary for grouping the frequencies that belong to long run, intermediate run and short run in this study with respect of maximum frequency axis point of 5 from the output of analysis. Here, the long run indicates the part of x-axis that close to the origin (close to zero) or at low frequencies i.e. 0-0.15 frequency (7 quarters cycle or more), the medium run indicates the part of x-axis that close to medium frequencies i.e. 0.175-0.275 frequency (4-6 quarters cycle) and the short run indicates the part of x-

axis that close to the high frequencies (close to the maximum point of x-axis i.e. 0.35-0.5 frequency/2-3 quarters cycle).

The findings indicate a bidirectional causality between GDP-FDI nexus, GDP-net export nexus and GDP-stock market index nexus in all Fragile Five Economies however the direction and the magnitude of causality through frequency domain are different for each nexus. This analysis has demonstrated a significant causality stemming from GDP to FDI at low frequencies and vice versa in all Fragile Five economies. However, the Granger causality seems weaker at the intermediate and high frequencies. Therefore, the predictive power of GDP for the future of FDI and the predictive power of FDI for the future GDP are predominantly present at the low frequencies.

The GDP-net export nexus, the GDP-stock market index nexus and the opposite direction of these causalities have the same pattern like the GDP-FDI nexus pattern as discussed above. The causality of these nexuses are getting stronger at low frequencies and then become weaker continously at the intermediate and high frequencies. It indicates that bidirectional causality of these nexuses show significant downtrend pattern from lower frequencies (long run) to higher frequencies (short run).

The findings show evidence that there is long run causality stemming from GDP to FDI in all countries and short run causality in Turkey, India and South Africa but no short run causality in Indonesia and Brazil. The similar finding on long run causality means that GDP has influence on FDI in the long run for all countries. It can be summarized that GDP is always a thread for future FDI. The opposite direction of causality stemming from FDI to GDP is also found proof of long run causality in all countries but short run causalities is detected in Turkey, India, Brazil and South Africa. Likewise, FDI could well predict GDP and FDI. Therefore, investor may take into account these findings in the long run to invest money if the host country economic growth is high.

Both long run and short run causality were found in the causal relationship running from GDP to net export only in India while other countries only have long run causality except Indonesia. It suggest that government should determine policies that able to stimulate and enhance economic growth because higher GDP will

promote higher exports. The causality stemming from net export to GDP in both long run and short run can be found in India and South Africa. It means that higher export in India and South Africa may lead to high gross domestic product in the short run and long run.

The causality stemming from GDP to stock market index is obtained in all countries in both long run and short run. The estimations imply that GDP has a powerful predictability for future stock market in the short run and long run. While the causality running from stock market index to GDP occured in long run for all countries and short run for Indonesia, India, Turkey, South Africa except Brazil. It indicates that stock market index is always a thread for GDP in the long run. This bidirectional causality result will help investor in determining asset allocation decision and forecasting the future of stock market movement in the short run and long run.

The researchers may use these outcomes for future prediction on GDP, FDI, stock market and exports variables in Fragile Five countries and should bear in mind all aspects related to this new information if they want to apply in other countries may yield different result for instance about time units of data could be monthly, quarterly or yearly. Data used in this study is in quarter series and it is affecting the frequency points appear on the results. To ease interpretation, the frequency is converted in time units of quarters. For long run, approximately around 10 quarters or more, for medium run approximately around 4 quarters and lastly for short run approximately less than 2.5 quarters.

The outcomes of this study emphasize the benefit of adopting various time scales approach across the frequency domain causality instead of relying on standard parametric Granger causality test as has been conducted many times in general literature.

In accordance with the highest magnitude of causality, it shows similar pattern of the result in each nexus. The highest magnitude of causality for GDP-FDI nexus is running from FDI to GDP in all Fragile Five economies, the highest magnitude of causality for GDP-net export nexus is running from GDP to net export and the highest magnitude of causality for GDP-stock market index nexus is stemming from GDP to stock market index.

Therefore, the estimation results confirm that GDP Granger causes FDI, net export and stock market index however GDP only has powerful predictability for net export and stock market, not for FDI. The other findings is stemming from the opposite direction of causality that GDP is caused by FDI, net export and stock market index. In particular, only FDI can give powerful prediction about GDP.

