The Relationship between FDI, Exchange Rate, Financial Development and Trade in Goods and Services: The Case of China

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Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Science
in
Banking and Finance

Eastern Mediterranean University
September 2018
Gazimağusa, North Cyprus

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ABSTRACT

This thesis investigates the long run equilibrium relationship between FDI, exchange rate, financial development and trade in goods and services for the case of China between the years of 1982- 2016. The thesis applies unit root tests (Augmented Dickey-Fuller, Phillips – Perron and the Kwiatkowski–Phillips–Schmidt–Shin test) to test the stationarity of the variables, the VAR model, Johansen cointegration test to investigate the long run relationship between the variables, vector error correction model (VECM) in order to investigate the short term and long term relationship, Granger causality to determine the direction of FDI, financial development, exchange rate and trade in goods and services, impulse response function and lastly variance decomposition.

VECM results shows a negative long term relationship between financial development and trade and also a long run positive relationship between exchange rate, FDI and Trade in the Chinese economy. The results of the thesis would guide policymakers in China to make efficient decisions in terms of the betterment of the Chinese economy.

Kewwords: Exchange rate; Financial development; Foreign direct investments; Trade; China

ÖZ

Bu tez Çin'de 1982-2016 yılları arasında doğrudan yabancı yatırımlar, döviz kuru, finansal gelişim ve mal ve hizmet ticareti arasındaki uzun dönemli denge ilişkisini incelemektedir. Bu tezde, değişkenlerin durağanlığını test etmek için birim kök testleri (Augmented Dickey-Fuller, Phillips - Perron ve Kwiatkowski – Phillips – Schmidt – Shin testi), VAR modeli ve uzun dönemli denge ilişkisini araştırmak içinJohansen eşbütünleşme testi, kısa ve uzun dönemli ilişkiyi araştırmak için Vektör Hata Düzeltme Modeli (VECM)uygulanmıştır.

VECM sonuçları, finansal gelişim ve ticaret arasında uzun vadeli ve negatif, doğrudan yabancı yatırımlar, döviz kuru ve ticaret arasında ise pozitif bir ilişki göstermektedir.Çalışmanın sonuçları Çin'deki politikacıların Çin ekonomisinin iyileşmesi açısından verimli kararlar vermesini sağlayacaktır.

Anahtar Kelimeler: Döviz kuru; Finansal gelişim; Doğrudan yabancı yatırımlar; Ticaret; Çin

DEDICATION

To My Lovely Parents

ACKNOWLEDGEMENT

I would like to acknowledge the efforts of my supervisor Asst. Prof. Dr. Nigar Taşpınar and thank her for her support and assistance.

I would also like to thank Assoc. Prof. Dr. Korhan Gökmenoğlu for his teachings and guidance.

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LIST OF ABREVIATIONS

ADF	Augmented Dickey- Fuller Test
AIC	Akaike Information Criteria
DC	Domestic Credit to the Private Sector
ECT	Error Correction Term
EXRATE	Exchange Rate
FDI	Foreign Direct Investment
FDV	Financial Development
FPE	Final Prediction Error
HQ	Hannan Quinn Information Criteria
KPSS	Kwiatkowski – Phillips – Schmidt - Shin
PP	Phillips Perron Test
SC	Schwarz Information Criterion
VAR	Vector Autoregressive Model
VECM	Vector Error Correction Model

Chapter 1

INTRODUCTION

In global economics, trade in goods and services, exchange rates, financial development and foreign direct investments are vital topics, as such, will constantly experience new developments. The integral relationship between these topics is till date a subject of high controversy, and in the past literature, it is evident that the most discussed issue is with regards to the existence of a bilateral relationship rather than a trilateral. Recently, there has been a surge of interest in gaining knowledge on the impact of financial development on exchange rates and exchange rates on trade due to immense trade imbalances in the global economy.

Financial development is undoubtedly associated with economic boom. But before the year 2001 China operated in a state-dominated banking sector which was a huge hindrance to its financial development given the unclear nature of the government. However, China's accession to the world trade organization (WTO) in 2001 paved a way for growth in other sectors as with the accession came the adoption of the WTO's organizational policies such as the opening up of its market for products and financial market to the invisible forces of demand and supply thereby restricting government intervention. (Zhang, Wang & Wang, 2012)

China's exchange rate administration has basically been held at a specified position against the dollar from the year 1995 to July 2005, this naturally caused a compelling

deterioration of the Yuan when the American currency devalued in the year 2004. Due to the fact that China is operating under a current account surplus, the deterioration with regards to conversion scale has brought up the issue of a conceivable undervaluation of the Yuan. The move to a managed float foreign exchange system with a referral to a collection of currencies with 2% revaluation of the YUAN was declared on 21-07-2005; despite this mid-year occurrence, it did not enormously amend the conditions of the open deliberation as the 2% has proven inadequate to generate an effect in terms of external imbalances (Coudert & Coubarde, 2008).

Furthermore, China's phenomenal accomplishment in pulling in foreign direct investment (FDI) has drawn much consideration of both scholastic researchers and regulatory bodies. One of the prime subjects among researchers looking into the Chinese economy is a manner to clarify the nation's FDI boom in recent years (Yuqing, 2006).

As confirmed by the United Nations Conference on Trade and Development in 1996, theoretical models of FDI and trade have customarily been created independently. The mix of FDI and exchange hypotheses was at its early stage then. Thus, the significance of FDI or trade as separate variables in financial development has been broadly recorded, their conceivable linkages have been understudied for years (Liu,Wang & Wei, 2001).

China's development and its ability to move in thirty years from being under developed to a rising worldwide power and also being among the biggest exporters of manufactured products has pulled in the attention of lots of emerging markets. China has filled in as a model for developing economies and an alternative source of trade

and finance from emerging markets' conventional development partners. The effect of China on developing economies has been varying depending in part on the sectoral composition of each nation's output. Generally speaking, China's expanded commitment to developing countries could be very beneficial to these developing economies. Notwithstanding, there is a need for further investigation to assess the focal points and impairments as well as developing a scheme for promoting policies and recommendations important to augment the advancement effect of China (Buckley et al., 2007). FDI theory in view of exchange rate determines the relationship of FDI flows and exchange rate changes. The current literature has clashing issues; a few researchers support the existence of a significant relationship while others dismiss it. The heading of the connection amongst FDI and exchange rate additionally differs with a few findings demonstrating a beneficial outcome of exchange rate on FDI and different discoveries proposing a negative impact (Lily, Kogid, Mulok, Sang & Asid, 2014).

The integral relationship between this topics is till date a question of high controversy and in the past literature, it is evident that the most discussed issue is with regards to bilateral relationship rather than trilateral. Recently there has been a surge of interest in gaining knowledge on the impact of exchange rates on trade due to immense trade imbalances in the global economy. An important issue in the Chinese economy is financing constraints. A very prominent highlight of the dynamic Chinese economy is substandard capital allotment; this comes as a result of the regulatory body's contortion of the country's monetary structure to accomplish certain economic goals, particularly to guarantee an extended stream of financing for the numerous ineffective yet giant government owned businesses to save jobs. This strategy generated disastrous results such as inefficient investments leading to little returns or losses,

prohibitive funding of the privately owned businesses that drive development, a weak disposition of financial related items to buyers as well as a negligible development in corporate bond markets, and inescapable state responsibility for banks and similar institutions that brings down productivity and pose constraints on the level of competition (Hericourt & Poncet, 2009).

