



FINANCIAL INTEGRATION IN THE BRICS COUNTRIES

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FINANCIAL INTEGRATION IN THE BRICS COUNTRIES

BY

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Marida Nephertiti Nach.

ABSTRACT

An optimum currency area (OCA) owes its definition to Robert Mundell (1961). In his seminal paper, Mundell (1961) defines an OCA as an area for which the costs of relinquishing the exchange rate as an internal instrument of adjustments are outweighed by the benefits of adopting a single currency or a fixed exchange rate regime. Mundell (1961) emphasises two major benefits of adopting a single currency: the elimination of transaction costs and a better performance of money as a medium of exchange and as a unit of account. Thus far, OCA theory has served as the framework for the discussion about monetary integration and has provided an explanation for the monetary integration processes around the world both developed and developing countries in Europe, Asia, Africa, and Latin America. The emergence of the BRICS (Brazil, Russia, India, China, South Africa) countries can be a model and a representation of developing and emerging countries in the global economic and financial system. Hence, this has made the BRICS economies the object of many discussions and recent empirical researches. The research presented in this thesis uses a structural vector autoregression (SVAR) econometric model to explore whether there is a feasibility of macroeconomic convergence among the BRICS economies. The SVAR model permitted to examine the symmetry of shocks (supply, demand and monetary) among the five BRICS countries. The findings of this research showed that there was some degree of symmetry of shocks among the BRICS countries. Nevertheless, there is a need for more policy coordination in order to achieve the desired level of symmetry of shocks among these countries.

Keywords: optimum currency area, symmetric shocks, economic integration, financial integration, structural shocks, structural vector auto-regression (SVAR), BRICS.

ABSTRAIT

Une zone monétaire optimale (OCA) doit sa définition à Robert Mundell (1961). Dans son article fondateur, Mundell (1961) définit une OCA comme un domaine pour lequel les coûts d'abandon du taux de change en tant qu'instrument interne d'ajustement sont compensés par les avantages de l'adoption d'une monnaie unique ou d'un régime de taux de change fixe. Mundell (1961) insiste sur deux avantages majeurs de l'adoption d'une monnaie unique: l'élimination des coûts de transaction et une meilleure performance de la monnaie comme moyen d'échange et comme unité de compte. Jusqu'à présent, la théorie de l'OCA a servi de cadre à la discussion sur l'intégration monétaire et a fourni une explication des processus d'intégration monétaire dans le monde, tant dans les pays développés que dans les pays en développement d'Europe, d'Asie, d'Afrique et d'Amérique latine. L'émergence des pays BRICS (Brésil, Russie, Inde, Chine, Afrique du Sud) peut être un modèle et une représentation des pays en développement et émergents dans le système économique et financier mondial. Par conséquent, cela a fait des économies BRICS l'objet de nombreuses discussions et recherches empiriques récentes. La recherche présentée dans cette thèse utilise un modèle économétrique d'autorégression vectorielle structurelle (SVAR) pour explorer s'il existe une potentialité de convergence macroéconomique entre les économies BRICS. Le modèle SVAR a permis d'examiner la symétrie des chocs (offre, demande et monétaires) entre les cinq pays BRICS. Les résultats de cette recherche ont montré qu'il y avait un certain degré de symétrie des chocs entre les pays BRICS. Néanmoins, il est nécessaire de renforcer la coordination des politiques afin d'atteindre le niveau souhaité de symétrie des chocs entre ces pays.

Mots clés: zone monétaire optimale, chocs symétriques, intégration économique, intégration financière, chocs structurels, autorégression vectorielle structurelle (SVAR), BRICS.

DEFINITIONS

Structural/Economic shock: any change to fundamental macroeconomic variables or relationships that can produce a significant change within an economy, either positively or negatively. Structural economic shock has a substantial effect on supply or demand and measures of economic performance, such as unemployment, consumption, and inflation.

Dollarization: a situation where a country, either officially or unofficially, uses a different country's currency as legal tender for conducting transactions. The main reason for dollarisation is to receive the benefits of greater stability in the value of a foreign currency over a country's domestic currency.

Eurozone: group of countries or a region using euro currency as legal tender for conducting transactions.

Endogeneity: a change caused by factors inside the system. The concept of endogeneity is particularly relevant in the context of time series analysis of causal processes. It is common for certain factors within a causal system to be dependent for their value in period n on the values of other factors in the causal system in period $n-1$.

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LIST OF ACRONYMS AND ABBREVIATIONS

AD	aggregate demand
ADF	augmented Dickey–Fuller test
AFCFTA	African Continental Free Trade Area
ANOVA	analysis of variance
APEC	Asian Pacific Economic Cooperation
AS	aggregate supply
ASEAN	Association of South East Asian Nations
BC	business cycle
BP	band-pass filter
BRIC	Brazil, Russia, India, China
BRICS	Brazil, Russia, India, China, South Africa
CACM	Central American Common Market
CAN	Comunidad Andina (Andean Community of Nations)
CARICOM	Caribbean Community
CARIFTA	Caribbean Free Trade Area
CCA	common currency areas
CM	common market
COMESA	Common Market for Eastern and Southern Africa
CPI	consumer price index
CRA	contingent reserve arrangement
CU	customs union

CUFTA	Canada-US Free Trade Agreement
CV	coefficient of variance
D-8	Developing-8 countries
DEY	dollar euro yen
DFIs	development finance institutions
DRM	domestic resource mobilization
EAC	East African Community
EAEU	Eurasian Economic Union
EAS	East Asia Summit
ECB	European Central Bank
ECCM	Eastern Caribbean Common Market
ECOWAS	Economic Community of West African States
ECU	European Currency Unit
EEC	European Economic Community
EFTA	European Free Trade Association
EMS	European Monetary System
EMU	European Monetary Union
EU	European Union
FTA	free trade area
FDI	Foreign direct investment
GATT	General Agreements on Tariffs and Trade
GCC	Gulf Cooperation Council

GDP	gross domestic product
GPPP	generalised purchasing power parity
IBSA	India-Brazil-South Africa
ICF	international financial centre
ICU	International Clearing Union
IMF	International Monetary Fund
IRF	impulse response function
KPSS	Kwiatkowski–Phillips–Schmidt–Shin
LAFTA	Latin American Free Trade Association
LAIA	Latin American Integration Association
LOP	law of one price
MDBs	multilateral development banks
MENA	Middle East and North Africa
MERCOSUR	Mercado Comon del Sur or Common Market of the South
MU	monetary union
NAFTA	North America Free Trade Agreement
NDB	New Development Bank
NTB	non-tariff barriers
OCA	optimum currency area
ODA	official development assistance
PPP	purchasing power parity
PTA	preferential trade area/agreement

RER	real exchange rate
RGDP	real gross domestic product
SAARC	South Asian Association for Regional Cooperation
SACU	Southern African Customs Union
SADC	Southern African Development Community
SCO	Shanghai Cooperation Organization
SDR	special drawing right
SVAR	structural vector auto regression
UK	United Kingdom
USA	United Nations of America
VAR	vector auto regression
WAEMU	West African Economic and Monetary Union
WAMZ	West African Monetary Zone
WB	World Bank
WTO	World Trade Organisation

CHAPTER ONE. INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION

Interest in financial integration has increased over the past decades. The tariff structure, capital mobility, revolution in transportation and technology may have accelerated this modern trend to become an international phenomenon. With the growing globalisation that the world is experiencing, the structure on which the international monetary system was built, is failing to keep pace with the economic dynamics in the shape and scale of cross-border finance, especially in emerging economies and newly industrialized countries.