The findings of this study are somewhat similar for some nexus compared to previous studies. In accordance with GDP-FDI nexus, the findings here corroborate with Zakaria (2009) for South Africa which is found bidirectional causality however for Brazil and India, the causality is stemming from FDI to GDP, not vice versa. Meanwhile, the causality for Indonesia is running from GDP to FDI. Turkey is not studied by Zakaria for this research. The other research conducted by Herzer et al (2007) also contradict to this findings. Herzer et al (2007) found that no linkage between GDP and foreign direct investment for Brazil, one way direction of causality stemming from foreign direct investment to GDP in India but also unidirectional causality is also found in Indonesia running from GDP to FDI. The findings here also support as well the findings of Bakir and Eryilmaz (2015) whose study investigating GDP-FDI nexus for Turkey that there is two directions of causality in GDP-FDI nexus.

The findings of Ekanayake (2009) who examined GDP and export nexus in some developing countries except Brazil, Turkey and South Africa are similar to the findings here. He found two directions of causality between export and economic growth for India and Indonesia. Sharma and Panagiotidis (2004) investigated whether exports have effect on growth in India and their finding is not supporting for the hypothesis that export Granger cause economic growth which contradict as well to the findings here. Alici and Ucal (2003) yielded a proof of unidirectional causality stemming from exports to GDP in Turkey but not vice versa. The findings of growth driven export in India here support the findings of Miankhel et al (2009) who are studying exports, foreign direct investment and growth in chosen emerging countries that economic growth Granger causes export.

In general, direct comparison cannot be done due to different countries coverage area from different studies, different time spans, different data and also different methodology used to analyze furthermore the results are different at the end

and similar for some cases. The difference obtained in new information by new methodology of the Wavelet-based nonparametric Granger causality because causality patterns seem complicated and this new methodology supports general causality patterns but also reveal new information about cyclic causality in the sort, intermediate and long run.

The Wavelet-based nonparametric Granger causality eliminates the need of explicit autoregressive data modelling and gives the spectral properties of a given data. Compared to other alternative causality test, the application of Wavelet-based nonparametric Granger causality is able to assess the causaliy between GDP-FDI nexus, GDP-net export nexus and GDP-stock market index at difference time period on frequency domain rather than considering time series as a whole. Furthermore, causality can be observed in the short run and long run which assist policy maker to understand the causality pattern in the different period of frequency.

When the causality is significant at such low frequencies, it is an indicator for a significant average causal effect as the oscillations passes through the average of the data in such long lag horizons and vice versa. For instance, as shown in the results that GDP growth of Turkey can give an average prediction about FDI in the long run and GDP growth of Turkey also has a powerful short run predictability for FDI. It shows possibility of one variable that can give an average prediction to another variable both in the short run and long run.

CONCLUSION

The main goal of this research is to investigate the causal relationship between economic growth, FDI, export and stock market index in Fragile Five economies i.e. Indonesia, Turkey, India, Brazil and South Africa for period 1991-2015. Methodology used in this study is a new approach of nonparametric Granger causality based on wavelet transformation because it is able to evaluate the oscillatory behaviour of the time series within various time frequencies and to distinguish the causal relationship between those variables. This method is crucial tool to forecast the impact of economic policies.

The findings of this study indicate a bidirectional causality between GDP-FDI nexus, GDP-net export nexus and GDP-stock market index nexus in Indonesia, Turkey, India, Brazil and South Africa however the the magnitude of causality through frequency domain are different for each nexus.

The significant causality between variables is stronger at the low frequencies but getting weaker at the intermediate and the high frequencies. Hence the variable has the predictive power to the other variable in the future is predominantly present at the low frequencies.

Evaluating the highest magnitude of causality, GDP-FDI nexus has the highest magnitude of causality that running from FDI to economic growth yet the highest magnitude of causality for GDP-net export nexus is running from GDP to net export. Likewise, the highest magnitude of causality for GDP-stock market index nexus is stemming from GDP to stock market index.

The outcomes of this study generally confirm that GDP Granger causes FDI, net export and stock market index however GDP only has powerful predictability for net export and stock market, not for FDI. Meanwhile, GDP is Granger caused by FDI, net export and stock market index. In particular, only FDI can give powerful prediction about GDP.