This research basically aims at contributing to the general understanding of the relationship or connection between trade in goods and services, foreign direct investment, financial development and exchange rate. The current thesis fills in the existing gap by contributing to the current literature despite the limitation of data availability for the variable real exchange rate. The relationship can be determined by exploring the annual data of the variables. Furthermore, foreign direct investment (FDI) is a universal flow of capital which offers multinational enterprises (MNEs) with certain influence over foreign affiliates. Right from the mid-1980s, FDI has always been regarded as an imperative apparatus for asset to stream crosswise over national fringes to make economic performance better, exports, international and industrial competitiveness. In an economy that is perfectly competitive to an extent, FDI will not be present yet academicians are now basically utilizing defective and asymmetric data of the market attributes in order to clarify FDI streams. With regards to these huge parts of FDI, a few investigations aimed at determining variables that impact FDI inflows or variables that have a relationship with FDI. One of the elements that as of late has been a topic for discussion is the foreign exchange rate (Lily, Kogid, Mulok, Sang & Asid, 2014).

The thesis will include a single model with exchange rate, FDI, financial development as the independent variable while trade will be the dependent variable. The data is

acquired from the World Bank data base and it covers a period of thirty-four years starting from 1982 to 2016. The present study employs time series methodology and it consists of the following: unit root testing to check if the variables are stationary or non-stationary, Vector Autoregressive Model (VAR) in order to uncover the coefficients and check for stability, heteroscedasticity and autocorrelation as well. The next step includes the Johansen cointegration test which will check for the existence of a long term relationship between the variables, in other words, it checks whether the variables converge in the long run or not. If there is cointegration, we go on further to use the Vector Error Correction Model (VECM) and lastly the Granger causality test.

The thesis is made up of five detailed chapters. Chapter One of the current study covers the introduction and this includes the study's background, the problem statement, the significance/objective of the study, methodology and lastly the structure of the study. Chapter two focuses on the previous research works and literature with regards to the subject of the study. Chapter three details the methodology used while Chapter four focuses on the results and empirical findings. Finally, Chapter five places forth the conclusion and policy recommendations.

Chapter 2

LITERATURE REVIEW

Foreign direct investment has been quite a handful in terms of economic growth and development. There's a powerful complementary association surrounding the economic process and FDI in almost every country around the world. In emerging economies, FDI has greatly affected human capital and it has also filled a wide technological gap in a country like China (Li & Liu, 2005). FDI is completely related to the development of economies, and therefore it is one of the forces behind the boost of investment in China. FDI has conjointly triggered its domestic industries to push and upgrade in order to compete with others internationally (Chen, Chang & Zhang, 1995).

The Chinese economy is developing at a much quicker rate than its previous record since 1978. In current years, policies regarding FDI has resulted in the country gaining $34 billion as of 1992. After the 1978 issues in the Chinese economy, FDI has been responsible for some many improvements such as resources augmentation. Foreign direct investment vitally boosted economic growth in China via the revenue generated from exports. The rate of improvement in the economic process from the late 80s certainly opened China to wider FDI opportunities (Hu, 2013).

Parikh (2001) in his study although controversial concluded that FDI triggered an upgrade within China’s local producers for global competition, and it's increasingly

elicited the producers and administration to use laissez-faire principles. Foreign direct investment conjointly assisted the Chinese technology market but there have not been much proceeds due to the issues surrounding Honk Kong; China's most significant supply of foreign investment, is not called significant supply of such technology (Parikh, 2001). FDI is said to have been responsible for China's borrowing and several critics have conjointly corrected FDI for a few political motivations like, rapid landlocked areas being less developed. Foreign direct investment has impacted China after 1978 and it has generated a considerable amount of benefits for the Chinese people. Consequently, it has also created political risks which is detested by the Chinese communist party members (Lardy, 1995). FDI impacts on China's post-1978 development in spite of everything have been helpful.

FDI represents the foremost vital supply of foreign capital for the Chinese and as of 1979, there was no single foreign company operating in China. Since early 1990s, FDI has improved the import of advanced technology and instruments, narrowing the technology gap between China and developed countries. The import of technology is indispensable to boost the Chinese industrial potency and to place China on equal footing with its Asian neighbors. Introducing modern technology to China is additionally a decent manner for manufacturing companies to penetrate the Chinese internal market. Foreign direct investment impacted revenues generated by the state and it also created a handful of jobs for the Chinese people (Resmini & Siedschlag, 2013).

Based on the accumulation of capital, FDI is anticipated to bring about development and growth by promoting the inducting recent technological advancements within the production method. According to Feenstra and Markussen, (1994), FDI is anticipated

to be a possible supply of productivity gains via spillovers to domestic companies, while in the case of recent advancements, the increase in level of production may be because of the utilization of FDI concerned services.

Demand aggregate, capital value and accessibility to credit are heavily associated with investments locally and internationally. FDI might depend on the investment choices of the domestic country alongside certain other macroeconomic variables that are considered to determine FDI Dieckmann, 1996). Exchange rates have long been thought to have a vital impact on the export and import of products and services, and, thus, exchange rates are expected to influence the value of the listed products. China rapidly became more open and accommodating business wise, this was of help in terms of stabilizing and correctly valuing the country's exchange rate (Thomas & King, 2007). Also, in the research conducted by Choudhri and Schembri (2010), China went through the most severe depreciation it had experienced in years and consequently, economic development was on a high. The 1979 depreciation was the main trigger behind this specific issue. There was the presence of heavy capital account policies that were deemed to be very restrictive and these policies also applied to the trade account. As of the 1980's, restrictions on foreign exchange were still regarded to be an obligation whereas alternative developing countries in the sample used by (Choudhri & Schembri, 2010) raised restrictions sometime within the course of the year 1980. Essentially, a country moving from a closed to open economy should ensure a depreciation in the value of its currency before running an actual open economy.

Financial procedures have an impact on the capabilities of important resources over a number of investment initiatives. Hence, the financial body also contributes to

economic development through a couple of predominant ways (subsequent to offering and preserving a usually common way of switching). As a result, it mobilizes financial savings which in turn increases finances generated for investment. The financial system is well-known, and precise financial institutions might also specifically assist in eliminating risks and ensuring that the local marketers truly adopt newly added technology by means of foreign firms (Essien, 2014). In a nutshell, the argument is that properly-functioning financial markets by means of decreasing expenses of un-going transactions, make sure capital is allocated to the projects that yield the best returns, and consequently, complements growth rates. There are different methods in which financial markets count. Financial markets are of relevance in so many different perspectives which includes the fact that restraining spillovers for non-worthy improvements within the workforce, especially given that domestic corporations have to restructure and procure the necessary tools and hire qualified and competent personnel (Alfaro, Chanda, Kalemli-Ozcan & Sayek, 2002).