Moreover, economic crises affect both developed and developing economies. Global financial crises, notably the 2007-2009 Global Crisis, led to many governments expressing their dissatisfaction over the pace of the international monetary fund (IMF) reforms. For instance, the 2007-2009 financial crisis led to the worldwide stock markets plunging along with the US market, and many currencies fell against the USA dollar (Wim, 2009, pp. 5, 6, 9, 11). One other thing, the inefficiency of the current system is reflected in the hundreds of trillions of dollars of waste capital movements that cross international borders every year solely because of uncertainty over exchange rates (Mundell, 2000, p. 219). Hence, it needs to be underlined that there are some defects in the international monetary system.

Subsequently, this dissatisfaction and other turbulences as the one stated above, have brought about a discussion about an acceleration of the international monetary system or/and a new architecture of the international monetary system. One of the facets of this broad discussion is whether one country one currency system is still adequate. The discussions and arguments have risen up as to whether a country should keep its independent domestic currency or use the same currency as other countries to facilitate global transactions. Thus, the pursuit of and interest in regional currency blocs are

increasing as an important phenomenon in international economic and financial world (Adams, 2005, p. 5).

Financial integration can take various forms; it can be in a form of liberalisation of the capital account; foreign entry; regulatory convergence and harmonisation; and subcontracting abroad of financial infrastructure and services. Countries can also involve convergences of interest rate, improve liquidity and deepening the capital market or in a form of monetary integration, either through currency unions such as in Europe, Western and Central Africa or through dollarization such in Latin America (Calari, 2007, p. 10). To emphasise the importance of the financial integration, De Grauwe and Mongelli (2005) state that financial integration is central to international financial system and benefits economic growth via risk sharing, improvements in efficiency allocation and reductions in macroeconomic volatility and transaction costs. The monetary integration is a constituent of a common financial structure and an essential proponent of financial integration. In addition, Baele, Ferrando, Hordahl, Krylova and Monnet (2004) emphasise that the monetary union are important in international finance system as they can deepen the international financial integration (De Grauwe & Mongelli, 2005); (Baele, Lieven; Ferrando, Annalisa; Hördahl, Peter; Krylova, Elizaveta; Monnet, 2004).

When researching about the term “monetary integration, it does not take long before the literature reveals the term “optimum currency area” (OCA). Generally, an optimum currency area (OCA) or an optimum currency region defines the geographic area within which it would be economically efficient to form a currency union. The term “optimum currency area” was principally introduced by Robert Mundell in the 1960s. According to Mundell (1961) an optimum currency (OCA) is an area for which the costs of relinquishing the exchange rate as an internal instrument of adjustments are outweighed by the benefits of adopting a single currency or a fixed exchange rate regime (Mundell, 1961, p. 658). This means the countries members of a currency union would adopt a common monetary and exchange rate policy.

In his seminal paper titled “A theory of optimum currency areas” in 1961, Robert Mundell founded the optimum currency area theory which nowadays underpins the concept of monetary integration. Thus, the OCA theory attempts to give an answer to the choice of an exchange rate regime. The optimum currency area theory underlies the theoretical framework for discussing monetary integration. Following the introduction of the concept of the OCA by Robert Mundell in 1961, numerous studies have been examining the feasibility of introducing a common currency in various group of economies. For instance, in the last two decades, a large body of empirical literature has emerged examining the future directions of monetary and exchange rate arrangements for many countries. Examples of regional integration organisations and communities that the literature has examined are as follows:

- European Union (EU);
- Association of Southeast Asian Nations (ASEAN);
- Southern Common Market/Mercado Comūn del Sur (MERCOSUR); and
- North America, Middle East and North Africa (MENA).

Others regional integration areas are in the East, Southern, Western and Central Africa such as:

- East African Community (EAC);
- South Africa Development Community (SADC);
- West Africa Monetary Zone(WAMZ); the ECOWAS (Economy Community of West African States; and
- COMESA (Common Market of East and Southern Africa (COMESA).

A currency union has become an attractive economic developmental transformation strategy for both emerging and developing countries. It is seen as an indispensable tool for the transformation of economies. This is because it can serve as a means of gaining access to a wider market, alleviating poverty and unemployment, and achieving economic growth to gain higher national welfare (Rusuhuzwa & Masson, 2012). Hence, there are already a few established currency zones outside the Eurozone.

In addition, Table 1.1 below represents a list of some monetary unions outside of the Eurozone.

Table 1.1. Monetary unions outside of Europe

Monetary union	Currency	Central Bank
Eastern Caribbean Currency Area (1950)	Eastern Caribbean dollar (is pegged to the USD, prior to 1976 it was pegged to GBP)	Eastern Caribbean Currency Authority (1950-1982).
Central African Economic and Monetary Community	Franc de la coopération financière en Afrique centrale (it was pegged to FRF and is now pegged to EUR)	Banque des Etats de l'Afrique Central
West Africa Economic and monetary Union (1945)	Franc de la communauté financière d'Afrique (it was pegged to French Franc, and is now pegged to EUR)	Banque Centrale des Etats de l'Afrique de l'Ouest

Source: World Bank and International Monetary Fund (2010).

The subject of optimum currency areas (OCAs) has been, and is still the object of extensive discussions and research. However, despite the large number of theoretical and empirical contributions on the subject, there are still few attempts to model a comprehensive and integrated analysis of the various economic aspects of the OCAs. One of the recent regional economic bloc formed has been the BRICS economic bloc which includes: Brazil, Russia, India, China, South Africa. BRICS, originally "BRIC" before the inclusion of South Africa in 2010, is the title of an association of "emerging" economies, namely Brazil, Russia, India, China and South Africa (BRICS). The BRICS economic bloc was formed in 2001, originally with four countries. The BRICS nations' role in international development cooperation has become significant and increasing. The BRICS bloc has already had an impact on international trade, foreign direct investment, infrastructure development and the financing of developing countries (O'Neill, 2001).

Moreover, the recent announcement of the Chinese currency, the renminbi (RMB) with a weight of 11% as a new currency reserve of the IMF, presents the opportunity for both developed and developing countries in terms of international trade, investment and finance (IMF, 2016). In addition, this can offer an effective financial instrument for mediating international investment and trade relationships, especially to China and the other partners of the BRICS. For example, as business between China and South Africa (SA) increases, the use of the renminbi in transactions can boost the trade and investment transaction in a region that is embarking upon massive programmes of industrialisation and infrastructure investment to address development, growth, unemployment, poverty and inequality. Hence, trade and investment amongst the countries of the BRICS are in the forefront in boosting economic growth and sustainable development in emerging and developing countries (Jash, 2017, pp. 1–11); (John, 2014, p. 2); (Morazan, Knoke, Knoblauch, & Schäfe, 2012, pp. 6–8).

However, one significant problem is that trade relations and investment transactions amongst emerging and developing economies are still dominated and determined by the dollar (42%), the euro (31%), the pound sterling (8%) and the yen (8%).

Figure 1.1 below presents the current International Monetary Fund (IMF) reserve currencies weight as since 2016, which now includes the Chinese national currency, the renminbi (IMF, 2016).