This is the first study that uses Wavelet based nonparametric Granger causality method to analyze the causality between foreign direct investment, stock market index, exports and gross domestic product in Fragile Five economies. The results derived from this study have some important policy implications. The most crucial

impact of this study in term of econometric for the current literature is the findings give another insight to researchers to uncover the causality between variables at different time period on a frequency domain whether the causality occurs in the long run (low frequencies), the intermediate/medium run and/or the short run (high frequencies) while other standards Granger causality method cannot recognize between the short run, medium run and long run. Moreover, the researchers are able to understand the oscillatory behaviours within various time frequencies whether the stronger causal relationship occures in the short run, medium run or long run. This study used quarterly data spanning from 1991-2015 with some missing values in some countries, hence researchers are expected to use longer time series data to get more robust results.

The main problems of Fragile Five economies is experiencing significant currency weakness hence triggering to high current deficit, the lack of new investment that makes it impossible to finance many growth projects which influenced to the slowdown in the economies. These problems created vulnerable economies. The countries are expected to raise interest rate, adjust their currencies, undertake major fiscal adjustment, in order to boost their growth and to leave the adverse economic instability. Government should recover from weakening growth potential. The policy to boost economic growth can be dediced by government through causality relationship under variables of FDI, exports and stock market that may influence economic growth whether those variables cause gross domestic product in the future.

The research outcomes can suggest government on how to decide economic policy. Firstly, the result indicates that exports cause GDP in the short run and long run. Distinguishing short run and long run causality between exports and GDP provides important policy implication for government because the demand and supply of exports tend to be different from short run to long run. If exports increase in the short run then it will shift aggregate demand to the right and it may create inflation and appreciation of exchange rate. If exports increase in the long run, the aggregate suppy will shift to the right and it may create productivity and economies of scale. Hence, government should adjust their policy in the short run and long run. Exports play important role to the economy, affecting economic growth rate, job and

also the balance of payments. Growth in export will create high rate of employment, rising in exports cause higher in economic growth and higher exports has important role in reducing the current account deficit.

Government may undertake policy to increase the level of exports to other countries such as supply side policies to improve competitiveness including education, training, reducing government regulation. These policies are able to increase export productivity. Promoting private sector productivity is also important but depends on new technology provided by government. The other policy can be made by government is reducing tariff barriers because reducing tariff barriers can help government to increase exports. However government should bear in mind that reducing general tariff barriers may yield local industries lose out due to tight competition in the market. The findings of this study indicate that exports affect GDP in short run, intermediate run, and long run. Yet, the power of causality is strong in the long run cycle. It means that government should adjust the economic policies periodically focus on the long run to achieve high GDP.

Secondly, it is observed that FDI significantly affects economic growth in the short run, intermediate run and also in the long run but the most powerful causality occures in the long run in almost Fragile Five countries. Some policy implications can be proposed by government with respect to the short run and long run causality findings. Government as policy maker need to wisely design what the best strategies to apply in attracting FDI. Long run policy is important but short run policy for attracting FDI is not negligible. The policy can be reducing government bureaucracy, expanding free trade zones, creating social and politic stability and making conducive macroeconomic environment. This suggests that it does not need long time for FDI to affect economic growth in Fragile Five economies because FDI may influence economic growth in the short run. FDI is good for host countries in the long run as long as the investing companies do not have power to influence the policy of the host countries they invest. When the percentage of FDI significantly increase in specific sector in the host countries then they will gain power and try to influence policy in their favour. Therefore, government should control FDI otherwise it will lead to economic colonisation in the future.

Thirdly, the findings from the causality of stock markets and GDP may assist government to create a policy. Stock markets Granger cause economic growth in the short run, intermediate run and long run but it has the large effect of causality mainly in the long run. Hence, government should focus on creating policy for long run. There are three elements of stock markets that can influence and improve economic growth. Those are increasing savings and investments, improving productivity of investment and raising profitability of existing capital stock. The government should focus on these policies to increase GDP in the long run. Greenwood and Jovanovic (1990) noted that deployment of information, promoting specialization as well as acquisition may promote growth in the long run period.

Furthermore the outcomes of this study can help governments to prioritize and adjust policy to get strong influence on economic growth whether in the short run, intermediate run or long run.