The significance of intermediaries in improving technological innovation and the economy as a whole is explained further by Guliano and Ruiz (2009) as they explained that despite the fact that some domestic firms might be able to finance new requirements with internal financing, the greater the technological-expertise gap among their modern practices and new technologies, the greater the need for external finance. In most instances, external finance is limited to home sources. Furthermore, the lack of financial markets can also constrain potential entrepreneurs. This is mainly actual while the advent of a whole new generation brings with it the ability to faucet not just domestic markets but export markets. Moreover, to the extent that enormous FDI arrives via mergers and acquisitions, what counts is not just the easy availability

of loans but the additionally properly-functioning stock markets as well. (Giuliano & Ruiz-Arranz, 2009).

The extent of development carried on in financial establishments can be an easy choice when figuring out if overseas corporations are isolated in terms of their operations and not using a link in any respect with the home country. The development of financial bodies locally, have driven overseas companies to take up loans in order to expand their innovative operations back at their base, and this may result in technological consequences for countries involved (Azman-Saini, Law & Ahmad, 2010). FDI as measured by way of the financial drift information may be only a part of the FDI to developing countries, as a number of the investment is financed through debt and/or equity raised in financial markets in the host countries, the supply and high-quality of home financial markets may also additionally affect FDI and its effect on the diffusion of era in the host country. This diffusion technique can be more efficient as soon as financial markets in the host country are more evolved, considering that this allows the subsidiary of an MNC to elaborate on the investment as soon as it has entered the host country (Alfaro, Kalemli-Ozcan & Sayek, 2009).

High volatility has been recorded with regards to the Chinese currency according to a research performed by Zhang and Song (2001). Throughout 1986 to 1997, particularly within the 90's the Chinese currency experienced massive inflation. Though exchange rates alone don't account for long-run trends in either FDI or trade, changes in exchange rates might have short effects on each FDI and exports. The weakening Chinese yuan was related to the rising of China's exports throughout this era as Chinese product became comparatively cheaper abroad. Similarly, the weakening of the

Chinese yuan has been coupled with increased FDI, as foreign corporations wanted to get comparatively cheaper Chinese assets (Zhang & Song, 2001).

According to Zhang & Keh (2010) China did not enable several domestic industrial enterprises to conduct business internationally until the late 90s. The alternative was that international firms localized at home were heavily regulated in such a way that they could not contend with other businesses as they would have wanted (Zhang & Keh, 2010). The hindrance faced by international markets and potential investors bit by bit were torn apart because costs were more accommodating to local markets. Though foreign exchange rates had been strictly controlled by the Bank of China, this did not affect the advent of black markets for currencies. Due to the besiege by certain investors from foreign countries, the government took the necessary steps and made sure that the foreign exchange was sold at an official rate everywhere in order to stabilize the foreign exchange market (Li, Yao, Sue-Chan & Xi, 2011).

By 1992, partially due to a need to affix General Agreement on Tariffs and Trade (GATT), the Chinese government took a step towards establishing one official exchange rate, however an outsized outflow of funds in the 1993, mostly prohibited, brought about negative implications on the official swap rate. The need to affix GATT conjointly initiated the Chinese government to scale back import revenues and to get rid of several meaningless tariffs (Chartier, 1998). The first action resulting in the capital outflow and devaluation of the yuan was most likely due to the popular and institutional needs in safeguarding the worth of their assets against the rising rate of inflation. In 1993, the Chinese government did intervene heavily within the swap markets by merchandising off dollars, however dominant inflation and/or raising

domestic interest rates was probably a simpler answer in maintaining an acceptable exchange rate over the long run (Li, 2005).

China becoming an open market doesn't justify the fact that it will thrive in the international business sector; in any case, nations that are receptive to foreign trade do not share similar success as China's in the export of manufacturing products. The manufacturing industry in China generated 5 billion to 70 billion in the span of 20 years.

Exchange rates have an effect on trade and FDI in many ways. Stein and Froot (1991) have mentioned the relative wealth impact of exchange rates. They also emphasize the impact of rate changes on relative labor prices. A real depreciation of the host country currency permits home country investors to rent a lot of labor for a given quantity of the home country currency and thus is related to a rise in inward FDI within the host country. This supports the importance of the relative wealth result whereas it fails to support the relative labor prices result. In general, the higher the ratio of the host country currency/US $ rate to the home country currency/US $ rate of exchange, the higher will be inward FDI within the host country (Liu, Song, Wei & Romilly, 1997).

In a world where both exchange rates and inflation rates are unsure, random fluctuations in the real rate of exchange will result in a spread of risk and expectation effects on direct investment. Cushman (1985) in his theoretical models discovered that the direct impact of risk-adjusted expected real foreign currency appreciation is to lower foreign cost of capital, therefore stimulating direct investment. However, once the prices of different inputs are affected, evoked productivity changes or output value

changes could offset the direct impact. If so, direct investment is reduced. The results of bilateral direct investment flows show important reductions in U.S's direct investment related, will increase within the current real price of foreign exchange and really sturdy, extremely important reductions related to the expected appreciation of the real foreign currency Increase in systematic risk raise direct investment. Thus, it might seem that several corporations have responded to increase in risk or reductions in expected real foreign exchange rate appreciation as follows. Although exports of ultimate products to the foreign country, they somehow have offset it by increasing foreign capital input and final product production level (Cushman, 1985).

Empirical studies have shown that the structure of capital inflows in developing countries isn't neutral for growth and the stability of the political economy. Much more important is that FDI provides a considerable amount of stable financial supply than portfolio investment, and it raises the world's productivity through technological spillovers. However, exchange-rate regimes themselves could have an effect on the composition of capital inflows: whereas portfolio investors ought to be indifferent to the exchange-rate regimes as long as spinoff markets permit them to hedge. Foreign direct investors ought to conversely worry concerning the exchange-rate regime as a result of the fact they cannot hedge at their horizon and are primarily curious about political economy variables like relative labor prices or getting power. This means switching the regulations of the exchange rate policies by integration of factors relating to location (Schneider & Frey, 1985). The selection of a financial anchor has its own complications which include the fact that the local countries should take into consideration things such as cultural shocks faced by foreigners and practices in developing countries. Exchange-rate regimes in developing countries doubtless represents one pillar of this new design. Our contribution is often viewed as an

indication that exchange-rate volatility will matter for foreign direct investment, and thence for a stable funding of growth in developing countries, particularly for those countries that are on the point of one main finance country. Additionally, we desire to show that exchange-rate regimes in developing countries ought to be outlined on a world framework given the externalities they embrace. More exactly, our analysis shows that financial regionalism is often the simplest way of skyrocketing FDI to developing countries, though it doubtlessly increase competition inside every region. The frontiers of financial areas would then be powerfully influenced by geography as FDI is. (Kiyota & Urata, 2004)

FDI and exchange rate have strong relationship. The major question addressed by most researchers is if the volatile nature of exchange rate affects FDI. Logically, it should be the case as it is popularly known that most investors are risk averse and risk averse investors will presumably not invest in a country where the exchange rate is deemed to be extremely volatile. If movements in currency are unrelated, or negatively are related to movements of alternative currencies during which the MNC operates, in this case, currency volatility could be for the most part counteractive for MNCs in operation across a “basket” of currencies. In short, it's in theory unclear how trade openness and rate of exchange volatility have an effect on FDI flows. (Globerman & Shapiro, 2002).