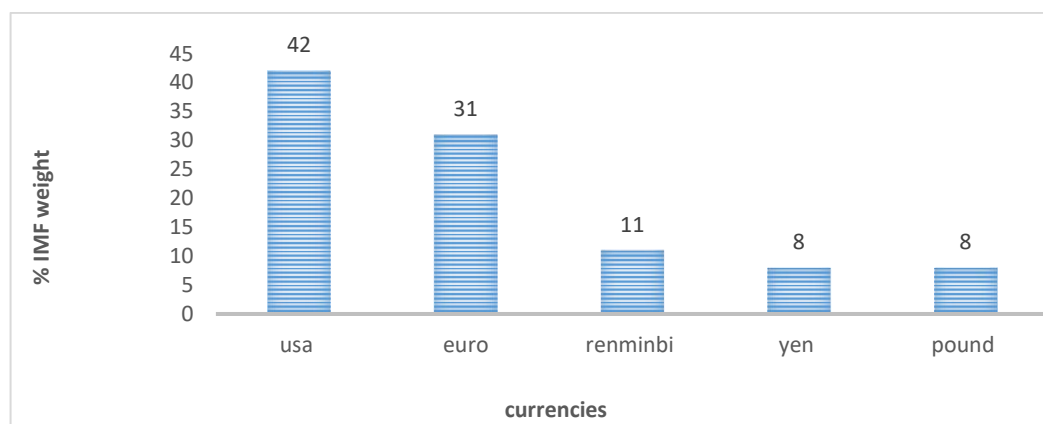


Figure 1.1. Percentage weight of the IMF currencies reserves.

Source: Author's own compilation, data for all the currencies from International Monetary Fund (2016).

As it is illustrated in the Figure 1.1 (above), the five IMF currencies reserve are the US dollar, the euro, the Chinese renminbi, the Japanese yen and the British pound, with the weight of 42%, 31%, 11%, 8% and 8% respectively, with the US and the Euro, the two currencies dominating in the international financial transactions (IMF, 2016).

With the world economy evolving, the international financial system needs more reserve currencies to reduce the dependence of the developing nations on the fluctuations of the dollar or euro. Yet, the countries of the BRICS have not reached the level of industrialisation that characterises traditional donors and are plagued by persistent inequality and poverty. Nevertheless, the BRICS has already started to disburse significant investment and foreign assistance funds to other developing countries. South Africa, for example, has become the leading economy in Africa. It is expected to lead in peace and security efforts, promote regional economic integration and fund development projects. Similarly, Brazil and India are beginning to exert influence on their less developed neighbours and China is becoming a major source of foreign direct investment in the developing countries and emerging markets. These changes are giving rise to so-called "South-South" cooperation, which is not only modifying the relationship between developing countries but also the relationship between developing and industrialised countries. In addition, amongst the currencies of the countries of the BRICS, the Chinese's RMB has already attained international reserve currency status. This amongst other common features and objectives of the BRICS therefore, provides an opportunity to explore the possibility of a single currency or common payment transaction mechanism among BRICS members. This may deepen financial relations and strengthen multilateral trade and investment among the countries of BRICS and between BRICS countries and the rest of the world (Morazan et al., 2012); (John, 2014).

1.2 PROBLEM STATEMENT

Economic growth can lead to poverty alleviation and social-economic improvements. Therefore, finding ways to foster economic growth and development is essential to the sustainable development. Yet, economic growth can be achieved through various channels. Among the channels of economic growth achievement; trade, manufacturing, infrastructure development and investment is of relevance for the BRICS economies. China, for example, has been influencing international growth dynamics through the demand for raw materials as well as manufacturing exports (Morazan et al., 2012, p. 6).

However, many emerging and developing economies such as the economies of the countries of the BRICS are not reaching their potential trade and investment transactions due for instance to their dependency on the dollar and the euro. This is because the BRICS' international trade, investment and financial transactions are affected by the value of these IMF dominant currencies as well as the exchange rate volatility. The current global economic slowdown for the countries of the BRICS and other emerging economies makes it imperative for the group to go beyond the rhetoric and adopt policies that promote a more targeted multilateral approach towards trade and investment integration policies in pursuit of sustainable economic growth and development within the BRICS and developing economies. Thus, these emerging economies could benefit from a deeper regional integration with a monetary integration through the harmonization of their currencies, as this would contribute in boosting the intra-BRICS's trade and investment.

Moreover, according to the OCA theory by Mundell (1961), the existence of separate currencies in a regional economic bloc reduces the volume and welfare gains of international trade and others transactions through several channels such as the costs of currency conversion and exchange rate risk (Mundell, 1961); (Rose & Stanley, 2005). Thus, a single currency can be an indispensable tool to eliminate these problems. Furthermore, it can be noted that the monetary unions identified above, have already formed regional

integration units. Hence, the BRICS has already formed a regional integration bloc and are in the process of building up their financial integration. In addition, in less than five years of their formation, BRICS countries have established of the New Development Bank (NDB) to further the deepening of their integration. This shows the willingness and priority given to financial integration amongst these countries.

Therefore, the introduction of a monetary integration and/or a common payment transaction mechanism may not only be a way to consolidating intra-BRICS trade and investment relations, but also a way to promote more balanced multilateral trade, investment and financial integration, from which other emerging and developing economies could benefit or even integrate. Although there are mounting doubts about the economic and political feasibility of monetary integration amongst others developing and emerging economies. Yet, the BRICS has taken several steps since their formation to integrate their economic and financial systems, which is gaining significant recognition. Deeper financial integration through a currency union is believed to help eliminate risks and costs associated with exchange rate fluctuations. It then follows that this study is focusing on whether these efforts toward financial integration are valid in the sense that an optimal currency can be formed amongst the countries of the BRICS.

1.3 AIM AND OBJECTIVES OF THE RESEARCH

The aim of the study sets the intention and defines what the study intends to achieve. While the objectives of the study here, are like the tools that guide the aim. Therefore, this aim and objectives of this study lead to embark on throughout on an analysis of recent and relevant primary and secondary data sources in order to become educated with regard to the research problem.

1.3.1 Aim of the research

The purpose of this thesis is to assess whether BRICS countries form an optimum currency area. Therefore, the study examines the feasibility of

monetary convergence amongst the BRICS economies, using empirical analysis to support this initiative.

1.3.2 Objectives of the research

To achieve the purpose stated above, the study has set specific objectives. The specific objectives of this study in relation to the aim of the research include:

- To identify the structural shocks (supply, demand, monetary) within the BRICS economies.
- To assess the correlation of the shocks (symmetric/asymmetric) amongst the BRICS economies.
- To identify which of these shocks is more predominant amongst the BRICS economies.
- To provide recommendations and draw policy implications for macroeconomic stabilisation and regional coordination policies based on the findings of the study.

1.4 RATIONALE OF THE RESEARCH

Emerging and developing countries have the incentive to form monetary unions with the intention of enjoying the benefits of increased regional economic integration and avoiding the monetary domination of developed economies in the international financial system. Additionally, economic bloc such as the BRICS have been interested in fostering their financial integration for example; by reducing governmental intervention in national financial sectors, privatising banks, enhancing market capitalisation and so on. Such policies have been expected to promote growth through, inter alia, a higher mobilisation of savings or a rise in domestic and foreign investments. However, the effectiveness of such policies requires a convenient payment mechanism if not a common currency.