Investors may also benefit from the findings of this study from the money they invest to host countries. It is obtained strong proof of causality between FDI and economic growth. It implies that the more FDI flow to host countries the more economic growth may increase. It is expected with the growing economy of host countries can return the capital to country it originated from and health investment is working on the growing economy meaning no doubt to invest money. In addition, if the results denote evidence of no causality between foreign direct investment and GDP, consequently investment by investor is not turning back and will suffer from investment loss. Invest money is kind of wasting money to recipient. According to cyclic causality, the findings exhibit that FDI influence GDP in short run, intermediate run and long run but the larger impact of causality occures on long run. From this point of view, investors may feel confidence and comfortable to invest to host countries because in the short run FDI may influence GDP of recipient countries via productivity and technology transfers and in return investor may enjoy the capital that will return to their countries. Investors also need to be careful on their investment if the host countries condition of economic, political, social and other dimensions are unstable. Furthermore, stability is very important for reassuring investors whether it is a good idea or not to invest in increasing capacity. The investment may not bring any good effect on economic growth of host countries and

at the end losing money cannot be avoided by investors. If investors observe the rise in uncertainty, their confidence tend to fall and it may cause investors to postpone the investment.

The analysis conducted in this study is having constraint on finding large number of observation of quarterly data because of lack of data and missing data for some countries and some time span. Therefore, the higher the frequency of data for instance the availability of monthly data used for research through this methodology, the investigation of nonparametric Wavelet Granger causality between GDP, FDI, net export and stock market index in the Fragile Five economies can be revisited for further research.

REFERENCES

Abbas, S. (2012). Causality between Exports and Economic Growth: Investigating Suitable Trade Policy for Pakistan. Eurasian Journal of Business and Economics, 5(10), 91-98.

Abou-Stait, F. (2005). Are Exports the Engine of Economic Growth? An Application of Cointegration and Causality Analysis for Egypt, 1977-2003, African Development Bank Economic Research Working Paper, 76.

Afsar, M. (2007). The Causality Relationship between Economic Growth and Foreign Direct Investment in Turkey. Retrieved June 3rd, 2017, from http://dergisosyalbil.selcuk.edu.tr/susbed/article/viewFile/350/332

Agarwal, S. (2001). Stock Market Development and Economic Growth: Preliminary Evidence from African Countries. (http://www.jsd-africa.com/Jsda/spring2001/articlespdf/ARC%20-20Stock%20Market%20Development%20and%20Economic%20Growth.pdf

Agf (2016). MSCI Emerging Markets Index Overview. Retrieved October 26rd, 2016, from http://www.agf.com/institutional/global-resources/files/quarterly-report/inst270-msci-em-usd.pdf

Ajmi, A. N., Aye, G., Balcilar, M., Gupta, R. (2015). Causality between Exports and Economic Growth in South Africa: Evidence from Linear and Nonlinear Tests. Retrieved May 29th, 2017, from http://repository.up.ac.za/handle/2263/52070

Alam, M. I. Hasan, T. (2003). The Causality between Stock Market Development and Economic Growth: Evidence from the United States. Studies in Economics and Finance, 21 (1), pp. 93-104.

Ali A.S. (2015). Stock Market Development and Economic Growth: An Empirical Analysis Between Turkey and BRICS Countries. In: Erçetin Ş., Banerjee S. (eds) Chaos, Complexity and Leadership 2013. Springer Proceedings in Complexity. Springer, Cham.

Alici, A. K. and Ucal, M. S. (2003). Foreign Direct Investment, Exports, and Output Growth of Turkey: Causality Analysis. Paper to be presented at the European Trade Study Group (ETSG) Fifth Annual Conference Universidad Carlos III de Madrid.

Amiri, A. (2012). Granger Causality between Exports, Imports, and Economic Growth in World. IX Convibra Administracao-Congresso Virtual Brasileiro de Administracao.

Amiri, A and Gerdtham, U. (2012). Granger Causality between Exports, Imports, and GDP in France: Evidence from Using Geostatistical Models. The Economic Research Guardian. Vol 2(1), pp 43-59.

Angko, W. (2013). The Determinants of Stock Market Volatilities in Ghana. Research Journal of Finance and Accounting. ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online). Vol.4, No.13, 2013.

Antonakakis, N., Chang, T., Cunado, J., Gupta, R. (2016). The Relationship between Commodity Markets and Commodity Mutual Funds: A Wavelet-Based Analysis. University of Pretoria. Department of Economics Working Paper Series. Working Paper: 2016-19.

Araujo, R. A. and Soares, C. (2011). Exports Led Growth vs Growth Led Exports: What Matters for the Brazilian Growth Experience after Trade Liberalization? MPRA Paper No. 30562. Online at https://mpra.ub.uni-muenchen.de/30562/

Atje, R. and Jovanovic, B. (1993). Stock Market Development. European Economic Review, 37, pp. 632-640.