The reason why the exchange rate regime could matter is due to the presence of some quite worth vicious cycle. Economic experts argue that once economies are hit by real shocks, the countries will quickly amend their relative costs and will therefore have additional powers as a tool for adjusting their quantities. More especially, experts noticed that in a world with sticky prices the speed at which relative prices change

depends crucially on the exchange rate regime. Beneath a flexible regime, relative prices will change instantly through changes within the nominal rate, whereas beneath fixed regimes the changes happen at the rate allowable by the nominal viciousness that is typically much slower. Therefore, flexible regimes ought to have power tool amount responses and faster relative value changes to real shocks than do fixed regime (Broda, 2002).

The Chinese foreign exchange reform came as a result of the push behind reforming international trade. Exchange retention was introduced in 1979 with the aim of encouraging export and generating more revenue. Local economic regulators were allotted a quota based on the foreign exchange gotten, and this was as a result of the exchange retention system. (Bénassy-Quéré, Fontagné & LahrÈche-Révil, 2001)

When interchange rate system became a sole body in 1994, the managing and keeping track of foreign exchange became easier by a huge percentage, it helped filling up all gaps and also closing up loose ends. The central bank got the capability to stabilize the nation's currency and cover discrepancies in the current account (Milani, 1993).

Chapter 3

DATA AND METHODOLOGY

3.1 Data Source

The data used for this research follows an annual sequence and was collected from the World Bank's (2018) website. The data covers the period of 1982 to 2016 and the variables are: Trade in Goods and Services, Official Exchange Rate domestic credit provided by financial sector (% of GDP) to proxy Financial Development and Foreign Direct Investment (net inflows). All the variables are transformed to natural logarithm form in order to capture the growth impacts (Katircioglu, 2009).

3.2 Methodology

This study adopts time series methodology and it consists of the following: unit root test to check if the variables are stationary or non-stationary, Vector Autoregressive Model (VAR) to see the coefficients and under this we check for stability, heteroscedasticity and autocorrelation. The next step is Johansen's cointegration test which checks for the presence of a long term relationship between the variables, to say more clearly, whether the variables converge in the long run or not. If there is cointegration, we can move further to use the Vector Error Correction Model (VECM) and then Granger causality test. Lastly shocks in impulse response and variance decomposition will be examined.

The Model can be expressed in logarithmic form as:

$$lnTRADE_t=\beta_0+\beta_2 lnFDI_t+\beta_3 lnEXRATE_t+\beta_4 lnFDV_t+\varepsilon_t \quad (3.1)$$

lnTRADE represents the natural log form of trade in goods and services, lnEXRATE represents the natural log form of exchange rate, lnFDI represents the natural log form of foreign direct investment, lnFDV represents the natural log form financial development and ε is the error term.

3.3Unit Root Tests

The ADF unit root test was developed by Dickey and Fuller (Dickey and Fuller, 1979). The ADF tests the null hypothesis that a unit root is present in the time series against the alternate hypothesis of stationarity in the series. This test specifies the model in three different ways; firstly, neither with a drift nor a trend, secondly with a drift and no trend and lastly with both a drift and a trend.

$$\Delta y_t=\alpha+\beta t+Y y_{t-1+}\partial_1\Delta y_{t-1+Ut} \quad (3.2)$$

Similar to the ADF, Phillips and Perron (1988) introduced a test to check for the presence of unit root among time series variables. Just like the ADF, the PP investigates the following hypothesis; $H_{0:}$ The series have unit root, H_1: The series as stationary. The equation of the PP is given as:

$$\Delta y_t=\alpha+\beta t+Y y_{t-1+}\partial_1\Delta y_{t-1+Ut} \quad (3.3)$$

Kwiatkowski et al (1992) developed the KPSS test as a criticism to the low power of unit root tests in the case of small samples (Brooks, 2014). Unlike the ADF and PP tests, the KPSS assumes a null hypothesis of stationarity and an alternate hypothesis of non-stationarity. The KPSS is often used as a confirmatory analysis given the fact that its null hypothesis differs from that of the unit root tests.

3.4 Vector Autoregressive Model (VAR)

VAR denotes the behavior of time series in econometrics and it is useful in forecasting. VAR models are especially flexible and can also be used for policy analysis (Zivot & Wang, 2006).

The VAR model is expressed as:

$$Yt = c + \Pi 1 Yt-1 + \Pi 2 Yt-2 + \cdots + \Pi p Yt-p + \varepsilon t,\ t = 1,...,T \quad (3.4)$$

3.5 Cointegration Test

The Johansen cointegration test was utilized in order to determine the long term relationship between the variables. The null hypothesis for the cointegration test is that there is no cointegration while the alternative hypothesis is that there is cointegration. The null hypothesis is rejected on the basis of the null hypothesis's critical values. The rejection is determined when the trace statistic is greater than the critical values and once the null hypothesis is rejected, it means that there is a long run relationship between the variables.

3.6 Vector Error Correction Model

The error correction model provides the long term coefficients, short term coefficients and speed of adjustment. The following equation demonstrates cointegration and vector error correction:

$$\Delta \ln TRADE_t = \beta_0 + \sum_{i=0}^{n} \beta_i \Delta ln TRADE_{t-1} + \sum_{i=0}^{n} \beta_2 \Delta ln FDI_{t-1} + \sum_{i=0}^{n} \beta_3 \Delta ln EXRATE_{t-1} + \beta_4 \varepsilon_{t-1} + u_t \quad (3.5)$$

In the equation, the variable εt-1 is the error correction term (speed of adjustment) and it has to be negative and significant in order to validate the model's coefficients.

3.7 Granger Causality Test

Granger's causality test is used to indicate the flow of direction between the variables under investigation, the flow might be uni-directional or bidirectional. The hypothesis for granger causality test is as follows:

H_0: No Granger Causality

H_1: There is Granger Causality

3.8 Impulse Response and Variance Decomposition

The purpose of this is to examine the impacts of exogenous shocks on the variables. An impulse response function estimates the impact of shocks on variables at different periods in a dynamic system (Pesaran and Shin, 1998). Variance decomposition determines the variation of a dependent variable as it is described by the independent variables and it also assists in determining the particular independent variable that best explains the variation in the dependent variable at a particular time (Campbell, 2009).