Interest in researching monetary unions among academics and policy makers has increased. Thus, this study contributes to empirical research and monetary integration policies concerning financial integration for emerging and

developing economies, more specifically recently formed regional economic bloc. Therefore, the rationale of this study is threefold: firstly, since the creation of the European monetary union, most empirical studies have been focused on the monetary integration of European countries. As a result, there is not enough literature analysing monetary integration outside of Europe. The regional integration literature lacks analysis on “South-South” integration as compared with “North-South” or “North-North” integration. Thereupon, the BRICS integration was chosen for this empirical investigation as its influence in developing and emerging countries is recognised and can forecast the future state of the “South-South integration. “South-South” regional integration needs to be understood as a strategy of immunisation against international monetary instabilities for developing and emerging economies.

Secondly, there is no consensus in most studies what exactly characterised an economic bloc of an optimum currency area. For instance, there is an increasing interest in empirical studies stressing the need for developing and emerging countries to adopt a common currency among various regional economic blocs. Examples of these are: Middle East and North Africa (MENA) bloc, East Africa Community (EAC) bloc, Southern African Custom Union (SACU); and in the Asian region such as the Association of Southeast Asian Nations (ASEAN), the South Asian Association for Regional Cooperation (SAARC), even geographically distant economic blocs such as the D-8 (Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey), to list just those.

Thirdly, to the best of my knowledge, this is the first empirical analysis of structural symmetry of shocks that considers the BRICS countries as being an option for an optimum currency area (OCA). The fact is that the BRICS nations are different from most. Statistically in terms of economic indicators, they differ significantly. Yet, the diversity of this group of economies is what makes them relevant. Moreover, BRICS economies have expressed their concern regarding the dependence of developing countries on the volatility of the exchange rates based on the US dollar and their need to establish a new vehicle currency to overcome competitive dollar dependence and enhance their international

transactions. In addition, BRICS economies could be a representation and future model for emerging and developing countries.

Having stated the above, it is therefore paramount before embarking on such a crucial process of forming a monetary integration, to explore the symmetry of shocks faced by these countries to determine whether the structural shocks faced by this economic bloc are symmetric so that the BRICS economies could adopt a common payment mechanism for the transactions within the bloc. Additionally, the use of such an influencing economic bloc in the international finance with recent data and econometric modelling provides up to date knowledge and recent evidence that may be beneficial to policy makers of emerging and developing economies and contribute to the recommendations for the international financial integration system and economic development. For all of those reasons presented above, this study exploring the feasibility of a common currency among the BRICS countries provides a foundation for future empirical studies. Moreover, the findings of this research may help BRICS officials and other policy makers in international finance in adopting the appropriate means for the intra-BRICS transactions and other regional economic blocs respectively.

1.5 SCOPE AND DELIMITATION OF THE RESEARCH

The scope of this thesis is limited to the empirical analysis of the feasibility of financial integration (single currency use) in an economic bloc: the BRICS economies. The optimum currency area (OCA) theory specifies various characteristics that define an OCA. This study has chosen to assess the degree of symmetry of structural shocks that affect these countries; using a multi-variate structural vector autoregression (SVAR) econometric model, instead of the usual two-variable structural vector autoregression (SVAR) model.

Furthermore, financial integration is a wide field of study that encompasses not only monetary integration but also other economic aspects such as the cost and benefit analysis of establishing a currency union; the social and the political dimensions. Subsequently, this study is not involved with the costs and benefits

analysis of establishing a single currency regime within an economic bloc, neither with the analysis of its political aspect. Therefore, the scope and delimitation of this research is in order with the aim and objectives of the study.

1.6 DATA SOURCES

The study uses thorough analysis of relevant and available sources of information in the form of books, academic journals, articles, legislation and subordinate legislation, research reports, regulations, annual reports, and the identification of theoretical criteria in the literature. The secondary data are a collection of the four variables used in the econometric model: The real global gross domestic product, the real gross domestic product, the real exchange and inflation rates of each the BRICS countries.

The secondary data set covers the annually period of 1981 to the period of 2017. This period of time is selected as it allows to collect sufficient data to conduct the modelling. The secondary data set is extracted from the main two international financial organizations notably, the World Bank and the International Monetary Fund (IMF), at the except for the Indian exchange rates data set which is extracted from the Federal Reserve Economic Data (FRED).

The reason for the variety in the source of data is that not all the variables could be obtained from one source. For instance the Indian's exchange rates are not available for the period of time chosen for the study in the those two organization. In addition, the Chinese's variables are also split between The republic of China and Taiwan in the World Bank's data set.

1.7 STRUCTURE OF THE THESIS

The structure of the study outlines and gives a description of the chapters that are included in the thesis. Thus, this thesis comprises eight chapters.

Chapter One: Introduction and background to the study.

This chapter has presented an introduction and given a theoretical background to the study. The chapter has also defined the research problem and outlined

the aim and objectives of the study. The motivation and the scope and demarcation have been defined.

The rest of the thesis is structured as follows:

Chapter Two: International monetary system and the exchange rate regimes

This presents the different global international monetary systems that rules the economic and financial world and reviews discussions on the exchange rate policies. The chapter focuses on the Gold Standard system and the Bretton Wood system. Then, this is followed by a discussion on the reform proposals of the international monetary system.

Chapter Three: BRICS integration and the New Development Bank (NDB)

This chapter provides the rationale and history of the BRICS integration. The discussion involves in the concept of the role of a development finance institution or a development bank in the process of financial integration. Particularly, the chapter discussed the establishment of the BRICS New Development Bank (NDB) as an accelerating engine in the process of the BRICS monetary integration. In addition, the chapter presents a presentation of a selective BRICS macroeconomic factors in contrast with the world's.

Chapter Four: Conceptual framework of Economic integration

Chapter Four reviews the different concepts of the economic integration. The different aspects and definitions of the concepts of the term "integration" are outlined. Additionally, the chapter presents the theory embodying the concept of economic integration. The different forms of the economic integration are presented. Then, the various international initiatives and developments in the economic integration are also discussed in the chapter.

Chapter Five: Theoretical and empirical literature review of the optimum currency area theory

Chapter Five reports the theoretical and empirical literature review on optimum currency area (OCA) theory, which is the framework of the monetary integration analysis. The chapter presents the different aspects of the monetary integration. In addition, the chapter presents a theoretical review of the theory of the optimum currency areas (OCAs) as well as the criteria that define an OCA. This review gives emphasis to the symmetry of shock criteria of the OCA theory as the aim of the study is to assess the symmetry of the structural shocks. Finally, the chapter presents an empirical literature review of the studies conducted on the OCAs.

Chapter Six: Research methodology, model specification and estimation techniques

This chapter describes the research methodology by discussing the theoretical framework of the structural vector autoregression (SVAR) modelling. It also highlights its benefits and limitations. The variables are described and the statistical and econometric estimation techniques are presented.

Chapter Seven: Results interpretation and analysis of the empirical modelling

Chapter Seven presents the analysis of the empirical modelling. This chapter reports on the results of the statistical and diagnostic tests; as well as discusses on the findings of the correlation of structural shocks of the BRICS economies.

Chapter Eight: Assessment of the main findings, conclusions, recommendation and areas of further research

This chapter provides an assessment of the main findings as well as and presents a conclusion to the study. This is followed by a presentation of the implication and recommendations for future policies based on the results analysis. Finally, the study provides suggestion on the areas for further research that may also contribute to the international Economics and finance field.