Awokuse, T. (2002). “Is the Export-Led Growth Hypothesis Valid for Canada?” Canadian Journal of Economics, Vol. 36, Issue 1, 126-136

Awokuse, T., Weishi Gu and Yan Yuan (2008). The Contribution of Foreign Direct Investment to China’s Export Performance: Evidence from Disaggregated Sectors. 2008 Annual Meeting, July 27-29, 2008, Orlando, Florida 6453, American Agricultural Economics Association.

Aydin, M and Sari, M. (2014). Relationship between GDP and Exports in Turkey. Annals of the “Constantin Brancusi” University of Targu Jiu. Economy Series.

Bakir, H. and Eryilmaz , F. (2015). Causal Relationship between Foreign Direct Investment and Economic Growth: Evidence from Turkey. Handbook of Research on Strategic Developments and Regulatory Practice in Global Finance.

Balasubramanyam, V. N., Salisu, M. and Sapsford, D. (1999). Foreign direct investment as an engine of growth. The Journal of International Trade & Economic Development: An International and Comparative Review. Volume 8, Issue 1, pages 27-40.

Bogenhold, D., Bonnet, J., Dejardin., M. (2016). Contemporary Entrepreneurship: Multidisiplinary Perspectives on Innovation and Growth. Springer International Publishing.

Borensztein, E., J. de Gregorio, and J. Lee. 1998. "How Does Foreign Direct Investment Affect Economic Growth?." Journal of International Economics 45 (1): 115-135.

Brems, H. 1970. A Growth Model of International Direct Investment. The American Economic Review 60 (3): 320-331.

Celik, S. and Baydan, E. (2015). Bringing A New Perspective on Co-movements of Stock Markets in Emerging Economies through Causality and Wavelet Analysis. Topics in Middle Eastern and African Economies. Vol. 17, Issue No. 1.

Celik, S. and Baydan, E. (2017). Do Stock Markets Comove in Emerging Economies? In book: Socio-Economic Perspectives on Consumer Engagement and Buying Behavior. DOI: 10.4018/978-1-5225-2139-6.ch010

Chen, Y., Bressler, S.l. and Ding, M. (2006). Frequency Decomposition of Conditional Granger Causality and Application to Multivariate Neural Field Potential Data. Journal of Neuroscience Methods. Vol. 150, pp.228-237.

Cicak, K. and Soric, P. (2015). The Interrelationship of FDI and GDP in European Transition Countries. International Journal of Management Science and Business Administration. Volume 1, Issue 4, pp 41-58.

Dhamala, M., Rangarajan, G. And Ding, M. (2088a). Estimating Granger Causality from Fourier and Wavelet Transforms of Time Series Data. Physical review Letters. Vol. 100, 018701.

Dhamala, M., Rangarajan, G. And Ding, M. (2088b). Analyzing Information Flow in Brain Networks with Nonparametric Granger Causality. Neuro Image, 41, 354-362.

de Mello, L. R., Jr. (1997). Foreign Direct Investment in Developing Countries and Growth: A Selective Survey. Journal of Development Studies 34 (1): 1-34.

Detto, M., Molini, A., Katul, G., Stoy, P., Palmroth, S. and Baldrocci, D. (2012). Causality and Persistence in Ecological Systems: A Nonparametric Spectral Granger Causality Approach. The American Naturalist. Vol. 179, pp. 524-535.

Dogan, E. (2013). Foreign Direct Investment and Economic Growth: A Time Series Analysis of Turkey, 1979-2011. Çankırı Karatekin Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 3(2), 239-252.

Ekanayake, E. M. (1999). Exports and Economic Growth in Asian Developing Countries: Contegration and Error-Correction Models. Journal of Economic Development. Volume 24, Number 2.

Filer, Hanousek and Nauro (1999). Do Stock Markets Promote Economic Growth? Working Paper No. 267.

Geweke, J. (1982). Measurement of Linear Dependence and Feedback between Multiple Time Series. Journal of American Statistical Association. Vol. 77, pp. 304-313.

Gilcher, D. (2014). The Turkish Stock Market: A Filter For Stocks In Turkey. Retrieved April 8th, 2017, from https://seekingalpha.com/article/2712575-the-turkish-stock-market-a-filter-for-stocks-in-turkey

Granger, C.W.J. (1969). Investigating Causal Relations by Econometric Models and Cross Spectral Methods. Econometrica. Vol. 37, pp.424-438.