Chapter 4

EMPIRICAL RESULTS

4.1 Unit Root Tests

The stationarity of the variables are investigated by making use of the ADF, PP and KPSS as mentioned in the methodology. The tests are performed on the variables at both level and first difference. The results are shown in table 4.1 below:

Table 4.1: ADF, PP, KPSS Tests of Unit Root

Statistics (Level)	lnEXRATE	lag	lnTRADE	Lag	lnFDI	lag	lnFDV	Lag
τ_T (ADF)	-1.780	(0)	-2.218	(0)	-1.437	(1)	-2.191	(0)
τ_μ (ADF)	-3.737*	(0)	0.022	(0)	-3.028**	(0)	-0.441	(0)
τ (ADF)	1.292	(0)	0.978	(0)	1.431	(1)	3.126	(0)
τ_T (PP)	-1.954	(9)	-2.581	(2)	-1.215	(1)	-2.191	(0)
τ_μ (PP)	-3.737	(0)	-0.111	(1)	-2.79***	(2)	-0.483	(1)
τ (PP)	0.852	(3)	0.891	(1)	2.694	(2)	2.977	(1)
τ_T (KPSS)	0.209**	(4)	0.077	(1)	0.182**	(4)	0.096	(3)
τ_μ (KPSS)	0.496**	(4)	0/835*	(4)	0.661**	(5)	0.804*	(4)

Statistics (First Difference)	lnEXRATE	lag	lnTRADE	Lag	lnFDI	lag	lnFDV	Lag
τ_T (ADF)	-5.391*	(0)	-2.567	(0)	-4.092**	(0)	-4.89*	(0)
τ_μ (ADF)	-4.026*	(0)	-2.71***	(0)	-3.479**	(0)	-4.98*	(0)
τ (ADF)	-3.710*	(0)	-2.868*	(0)	-3.029*	(0)	-3.98*	(0)
τ_T (PP)	-5.373*	(4)	-2.567	(0)	-3.920**	(4)	-4.91*	(1)
τ_μ (PP)	-4.012*	(1)	-2.67***	(1)	-3.381*	(2)	-4.99*	(1)
τ (PP)	-3.665*	(1)	-2.868*	(0)	-3.029*	(0)	-3.92*	(0)
τ_T (KPSS)	0.123***	(6)	0.100	(2)	0.052	(3)	0.082	(1)
τ_μ (KPSS)	0.648**	(3)	0.102	(1)	0.497**	(1)	0.080	(1)

Note:
EXRATE is a representation of exchange rate, TRADE is a representation of trade in goods and services and FDI is a representation of foreign direct investment. The sereies are in their natural logarithimic form. τ_T represents trend and intercept, τ_μ represents intercept without trent and τ represents no trend nor intercept. In terms of PP test, the numbers within the bracke represent the Newy-West Bandwith (Bartlett-Kernel). In the model * represents level 1 percent , ** represents level 5 level and finally *** represents level 10 percent

As it can be seen in the table 4.1, the ADF test could not provide enough statistical evidence for rejecting the null hypothesis of unit root for the variables lnEXRATE, lnTRADE, lnFDI and lnFDV at level forms for the trend and intercept as well the no trend nor intercept test equations, therefore the variables are said to be non-stationary at level form. After taking the first difference the series of the variables became stationary. This suggests that the variables are integrated to an order of 1, I (1). In the case of the PP test results, the series illustrate unit root at level form with the exception of the variable FDI (intercept), the series does not have unit root. After taking the first difference, all the variables become stationary except the variable FDI (intercept).

The KPSS test shows exchange rate and FDI variable in the level form is stationary as the series are significant. Also at level form, trade is stationary at trend and intercept but non stationary at intercept only.

Furthermore, with regards to the Exchange rate variable, KPSS does not confirm ADF and PP as the series are still non stationary after taking the first difference. Trade is stationary after first differencing while FDI is stationary at trend and intercept but still non stationary at intercept. FDV is stationary at level form in terms of trend and intercept but non stationary at just the intercept. After taking the first difference the series becomes stationary.

4.2 Vector Autoregressive Model (VAR)

The VAR model is presented in the table below:

The vector autoregressive model shows the short term relationship of the variables, however, it is argued that the coefficient of these variables are not be interpreted in econometrics.

Table 4.2: Vector Autoregressive Model

	DLNTRADE	DLNEXRATE	DLNFDI	DLNFDV
DLNTRADE(-1)	-0.013491	0.010055	-0.118685	0.027429
	(0.23324)	(0.02054)	(0.14205)	(0.06741)
	[-0.05784]	[0.48957]	[-0.83554]	[0.40692]
DLNTRADE(-2)	0.043392	-0.014272	-0.036833	-0.069197
	(0.22515)	(0.01983)	(0.13712)	(0.06507)
	[0.19273]	[-0.71989]	[-0.26862]	[-1.06346]
DLNEXRATE(-1)	21.76466	-0.085170	11.96123	-3.111124

	(4.93165)	(0.43426)	(3.00345)	(1.42526)
	[4.41326]	[-0.19613]	[3.98250]	[-2.18285]
DLNEXRATE(-2)	-11.66336	0.755641	-11.64861	2.495354
	(4.96309)	(0.43703)	(3.02259)	(1.43434)
	[-2.35002]	[1.72904]	[-3.85385]	[1.73972]
DLNFDI(-1)	0.278728	-0.091886	0.351005	-0.119965
	(0.45095)	(0.03971)	(0.27463)	(0.13032)
	[0.61809]	[-2.31399]	[1.27808]	[-0.92051]
DLNFDI(-2)	1.420003	-0.045285	0.578302	-0.179277
	(0.50499)	(0.04447)	(0.30754)	(0.14594)
	[2.81197]	[-1.01839]	[1.88039]	[-1.22841]
DLNFDV(-1)	-4.744375	0.151781	-2.101126	0.704251
	(1.41123)	(0.12427)	(0.85946)	(0.40785)
	[-3.36187]	[1.22141]	[-2.44471]	[1.72675]
DLNFDV(-2)	-0.264099	-0.055148	-0.036601	-0.488694
	(1.47744)	(0.13010)	(0.89978)	(0.42698)
	[-0.17875]	[-0.42389]	[-0.04068]	[-1.14452]
C	0.425994	-0.009382	0.371458	0.069357
	(0.30738)	(0.02707)	(0.18720)	(0.08883)
	[1.38589]	[-0.34663]	[1.98430]	[0.78076]
@TREND	-0.006200	0.000799	-0.012356	-0.000253
	(0.01248)	(0.00110)	(0.00760)	(0.00361)
	[-0.49696]	[0.72695]	[-1.62637]	[-0.07018]

4.2.1 Lag Length Criteria

Table 4.3: Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	69.42739	NA	1.83e-08	-6.466041	-6.068382	-6.398741
1	90.78444	29.22545	1.14e-08	-7.029941	-5.836966	-6.828043
2	128.8848	36.09505*	1.62e-09	-9.356292	-7.368000	-9.019794
3	165.3255	19.17931	6.17e-10*	-11.50794*	-8.724334*	-11.03685*

*Note: *indicates the chosen lag by the criterion.*

LR represents sequential modified LR test statistic (each test at 5% level), FPE is final prediction error, AIC is Akaike information criterion, SC is Schwarz information criterion and finally HQ is Hannan-Quinn information criterion.

In the table above based on the recommendation of four of the criteria which are FPE, AIC, SC and HQ we adopted three lags for the analysis.

4.2.2 Stability

The stability of the model is determined if all the roots are inside the circle. At optimal lag length, one of the roots is outside the circle but after adjusting the number of lags the roots are all within the circle.