1.8 CONCLUDING REMARKS

In summary this chapter has provided an introduction and a background; the research problematic. It has given the rationale of the study the problem and underlined the objectives of the research, with the aim of the study which is to explore the potential of forming an optimum currency area amongst the BRICS through the analysis of the symmetry of shocks.

In this chapter, the study has presented a discussion that the instability of the international finance system and the global financial crisis notably, the 2007-2009 financial crisis, have made the governments of various countries aware of the impact of the leading dominant IMF currencies on their economic activities. This has given rise to increasing regional integration amongst countries and motivated several bloc economies to seek some form of single currency payment mechanism or to process in the adoption of a a currency union.

Moreover, the chapter has presented the discussion on that fact that the literature is still lacking on monetary integration in developing and emerging countries, which is also called the South-South integration. Emerging and developing countries such as the BRICS nations seek to enhance their intra-trade and investment that are affected by the volatility of their exchange rates. This makes the various countries more reluctant to reach their full capacity of trade and investment not only amongst themselves but with others countries as well. Therefore, the question of whether the BRICS have the potential to form an OCA was brought to light.

The following Figure 1.2 below provides a presentation of the structural framework of this study.

This structure framework presents the title of the thesis, the eight chapters of this thesis as well as their title respectively.

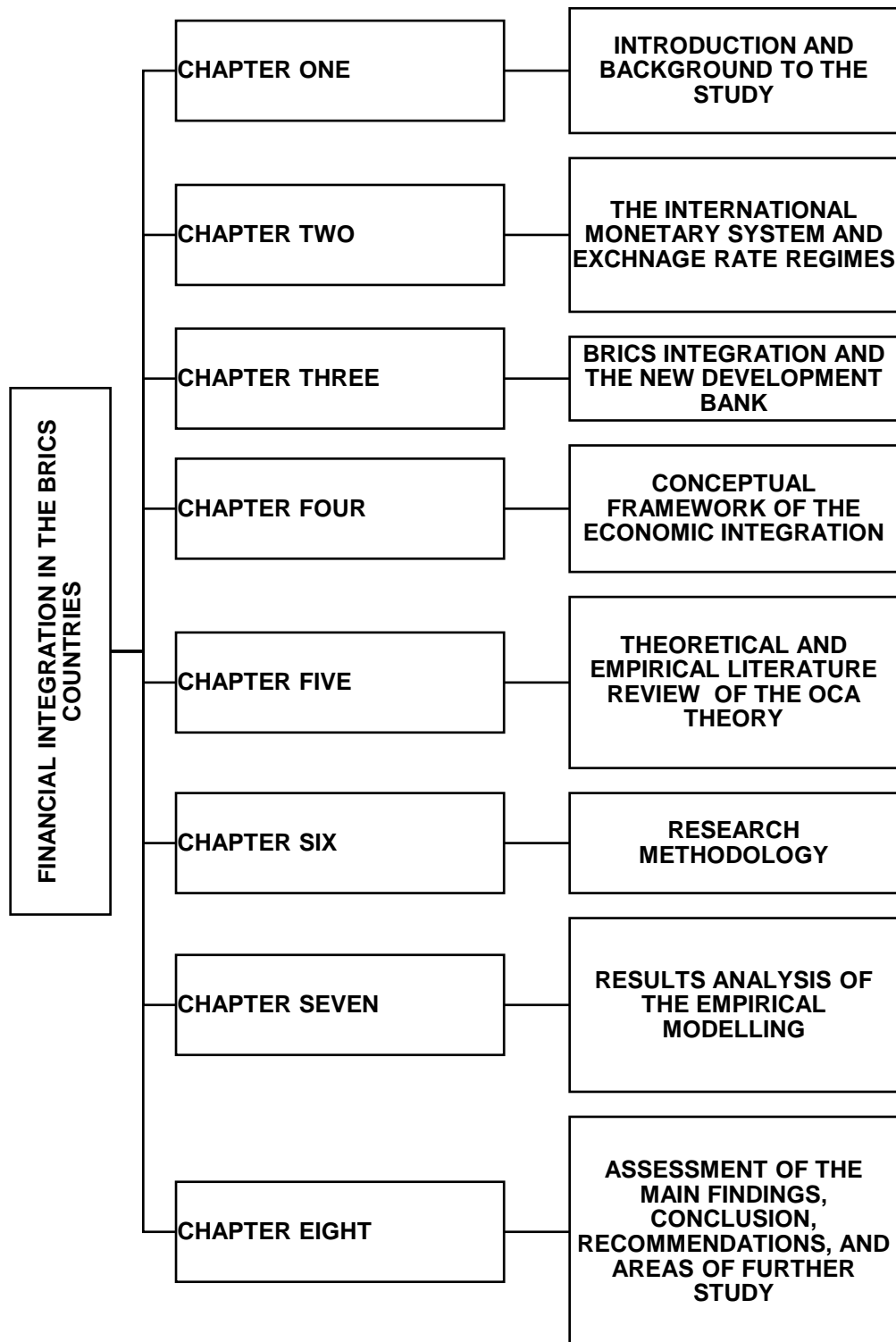


Figure 1.2. Structure of the research thesis.

Source: Author's own compilation.

CHAPTER TWO. ARCHITECTURE OF THE INTERNATIONAL MONETARY SYSTEM AND THE EXCHANGE RATE REGIMES

2.1 INTRODUCTION

The international monetary system has been in place for decades and has proved to be a source of solutions in cases of international economic and financial turbulences. However, these same crises have also come to highlight its shortcomings and weaknesses in adjusting and relieving economies after financial crises. Admittedly, as stated by Foreman-Peck (1995) and additionally Davidson (2004), there have been about hundred currency crises over the past 35 years. The recent recurrent financial crises such as the Mexico Crisis of 1994; the Asia Crisis of 1997; the 2008/2009 Global Financial Crisis; the 2010 Euro Crisis, have underlined the flaws in the adjustment mechanism of the international monetary system and has put in doubt its performance (Foreman-Peck, 1995, p. 65); (Davidson, 2004, pp. 591-592).

Furthermore, the former IMF chief economist and Economic Nobel Prize winner Joseph Stiglitz, during his interview with Lucy Komisar in June 2000, emphasised that the need to reform the two major international financial institutions. Additionally, the former chief economist pointed out that problem is not whether there will be other financial crises, but where it will be (Komisar, 2000). Hence, this indicates the need of reform of the international financial system and that financial crises are still prone to occur and that there are flaws if not failure in international economic policies and the financial institutions that enforce them, notably the International Monetary Fund and the World Bank.

The international monetary system as it is known, comprises a set of institutions formed from internationally agreed rules, conventions and supporting institutions that facilitate international trade, cross border investment and generally the reallocation of capital between nations (Reis, 1995, p. 504); (Davidson, 2004); (Subacchi, 2010, p. 669). To emphasise the importance of this institution, Eichengreen (2008, p. 1) describes the international financial system as the glue that binds all the countries together.