Greenwood, J., & Jovanovic, B. (1990). Financial Development, Growth, and The Distribution of Income. Journal of Political Economy, 98, 1076–1107. http://dx.doi.org/10.1086/261720

Gunaydin, I. and Tatoglu, E. (2005). Does Foreugn Direct Investment Promote Economic Growth? Evidence from Turkey. Multinational Business Review, Vol. 13 Iss 2 pp. 89-106.

Gursoy, F. and Kalyoncu, H. (2012). Foreign Direct Investment and Growth Relationship in Georgia. International Journal of Economics and Financial Issues. Vol. 2, No. 3, pp. 267-271.

Gursoy, C.T. and Muslumov, A. (1998). Stock Markets and Economic Growth: A Causality Test. The Institute of Social Sciences, Istanbul Technical University.

Hameed, A., Iqbal, A., Devi, K., 2012. Relationship between Exports and Economic Growth of Pakistan. European Journal of Social Sciences, 32 (3), 453-460.

Herzer, D., Klasen, S. and Nowak, F. (2007). In search of FDI-led Growth in Developing Countries: The Way Forward. Science Direct, Economic Modelling 25, 793-810.

Hossain, A. & Hossain, M.K. (2012). Empirical Relationship between Foreign Direct Investment and Economic Output in South Asian Countries: A Study on Bangladesh, Pakistan and India. International Business Research, 5(1), 9-22.

Hsiao, F. S. T. and M.-C. W. Hsiao, (2006). FDI, Exports and GDP in East and Southeast Asia – Panel Data Versus Time-Series Causality Analysis. Journal of Asian Economics 17, pp. 1082-1106.

Hussain, M. A. (2014). Economic Growth, Exports and Imports in Pakistan: Granger Causality Analysis. The Journal of Business in Developing Nations. Vol. 13.

Johnson, A., (2006). FDI and Exports: the case of the High Performing East Asian Economies, Electronic Working Paper Series, Paper No. 57

Kaur, M., Yadav, S.S., Gautam, V. (2013). A Bivariate Causality Link between Foreign Direct Investment and Economic Growth. Evidence from India. Journal of International Trade Law and Policy. Vol. 12 No. 1 pp. 68-79.

Konya, L. (2004). Export-Led Growth, Growth-Driven Export, Both Or None? Granger Causality Analysis On OECD Countries. Applied Econometrics and International Development. AEEADE. Vol. 4-1.

Korajczyk, R, A. (1996), A Measure of Stock Market Integration for Developed and Emerging Markets, World Bank Economic Review, World Bank Group, 10(2), 267-89.

Kose, M. A. et al. 2006. Financial Globalization: A Reappraisal. IMF Working Paper No. 189. Washington, D.C.: International Monetary Fund.

Kumari, D. and Malhotra, N. (2014). Export-Led Growth in India: Cointegration and Causality Analysis. Journal of Economics and Development Studies June 2014, Vol. 2, No. 2, pp. 297-310.

Lee, J. and P. Rana, P. (1986). The Effect of Foreign Capital Inflows on Developing Countries of Asia. Asian Development Bank Economic Staff Paper, 4:30, Manila.

Lee, S. W. (2007). Foreign Direct Investment and Export Performance: The Case of Taiwan. M.Econ-Res. thesis, Economics and Information Systems, University of Wollongong.

Levine, R and Zervos, A. (1998), Stock Markets, Banks, and Economic Growth, American Economic Review, 88(3), 537-58.

Lord, J. (2013). EM Currencies: The Fragile Five (Global Outluk) (pp. 15–19). Morgan Stanley Research. Retrieved from https://www.morganstanley.com/institutional/research/pdf/FXPulse_20130801.pdf.

Mahroowal, M., Sarmidi, T. and Nor, A.H.S.M. (2014). Exports, Imports And Economic Growth Nexus In Afghanistan. International Management Accounting Conference 7.

Mallampaly, P. and Sauvant, K. P. (1999). Foreign Direct Investment in Developing Countries. Finance and Development. A Quarterly Magazine of the IMF. March 1999, Volume 36, Number 1.

McKinnon, R.I., (1973). Money and Capital in Economic Development. Brookings Institution, Washington, DC.

Miankhel, A. K., Thangavelu, S. M., Kalirajan, K. (2009). Foreign Direct Investment, Exports, and Economic Growth in South Asia and Selected Emerging Countries: Multivariate VAR Analysis. MPRA Paper No. 22763, posted 18.