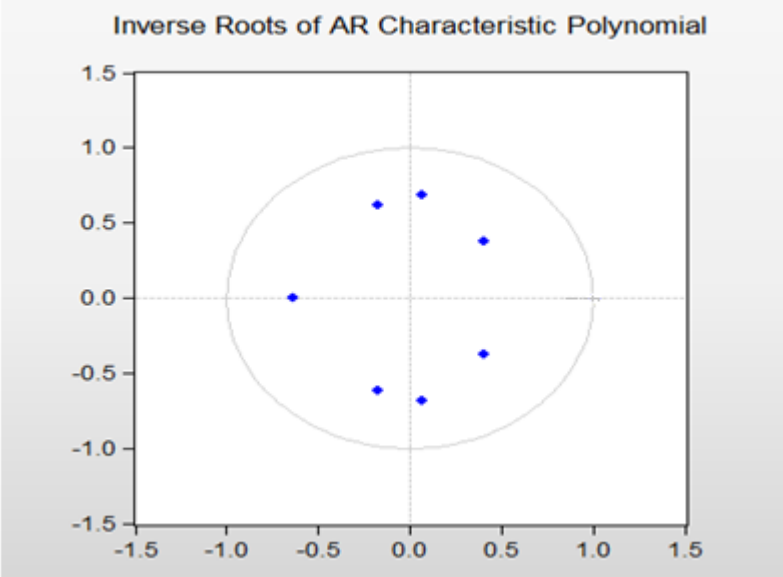

Figure 4.1: VAR Stability AR Graph

4.2.3 Autocorrelation

H_0: No serial correlation

H_1: There is serial correlation

Table 4.4: Autocorrelation Test

LAGS	**LM-STAT**	**PROB**
1	25.26	0.1652
2	14.39	0.5694

The null hypothesis is not rejected at a 5% level of significance and this signifies that there is no autocorrelation problem. As such, in terms of autocorrelation, there is no diagnostic issue.

4.2.4 Heterocedasticity

H_0: No heteroscedasticity

H_1: There is heteroscedasticity

Table 4.5: Heteroscedasticity Test

Chi-sq	**Df**	**Prob**
186.733	180	0.3499

The null hypothesis has failed to be rejected as the prob value is not significant. This imply that there is no heteroscedasticity diagnostic problem.

4.3 Johansen Cointegration Test

After conducting the unit root test and the variables are I(1), we do the Johansen cointegration test and present the results on a Pantula table. The Pantula principle is basically applied in order to choose the appropriate model.

Based on pantula's principle we chose the 2nd model, this show us that there is cointegration, or simply put a long term relationship among variables.

Table 4.6: Johansen Cointegration Test

	MODEL2	MODEL3	MODEL4
NONE	66.48*****	49.92*	63.87*****
ATMOST 1	31.18	17.31	42.91
ATMOST 2	13.81	7.141	25.87
ATMOST 3	3.940	0.646	12.51

*Note: * indicates rejection of the null hypothesis at 1%*

4.4 Vector Error Correction Model

After investigating the long run relationship of the variables, the next step is to carry out vector error correction. The speed of adjustment is the variable of interest and is observed to be significant with a value that range between 0 and -1. In that case it can be said that the independent variable of the model converge to its equilibrium at 0.15% by the help of Trade, financial development and exchange rate.

Table: 4.7: Vector Error Correction

Error Correction:	D(LNTRADE)	D(LNFDV)	D(LNFDI)	D(LNEXRATE)
CointEq1	0.131028	0.110766	-0.159882	0.033953
	(0.14369)	(0.02269)	(0.07948)	(0.00586)
	[0.91188]	[4.88073]	[-2.01150]	[5.79005]

Table 4.8: Long term Coefficients

Independent Variables	Coefficients
LNFDV(-1)	-5.244196*
	(0.75451)
	[6.95050]
LNFDI(-1)	7.997662*
	(0.55026)
	[-14.5343]
LNEXRATE(-1)	38.86572*

	(2.74179)
	[-14.1753]
C	229.2662
	(16.2246)
	[14.1308]

*Note: * indicates significance at level 1%*

The long term relationship as shown in table 4.8 shows that financial development, foreign direct investment and exchange rate are all statistically significant. This imply that in the long run there is a relationship between FDI, EXRATE, FDV and TRADE. The relationship is such that if FDV increases by 1%, TRADE will decrease by 5.24%. Also if FDI increases by 1%, TRADE will increase by 7.99% and finally if EXRATE increase by 1%, TRADE will increase by 38%.

As seen in the tables below showing the short term coefficients, firstly, it can be interpreted that if FDV increases by 1%, TRADE increases by 0.07% in the short run and also if EXRATE increases by 1%, TRADE increases by 0.018%. Here it can also be seen that if TRADE increases by 1%, FDV decreases by 5.5%, and if EXRATE increases by 1%, FDV decreases by 0.2% in the short run. Furthermore, if FDV increases by 1%, FDI decreases by 0.6% and if EXRATE increases by 1%, FDI increases by 0.14%. Lastly, if EXRATE increases by 1%, TRADE increases by 24% in the short run and FDI increases by 9.74%.

Table 4.9: Short Term Coefficients

	D(LNTRADE)	D(LNFDV)	D(LNFDI)	D(LNEXRATE)
D(LNFDV(-1))	-5.522920*	-0.389409	-0.121314	-0.206269*
	(2.15648)	(0.34060)	(1.19289)	(0.08801)
	[-2.56108]	[-1.14331]	[-0.10170]	[-2.34379]
D(LNTRADE(-1))	0.151203	0.071802*	-0.098558	0.018931*
	(0.21957)	(0.03468)	(0.12146)	(0.00896)
	[0.68865]	[2.07049]	[-0.81147]	[2.11267]
D(LNFDI(-1))	1.446579	0.696376*	-0.649798	0.147877*
	(1.07595)	(0.16994)	(0.59518)	(0.04391)
	[1.34447]	[4.09786]	[-1.09177]	[3.36774]
D(LNEXRATE(-1))	23.99117*	-1.203024	9.747275*	0.458396
	(5.74275)	(0.90702)	(3.17668)	(0.23436)
	[4.17765]	[-1.32635]	[3.06839]	[1.95592]

4.5 Granger Causality

Firstly, there is granger causality from FDI and EXRATE to Trade which means there is a unidirectional relationship from both FDI and EXRATE to trade. Furthermore, the other unidirectional granger causality is from FDV to trade, Exrate to FDI, FDV to Exrate and finally FDI to FDV. There is no bi-directional relationship between any of the variables as seen in the table 4.10.