Nowadays, economies are facing new challenges; economic interdependence among nations has increased; and macroeconomic conditions of a country can affect those of other countries. For example: a change in the home country's real exchange rate automatically implies an opposite change in foreign real exchange rates, and, any shift in overall domestic spending is likely to change domestic demand for foreign goods, unless the country is insignificantly small. These channels of interdependence depend, in turn, on the monetary, financial, and exchange rate arrangements of the countries that adopt them (Eichengreen, 2000, pp. 1-3); (Salin, 2016, pp. 57-60). In addition, as stated by Aglietta (1990), the foundation of a free market economy lies in this monetary order (Aglietta, 1990, p. 25). Therefore, in order to understand what is happening to the world of the international financial system and its growing integration, it is worthy to consider past international monetary arrangements and understand how this international monetary system has been brought out.

That being said, the aim of this chapter is to provide provides an overview on the historical background of the international monetary system, beginning with the late 19th century when the gold standard began and continuing to present-day systems. It outlines the historical experience of the main international monetary systems. The focus here is to provide insights explicitly on the classical Gold Standard system (1880-1914), the Bretton Woods system (1946-1971), the Managed Float period (1971-1995). Insights are also provided on the process of the European union as it is the world benchmark for future monetary integration. Finally, the chapter presents a discussion on the reform of the present international financial institution arrangements, notably the international monetary fund (IMF); the World Bank (WB).

2.2 INTERNATIONAL GOLD STANDARD SYSTEM (1870–1914)

As mentioned above, in order to understand where the world financial system is going and to comprehend why there is such an expansion of international financial integration across the world, there is a need to look back to past international financial arrangements. As Melvin and Noorbin (2017) emphasises, the beginning of any conversation about the international

monetary system starts with the Gold Standard (Melvin & Norrbin, 2017, p. 26). The objective here is not to dwell on the merits and inconvenient of this international monetary system. It will be too vast and far diverse of a debate. But rather this section focuses in how the Gold Standard originated and the rules that were underpinning the Gold Standard regime, especially with regards to the operation of the transfer of capital; discuss how this regime has affected the establishment of the monetary order and lessons that can be drawn from this international monetary system.

The literature on the Gold Standard or the Classical Gold system dates as far back as 1936 (Cassell, 1936), (Cooper, 1987). Yet, this research does not intent to go as far as the establishment of the first banking system nor to discuss the politics of it. Rothschild family is known to be the first to establish a formal banking business in the 1760s. Moreover, the Baring family, who concentrated their banking business largely in Europe, was as powerful as the Rothschild family (Foreman-Peck, 1995, pp. 65-67); (Ferguson, 1998); (Ferguson, 2016). Nevertheless, the establishment of these first banking systems would not have been made possible without the exploitation of the gold. The use of gold coins as a medium of exchange, a unit of account, or a store of value defines the origin of the Gold Standard system. Gold has played these roles since ancient times far before its formal establishment as an international medium of exchange. The Gold Standard system only became an international legal institution in 1819 in Britain, the world leading economic nation at the time. Given Britain's position in international trade and the advanced development of its financial institutions, London naturally became the centre of the international monetary system built on the Gold Standard system. Thereafter, the United States of America established its monetary system based on the gold and popularised across the globe the use of the Gold Standard system. Later in the 19th century other countries such as Germany and Japan also adopted the Gold Standard system. However, the First World War (WWI) brought about reconsideration of the financial system at the time and countries were forced to abandon this international monetary system (Cassell, 1936, p. 1); (Reis, 1995, p. 511); (D'Arista, 2009, p. 636).

Officially operating as an international monetary system, the Gold Standard system lasted from 1880 to 1914. Under the international Gold Standard system, gold was the only international reserve; the exchange rates amongst countries fluctuated only within the gold weights; and the balance of payments adjustment was absorbed by the price-specie-flow mechanism (model developed by David Hume (1749) to explain how trade imbalances can be automatically adjusted under the gold standard). Under the Gold Standard system, if a deficit nation “loses” gold, it automatically experiences a reduction in money supply, thus reducing domestic prices (Foreman-Peck, 1995, p. 208); (Cassell, 1936); (Reis, 1995); (Eichengreen & Flandreau, 1997) (Mundell, 2000); (Knafo, 2006). In other words, the Gold Standard system was a fixed exchange rate system in which a country’s currency or paper money was directly linked to gold. Within the Gold Standard system, countries agreed to convert their currency into a fixed amount of gold. A country that uses the Gold Standard system was to set a fixed price for gold and buys and sells gold at that price. This was how the monetary system under the Gold Standard operated (Melvin & Norrbin, 2017, pp. 25–53).

Moreover, the Classical Gold Standard system, for most countries, held two important characteristics. Firstly, it relied upon banknotes that were convertible into gold at a fixed exchange rate. This often involved a central bank being responsible for issuing banknotes and converting them into gold at a fixed price. Secondly, the Gold Standard allowed a relatively free movement of capital. Hence, the aim of this monetary framework was the discipline of the market, as the primary targets of this system were the banks and the central banks (Knafo, 2006, p. 81). Moreover, in the Classical Gold Standard system, economic adjustments between countries were said to be “natural” and automatic; that is, they were achieved without political intervention. This view is based on David Hume’s price-specie mechanism of 1749, which states that an imbalance between countries increases or reduces their stock of gold and triggers adjustments, which re-establishes a monetary equilibrium through this view of the self-adjustment system of the Gold Standard system (Bordo, 2009, p. 25). This view is also emphasised by D’Arista (2009) who asserted that the system

of the Gold Standard was automatic and self-adjusting, though its advantages (D'Arista, 2009, pp. 635-636).

With no international legal foundation (no treaties, agreements or conference), the adoption of the Gold Standard system was a gradual process. Hence, there is no exact date when the Gold Standard system started to be implemented. Despite its short duration (1870-1914), the system of the Gold Standard came with various advantages. One of the benefits of the Gold Standard monetary system as pointed out earlier was that a fixed asset (gold) determined the value of money. The value of money was directly attached to gold, which is a valuable asset. This means that under such a system, the exchange rates between countries were fixed; if exchange rate rose above or fell below the fixed rate by more than the cost of shipping gold from one country to another, large gold inflows or outflows occurred until the rates return to the official level. Another advantage of the Gold Standard system is that because of its fixed exchange rate, it provided a self-regulating and stabilising effect on the economy. Furthermore, since all currencies were fixed against gold, therefore, they were all fixed against one another. Thus, the government could only print as much money as its country had in gold. This, then, discouraged inflation, which involves too much money purchasing too few goods (Foreman-Peck, 1995, p. 172); (Reis, 1995); (Eichengreen & Flandreau, 1997); (Knafo, 2006); (D'Arista, 2009); (Melvin & Norrbin, 2017).

Even if it was for a short term, countries enjoyed the fruits of the Gold Standard system: proponents of the Gold Standard often refer to the Gold Standard system as the "golden era"; characterized by stable prices, economic growth, international trade development. On the other hand, others suggested that all these merits do not necessary reflect the Gold Standard system nevertheless the absence of any international shocks (war) (Melvin & Norrbin, 2017, p. 27). This is why one of the main reasons of abandoning this international monetary system has been attributed to the first World War (WWI) (1914-1918). The First World War brought into light the weaknesses of the Gold Standard system.