Mun, H.W., Siong, E.C. and Long, B.S., (2008) Stock Market and Economic Growth in Malaysia: Causality Test. Asian Social Science, 4, pp. 86-92.

Naveed, A. and Shabbir, G. (2006). Trade Openness, FDI and Economic Growth: A Panel Study. Pakistan Economic and Social review. Volume XLIV, No. 1, pp. 137-154.

Ndako, U. B. (2010). Stock Markets, Banks and Economic Growth: A Time Series Evidence from South Africa. The African Finance Journal. Vol. 12, issue 2, 72-92.

Nunnenkamp, P. (2002). Foreign Direct Investment in Developing Countries: What Economists (Don't) Know and What Policymakers Should (Not) Do! CUTS Centre for International Trade, Economics & Environment D-217, Bhaskar Marg, Bani Park Jaipur 302 016, India.

OECD (2002). Foreign Direct Investment for Development. Maximising Benefits, Minimising Costs. OECD Publications, 2, rue André-Pascal, 75775 Paris Cedex 16.

OECD (2016). OECD and the Sustainable Development Goals: Delivering on Universal Goals and Targets. Retrieved May 30th, 2017, from http://www.oecd.org/dac/sustainable-development-goals.htm

Olusanya, S. O. (2013). Impact of Foreign Direct Investment Inflow on Economic Growth in A Pre and Post Deregulated Nigeria Economy. A Granger Causality Test (1970-2010). European Scientific Journal. Vo. 9, No. 25. ISSN: 1857-7881.

Pacheco-López, P. (2005). Foreign Direct Investment, Exports and Imports in Mexico, The World Economy, 2005, vol. 28, issue 8, pages 1157-1172.

Padmanabhan, D., Sinha, A., Venkataraman, A., Ravi, A. and Joshi, A. (2015). Comparative Analysis of the Stock Markets of China, Russia, Brazil, South Africa and Argentina. MPRA Paper No. 63440, posted 5 April 2015 13:05 UTC. Online at https://mpra.ub.uni-muenchen.de/63440/

Pan, L and Mishra, V. (2006). Stock Market Development and Economic Growth: Empirical Evidence from China. Monash Business School. Department of Economics. ISSN 1441-5429. Discussion Paper 16/16.

Paramati, S.R. and Gupta, R. (2011). An Empirical Analysis of Stock Market Performance and Economic Growth: Evidence from India. International Research Journal of Finance and Economics. ISSN 1450-2887 Issue 73. © EuroJournals Publishing, Inc. http://www.eurojournals.com/finance.htm

Pearce, D.K. (1983) Stock Prices and the Economy. Federal Reserve Bank of Kansas City Economic Review, pp. 7-22.

Pham, T.H.H. (2008). Temporal causality and the dynamics of foreign direct investment, exports and imports in Vietnam. The Journal of International Trade & Economic Development: An International and Comparative Review. Volume 21, Issue 1.

Rahmaddi, R. and Ichihashi, M. (2011). Exports and Economic Growth in Indonesia: A causality Approach based on Multivariate error Correction Model. Journal of International Development and Cooperation, Vol. 17, No.2, pp. 53-73.

Raki, M., Kabirian, M. and Amirmojahedi, S. (2012). The Impact of Foreign Direct Investment on Economic Growth (Panel data Method in D-8 Countries). International Conference on Econometrics.

Romer, P. 1990. Endogenous technological change. Journal of Political Economy 98(5): 571-602.

Roy, S. (2012). Foreign Direct Investment and Economic Growth: An Analysis for Selected Asian Countries. Journal of Business Studies Quarterly. Vol. 4, No. 1, pp. 15-24.

Schreiber, T. and Schmitz, A. (2000). Surrogate Time Series, Physica D Vol. 142, pp. 346-382.

Schumpeter, J.A., (1911), The Theory of Economic Development. Harvard Univ. Press, Cambridge, MA.

Shan, J and Tian, G.G. (1998). Causality between Exports and Economic Growth: The Empirical Evidence from Shanghai. Australian Economic papers, 37 (2), 195-202.

Shao-Wei (2007). Foreign Direct Investment and export performance: The case of Taiwan, M.Econ-Res. thesis, Economics and Information Systems, University of Wollongong. http://ro.uow.edu.au/theses/669

Sharma, K. (2000). Export Growth in India: Has FDI played a role, Yale University Economic Growth Center Discussion Paper, No. 816.