Table 4.10: Granger Causality Test

Dependent variable: LNTRADE			
Excluded	Chi-sq	Df	Prob.
LNFDV	20.077	3	0.0002
LNEXRATE	29.625	3	0.0000
LNFDI	25.923	3	0.0000
All	82.051	9	0.0000
Dependent variable: LNFDI			
Excluded	Chi-sq	Df	Prob.
LNFDV	5.855	3	0.1189
LNEXRATE	41.94	3	0.0000
LNTRADE	2.072	3	0.5576
All	58.83	9	0.0000
Dependent variable: LNEXRATE			
Excluded	Chi-sq	Df	Prob.
LNTRADE	2.226	3	0.5267
LNFDV	6.571	3	0.0869
LNFDI	2.487	3	0.4776
All	21.20	9	0.0118
Dependent variable: LNFDV			
Excluded	Chi-sq	Df	Prob.
LNTRADE	0.469	3	0.9225
LNEXRATE	7.062	3	0.6931
LNFDI	1.453	3	0.0699
All	11.85	9	0.2214

4.6 Impulse Response

The multiple graphs illustrated below show the variables responses to impulse. Firstly, when you give an own shock to trade, this variable will decline and and will be stable at negative from period 3 to 5. This is the similar pattern is observed when shocks are given to other variables. Also as it can be seen, when you give a shock to DLNEXRATE, DLNFDI and DLNFDV will go up sharply.

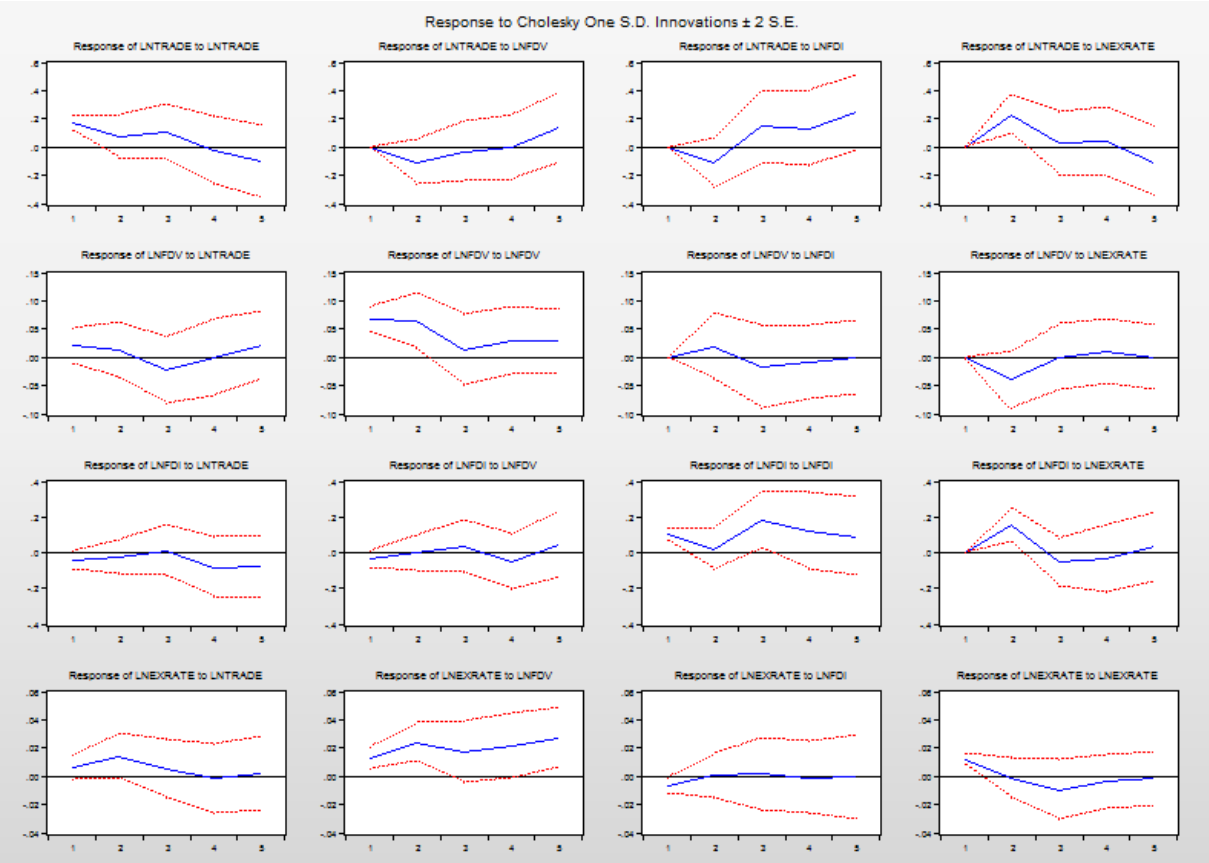

Figure 4.2: Impulse Response Function

4.7 Variance Decomposition

The table below shows the variable decomposition of the variables. In the first period, if you put a shock to Trade, there will 0 variation in FDV, exchange rate and FDI. Also, if you put a shock to trade at period 5 there will 25% variation in exchange rate, 12% variation in FDV and 42% variation in FDI.

Also, if you put a shock to FDV, there will be 8.3% variation in TRADE, 0 variation in FDI and EXRATE in the first period. At period 5, there will 11.2% variation in TRADE, 11.7% in EXRATE and 5.11% variation in FDI.

Furthermore, if a shock is given to FDI, there will be 12.7% variation in TRADE, 10% in FDV and 0% variation in EXRATE in the first period. In period 5 there will 13% variation in TRADE, 6.08% in FDV and 24% variation in EXRATE.

Finally, if a shock is given to EXRATE, there will be 9.8% variation in TRADE, 41% in FDV and 12% variation in FDV in the first period. In period 5 there will 9.85% variation in TRADE, 79% in FDV and 1.8% variation in FDI.

Table 4.11: Variance Decomposition Table

Variance Decomposition of LNTRADE:					
PERIOD	S.E.	LNTRADE	LNFDV	LNFDI	LNEXRATE
1	0.167483	100.0000	0.000000	0.000000	0.000000
2	0.331826	29.85656	10.49512	11.99982	47.64849
3	0.378975	30.20975	8.710179	24.06080	37.01927

4	0.403085	27.09092	7.733130	31.62798	33.54797
5	0.514811	20.70533	12.06134	42.07317	25.16017
Variance Decomposition of LNFDV:					
PERIOD	S.E.	LNTRADE	LNFDV	LNFDI	LNEXRATE
1	0.069463	8.343135	91.65686	0.000000	0.000000
2	0.104471	5.232742	77.22067	3.420745	14.12584
3	0.109091	9.458530	72.23865	5.348016	12.95480
4	0.113684	8.721186	72.86024	5.585903	12.83267
5	0.119042	11.29812	71.87603	5.110888	11.71496
Variance Decomposition of LNFD:					
PERIOD	S.E.	LNTRADE	LNFDV	LNFDI	LNEXRATE
1	0.116808	12.70316	10.11280	77.18404	0.000000
2	0.196344	6.121986	3.590282	28.31556	61.97217
3	0.276374	3.216143	3.118644	58.45107	35.21415
4	0.317886	9.097874	5.022376	58.22267	27.65708
5	0.343719	13.00589	6.082743	56.48776	24.42361
Variance Decomposition of LNEXRATE:					
PERIOD	S.E.	LNTRADE	LNFDV	LNFDI	LNEXRATE
1	0.019891	9.893452	41.55924	12.11723	36.43007

2	0.034430	20.63104	62.96823	4.074809	12.32591
3	0.040149	16.92080	65.21035	3.114955	14.75389
4	0.045638	13.26429	72.14545	2.449391	12.14087
5	0.053160	9.850726	79.25705	1.817995	9.074234

Figure 4.3 contains multiple graphs that show the results from the table in a graphical format and they show the same results in general.