Moreover, it was taught to believe that the Gold Standard system was an international monetary system of financial stability. However, the Gold Standard was not a system that was permanently fixed. It was possible to suspend or abandon the convertibility, and that was the case after War World Two (Aglietta, 1990, p. 38). In a study, Aglietta (1990) analyses of two countries' economies (US and United Kingdom) under the Gold Standard. It was found that long-term price variations and currency fluctuations were of importance, and short-term variations were even greater after the World War Two comparing to the Bretton-Wood system. Between 1879 and 1913, the coefficient of variation of prices in England and US were 14.9 and 17.0 respectively. According to Aglietta, price fluctuations were not the only reasons to reconsider the international monetary system. The period of the Gold Standard regime of 1879-1913 was characterised by repetitive financial crises as well (Aglietta, 1990, p. 34). Another argument brought by Aglietta (1990) is that the stability witnessed under the Gold Standard regime was external rather than internal. This means that it concerns the stability of exchange rate rather than of the purchasing power of money. Aglietta (1990) cited A. Giovannini (1988) to explain that the symmetry of the Gold Standard was of a strategic point of view. This means that the adhered countries of the Gold Standard regime optimised the objectives using the same rules of convertibility. To maximise the objective in different countries, this was the same rule for the interest rate, short-term nominal rate and foreign exchange level. With asymmetric monetary system, each country is for itself; each country is preoccupied and only handles its rate of exchange or of interest. Hence, an internal shock is entirely absorbed by the variations of the interest rate in the country. Thus, what made the Gold Standard regime a global financial condition, was the common response to shock due to the correlation in the variations of interest rates (Aglietta, 1990, p. 34).

Furthermore, other critics believe the Gold Standard system was also at the root of the depression. However, others believe that it was not the Gold Standard that caused the depression, but the irresponsible lending policies (misguided government policies) by countries under the Gold Standard system.

Nevertheless, the Gold Standard system, however, was not without problems. Whether the Gold Standard system was at the root of the great depression of 1930s or not, the Gold Standard caused the spread of the 1930s great depression since it linked nearly all the countries of the world in a network of fixed currency exchange rates. Therefore, the Gold Standard system started to be viewed as impractical; basing the monetary standard on a single commodity (gold), was bound to fail because of the instability in its supply and demand. In addition, there was never enough gold in the world to promise conversion to all currencies. Therefore, the first problem with the system was that the unequal distribution of gold deposits makes the Gold Standard more advantageous for those countries that produce gold. Another problem was that gold was a fixed supply kind of money. The supply of gold only increases as fast as new gold can be mined and refined. In addition, not all gold is used as money. Gold is a commodity that also has cosmetic and industrial uses. In the same view, it is argued that the Gold Standard provides practical constraints against the measures that central banks might otherwise use to respond to economic crises. The creation of new money reduces interest rates and thereby increases demand for new lower cost debt, raising the demand for money. The money supply would essentially be determined by the rate of gold production. When gold stocks increase more rapidly than the economy, there is inflation and the reverse is true. Inflation gives the central banks opportunity to tighten policy without inducing deflation (Romer, 1992); (Temin, 1993); (Bordo, 2009, pp. 53-56); (Fishback, 2010).

In the stream of the debate about the international Gold Standard system, although the Gold Standard brings long-run price stability, it is historically associated with high short-run price volatility. It is believed that economic recessions can be largely mitigated by increasing the money supply during economic downturns. A Gold Standard means that the money supply would be determined by the gold supply and hence monetary policy could no longer be used to stabilise the economy. Some people believe that the Gold Standard also acts as a limit on economic growth. As the productive capacity of an economy grows, then its money supply should do so as well. Because a Gold

Standard requires that money be backed in a metal (gold), then, the scarcity of the metal constrains the ability of the economy to produce more capital and grow. For instance, critics argue that the US experienced dramatic growth up until 1971 when the US went off the Gold Standard. Notably, economists used Keynes's solution to the depression to emphasise the abandonment of the Gold Standard. Throughout Keynes proved that the business cycle could be somewhat calmed down if governments could run deficit spending at certain times. Then, the Gold Standard would make that hard to recover from. Thus, there was indeed a need for a new international monetary system.

The recovery from the Great Depression was spurred largely by the abandonment of the Gold Standard and the ensuing monetary expansion. The Great Depression brought about fundamental changes in economic institutions, in macroeconomic policy, and in economic theories. As stated by Knafo (2006, p 86), "Unwittingly, this new institutional framework set out the basis of a modern international monetary system. This new monetary system, now referred to as the classical Gold Standard, profoundly changed the nature of monetary policy and the international dynamics that resulted from it". Moreover, Aglietta (1990) drew some lessons that can be taken from the Gold Standard and they are summarised as follows:

- The quality of financial integration depends crucially on the good organisation of the monetary system
- The long-term interest rates with low risk and few variations over the temps are conditions that favour the savings allocation of external countries
- The stability in long-term interest rates depend on the exchange rates, the exchange rates perform in such a way that the risqué involved in negligible (Aglietta, 1990).

Despite the fact that lessons can be drawn from this past international monetary system, the fact is politics which leads the national budget also leads long-term market conditions. The issue is that political disagreement in the main countries lead to high variations of the interest rates in the long-term and fluctuations of

exchange rates. Furthermore, with the current state of international relations, fixed exchange rate seems to only be established within the space of voluntary and common economic and monetary region.

2.3 BRETTON WOODS SYSTEM (1944-1971)

The international monetary system that followed World War II was the Bretton Woods system (1944-1971). The Bretton Woods period was divided into two sub periods: the pre-convertible phase (1946-58) and the convertible phase (1959-70) (also known as the Bretton Wood system I and II respectively). This explanation views the Bretton Woods system's two areas as a whole. As World War II (WWII) was drawing toward an end, a United States monetary and financial conference was held in Bretton Woods in 1944 led by the British economist John Maynard Keynes. From the conference, emerged two international institutions: The International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD), also known today as the World Bank (WB). In this discussion, the focus is on the IMF, as it was the key institution with regard to the functioning of the international monetary system known as the Bretton Wood system (Bordo, 1993); (Foreman-Peck, 1995, pp. 239-241); (Sau, 2015, p. 326).

The Bretton Woods system was an international monetary system of fixed but adjustable exchange rates where currencies were pegged against the dollar as America had become the new world economy. Currencies became convertible into dollars. The world held the US dollars as a reserve currency and as an international store of value and medium of exchange (Foreman-Peck, 1995, p. 294). The aim was to replace private finance for a more reliable source of lending for investment projects in developing states. This new exchange rate system could allow countries facing hardship to devalue their currencies by up to 10% against the dollar and of course to be approved by the IMF. Additionally, it was during the pre-convertibility period that the dollar emerged as the key currency of the international monetary system. At the beginning of the period, the sterling was the dominant currency in the world reserves, but, by the end of the 1950s, it was eclipsed by the dollar. Because of the undeniable size of the

role that the United States played in the world economy, its great importance in world trade, and its open and deep capital markets, the dollar emerged in the 1950s as a private international money (McKinnon 1988). Therefore, the dollar came to be used as a unit of account in invoicing imports and exports, as a medium of exchange in serving as a vehicle currency for interbank transactions, and as a store of value for private claims. Simultaneously, the dollar emerged as an official international money. Because of its role as a unit of account and a medium of exchange and its growing private acceptance, it became the dominant international store of value to be used as reserves (McKinnon, 1988, pp. 83-103); (Bordo, 1993, pp. 35, 48-50).