Sharma and Panagiotidis (2004). An Analysis of Exports and Growth in India: Cointegration and Causality Evidence (1971 - 2001), Working Papers 2003004, The University of Sheffield, Department of Economics.

Shaw, E.S. (1973). Financial Deepening in Economic Development. Oxford Univ. Press, London.

Silaghi, M. I. P. (2009). Exports-Economic Growth Causality: Evidence from CEE Countries. Romanian Journal of Economic Forecasting.

Singh, M. (2017). An Introduction To The Indian Stock Market. Retrieved April 8th, 2017, from http://www.investopedia.com/articles/stocks/09/indian-stock-market.asp

Tahir, M., Khan, H., Israr, M., Qahar, A. (2015). An Analysis of Export Led Growth Hypothesis: Cointegration and Causality Evidence from Sri Lanka. Advances in Economics and Business 3(2): 62-69.

Thelle, M. H., Jeppesen, T., Lund, C. G., Biesebroeck, J.V. (2015). Export Performance and Poverty Reduction. Belgium.

Thenewsavvy (2015). How to Invest in the Indonesia Market and Stocks. Retrieved April 8th, 2017, from https://thenewsavvy.com/invest/markets/how-to-invest-in-the-indonesia-market-and-stocks/

Thomas, L. (2014). 'Fragile Five' Is the Latest Club of Emerging Nations in Turmoil. Retrieved May 30th, 2017, from https://www.nytimes.com/2014/01/29/business/international/fragile-five-is-the-latest-club-of-emerging-nations-in-turmoil.html

Toda, H. Y. and Phillips, P. C. B. (1993). Vector Autoregressions and Causality. Econometrica 61, 1367-1394.

UNCTAD (United Nations Conference on Trade and Development). (2012). World Investment Report 2012: Methodological Note. Geneva: United Nations.

UNCTAD (United Nations Conference on Trade and Development). (2015). World Investment Report 2015: Reforming International Investment Governance. Geneva: United Nations.

Unlimitedeconomiczone (2012). How Can Foreign Direct Investment Help Developing Countries? Retrieved April 13rd, 2016, from http://unlimitedeconomicszone.over-blog.org/article-how-can-foreign-direct-investment-help-developing-countries-108953176.html

Vernon, R. (1966). International Investment and International Trade in the Product Cycle", Quarterly Journal of Economics, 80, pp. 190-207.

Wacker, K. M. (2011). The Impact of Foreign Direct Investment on Developing Countries' Terms of Trade. World Institute for Development Economics Research. Working Paper No. 2011/06. Retrieved April 20th, 2016, from https://faculty.washington.edu/karyiu/confer/beijing06/papers/wong_ht.pdf

Wen, X., Rangarajan, G. and Ding, M. (2003). Multivariate Granger Causality: An Estimation Framework Based on Factorization of The Spectral Density Matrix. Phil Trans R Soc A 371: 20110610

Wilson, G.T. (1972). The Factorization of Matricial Spectral Densities. SIAM. Journal on Applied Mathematics. Vol. 23, 00. 420-426.

Wilson, G.T. (1978). A Convergence Theorem for Spectral Factorization. Journal of Multivariate Analysis. Vol. 8, pp. 222-232.

Wong Hock Tsen (2006). Exports, domestic demand and economic growth in China: Granger causality analysis.

Worldstopexports (2017). Brazil's Top 10 Exports. Retrieved April 8th, 2017, from http://www.worldstopexports.com/brazils-top-10-exports/

Worldstopexports (2017). India's Top 10 Exports. Retrieved April 8th, 2017, from http://www.worldstopexports.com/indias-top-10-exports/

Worldstopexports (2017). Indonesia's Top 10 Exports. Retrieved April 8th, 2017, from http://www.worldstopexports.com/indonesias-top-10-exports/

Worldstopexports (2017). South Africa's Top 10 Exports. Retrieved April 8th, 2017, from http://www.worldstopexports.com/south-africas-top-10-exports/

Worldstopexports (2017). Turkey's Top 10 Exports. Retrieved April 8th, 2017, from http://www.worldstopexports.com/turkeys-top-10-exports/

Zakaria, Z. (2009). Empirical Evidence on the Causality Relationship between Foreign Direct Investment and Economic Growth in the Developing Countries. Jurnal Ekonomi Malaysia 43: 27-52.