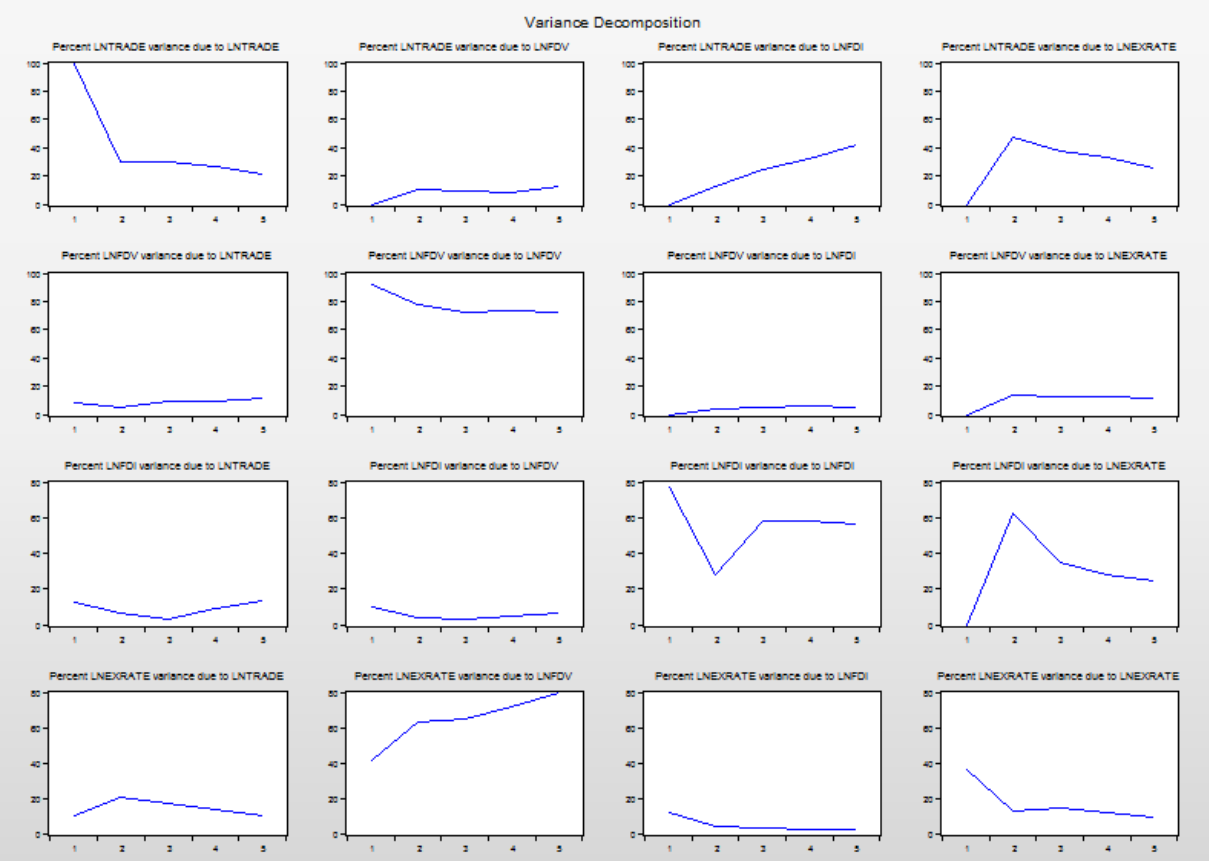

Figure 4.3: Variance Decomposition

Chapter 5

CONCLUSION AND RECOMMENDATIONS

The aim of this thesis was to investigate the long run relationship between trade, FDI, financial development and exchange rate with the use of data from the year 1982 to 2016. The steps carried consisted of investigating the stationarity of the variables and this was through the use of ADF, PP and KPSS test. KPSS was used as a a confirmatory test. Secondly, the VAR model was presented and the lag length criteria were determined. Next, the stability of the VAR model was checked and it can be said that the VAR model is stable. Also, autocorrelation and heteroscedasticity assumptions where checked. The cointegration test was carried out using Johansen's Cointegration test. It was concluded that the VAR model is stable and that there is no autocorrelation and heteroscedasticity. Based on the cointegration test, it is evident there is one cointegrating vector and it was established that there is a long term relationship between trade, FDI, financial development and exchange rate. However, exchange-rate regimes themselves could have an effect on the composition of capital inflows: whereas portfolio investors ought to be indifferent to the exchange-rate regime as long as spinoff markets permit them to hedge, foreign direct investors ought to conversely worry concerning the exchange-rate regimes. The resulting effect is such that they cannot hedge at their desired horizon and are primarily curious about politico-economic variables like relative labor prices or getting power. From the VECM it can be seen that there is a long term negative relationship between trade and financial development and a positive long term relationship between trade and FDI/exchange

rate. This is in such a way that if financial development increases by 1%, trade will decrease by 5.24%. The reason for this decrease can be justified by China's socio economic policies. Also, it is seen that if FDI increase by 1%, trade increases by 7.99% and if exchange rate increases by 1%, trade increases by 38%. Exchange rate has an enormous impact on trade. Any slight change on exchange rate is bound to immensely impact trade. In the short run, a 1% increase in financial development increases trade by 0.07% and also a 1% increase in exchange rate increases trade by 0.018%. If trade increases by 1%, FDV decreases by 5.5%, and if exchange rate increases by 1%, FDV decreases by 0.2% in the short run as well. Furthermore, if FDV increases by 1%, FDI decreases by 0.6% and if exchange rate increases by 1%, FDI increases by 0.14%. Lastly, if exchange increases by 1%, TRADE increases by 24% in the short run and FDI increases by 9.74%. With regards to the Granger causality test, it is discovered that there is a unidirectional causal relationship from FDI, exchange rate and financial development to trade. This is correlative to simple logic, and the impulse response and variance decomposition are in confirmatory terms with the causal relationship.

Due to a negative relationship between financial development and trade, this research suggests that the Chinese government should ensure that domestic credit is essentially distributed and channeled to efficient ventures which will in turn secure the development of the Chinese economy. The government should also aim at introducing restrictions on the importation of items such as food items.

The main reason behind the negative relationship between financial development and trade is that countries with developed financial sectors always have an edge or an advantage when it comes to industrial and manufacturing sectors. Therefore, as

financial development gets better in China there is likely to be less imports and this will result in a decline in trade.

Due to the investigative facts, the best recommendation for the government is to try an attraction of foreign investors in China. There is both a long and short term positive relationship between FDI and trade, and therefore the Chinese government should bring about certain modifications to the present socio economic policies in order to attract foreign investors. It can be seen that exchange rate has a very high impact on trade and it is the duty of policy makers to contemplate on whether it is best for the Chinese economy to utilize an expansionary monetary policy or a restrictive monetary policy.

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