The Bretton Woods system was one of capital controls and was introduced to protect countries from the damaging effects of capital flight and to allow countries to pursue independent macroeconomic policies while still welcoming the flows intended for productive investment. The world experienced a growth in world trade during this system, and most economies removed most of their post-wars exchange restrictions. According to the literature, countries recovered from the wars and experienced growth without major setbacks. Authors such as Bordo (1993) maintained that the Bretton Woods regime exhibited the best overall macro performance compared with other monetary regimes. He added that the Bretton Woods period exhibited the most rapid growth of any monetary regime. Moreover, it presented the most stable inflation rate, especially during the sub convertible period as well as the lowest divergence in variability among countries and in terms of money growth (Bordo, 1993, pp. 12, 28); (Cesarano, 2006); (Subacchi, 2010, pp. 665-667); (Sau, 2015, p. 327); (Uddin, 2011, pp. 19-20); (Frieden, 2012, p. 31); (Melvin & Norrbin, 2017, pp. 31–33).

Moreover, during the convertible phase of the Bretton Woods system from 1959 to 1971, the advanced countries enjoyed exceptional macroeconomic performance. The phase had the lowest and most stable inflation rate and like the classical Gold Standard period, long-term interest rates were low, stable and exhibited a high degree of convergence. Moreover, the real growth rates were the highest and most stable of any modern regime. Although aggregate

demand and supply shocks were smaller than under the Gold Standard, the convertible phase of the Bretton Woods system was short-lived. This suggests that the reason for its brief existence was not the external environment but, like the gold exchange standard, structural flaws in the regime and the lack of a credible commitment mechanism led to its early abandon (Bordo, 1993); (Bordo & Eichengreen, 2007).

Despite this seeming success, problems emerged from the Bretton Woods system. According to economic history literature, the system of a fixed exchange rate dollar standard faced three problems: adjustment, liquidity and confidence. As the system evolved into a fixed exchange rate gold dollar standard, those key problems of the interwar system re-emerged in the form of adjustment, liquidity, and confidence. These problems dominated all discussion of the international monetary system during the convertible Bretton Woods period, particularly from the perspective of the adjustment problem. This was the asymmetric adjustment between deficit and surplus countries. The liquidity problem emerged because of the inadequate financing of the growth and trade. Bordo and Eichengreen (2007) emphasised that the key problem of the convertible Bretton Woods period was the confidence crisis with regard to the dollar. The confidence problem resulted from the shift of currencies between major centres (London, New York and later Paris). Shifts between strong reserves centres and weak reserve centres cause foreign currency imbalance. Therefore, this can affect the monetary system and is likely to create a confidence crisis on one centre, which can affect other centres (Bordo, 1993, p. 50); (Bordo, 2003); (Bordo & Eichengreen, 2007, pp. 28-30).

In addition, most of the historians and economists believe that the international monetary system that began after World War was different from the system that the architects of Bretton Woods envisioned. One reason is that the transition period from war to peace was much longer and required more effort than what was anticipated. The system that began operations after the Bretton Woods conference and the establishment of the IMF is said to be different in many major respects from what the architects intended. In addition, the key problem of the system was how to maintain confidence. Towards the end of the Bretton

Woods era, the central role of the dollar became a problem as international demand eventually forced the US to run a persistent trade deficit. Moreover, the failure of the United States to take measures to adjust to its deficit undermined the confidence in the dollar (Melvin & Norrbin, 2017, p. 34).

It can be said that there was insight regarding the dollarization system long ago. For example, the economist Keynes argued against the dollar having such a central role in the monetary system, and suggested an international currency called bancor be used instead. Moreover, the bancor was to be a fixed exchange rate with national currencies and would have been used to measure the balance of trade between nations. The International Clearing Union (ICU) would be a global bank whose objective would be the clearance of trade between nations, similar to a trade exchange with every country as a member. All international trade would be denominated in its own unit of account, the proposed bancor. Every good exported would add bancor to a country's account, every good imported would subtract them. Each nation would be incentivised to keep their bancor balance close to zero. If a nation had too high a bancor surplus, the ICU would take a percentage of that surplus and put it into the Clearing Union's Reserve Fund, which would encourage nations with a surplus to buy other nations' exports. Nations that imported more than they exported would have their currency depreciated against the bancor, encouraging other nations to buy their products, and making imports more expensive. Gold and national currency would no longer be used in international trade and no longer move between countries (Bordo, 1993, pp. 32-33; 47); (Sau, 2015, p. 326).

Nevertheless, the initial effect of the Bretton Woods agreements was positive; it gave a prompt boost to international trade and guaranteed stability. Subsequently, increasing trade also entailed the need for an increase in the quantity of dollars. Within the Bretton Woods system, monetary authorities at both national and international level managed to condition and succeeded in controlling the market through the international coordination of economic policies. The result of this was monetary stability worldwide (Sau, 2015, p. 327). However, the fruitful benefits of this international monetary system did not last.

Most argued that, it would be impossible to restore it now because of the fundamental changes that have occurred in the world economy and the role of market forces that have transformed the way the international monetary system functions. If the Bretton Woods system was mainly led and influenced by governments and the IMF, today's system is led and influenced to a much greater degree by market forces. Additionally, the current system is also fundamentally different from Bretton Woods because of the shift that has taken place in the balance of power. As stated by Subacchi (2010), the Bretton Woods system was an "expression" and a "consequence" of the USA hegemonic position in the western world after the Second World War. Since the late 1990s, the US has been losing relative weight in economic and financial matters in the face of the economic dynamism of emerging market economies, notably China (Subacchi, 2010, p. 671). Foreman-Peck (1995) maintained that the increasing unification of the world capital market was one of the contributions to the environment in which the old monetary system was no longer viable. Yet despite the critics of the Bretton Woods system, it is important to highlight that from the Bretton Woods agreement was born one of the most powerful institutions which despite its weaknesses, the economic and financial world has not yet found alternative or similar: the international monetary fund IMF (Foreman-Peck, 1995, p. 293).

Nowadays, more and more countries are looking for ways to escape the influence of the dollar in their financial markets. Even the US's response to the global financial crisis of 2008 suggested that the dollar might be superseded as the base currency (Sau, 2015). The example of the Eurozone has paved ways to investigate the single currency system for other regions. In addition, there is a growing debate on the emergence of a new international system involving an interdependency between states with generally high savings in Asia, lending and exporting to western states with generally high spending. Since 2007, the term "Bretton Woods II" has been used to call for a reform of the system: for key international financial institutions like the IMF and World Bank to be revamped to meet the demands of the current economic and financial age. The debate revolves among authors such as (Triffin, 1980); (Mikesell, 2000);

(Cameron & Chris Wallace, 2002); (Dooley, et al., 2003); (kenen, 2008); (Stein, 2011); (Eckes Jr, 2012); (Wolff, 2013); (Hall & Tavlas, 2013).

After the abandon of the Bretton Woods system, countries started to look at ways to manage their exchange rates according to their economic structure. Thus, the next section discusses what followed in term of an international monetary system after the Bretton Woods system.

2.4 PRESENT-DAY MONETARY SYSTEM

The International Monetary Fund (IMF) and the World Bank (WB) are the two international institutions created from the Bretton Woods system that remain the main international financial institutions ruling the world of economy and finance of today. Bretton Woods was the last “gold” convertible global monetary regime. After the breakdown of the Bretton Woods system, the major countries adopted a variety of different exchange rate mechanisms.

Two types of international monetary systems have existed in history, one based on convertibility, that is, on an ultimate source of liquidity not under the discretionary control of the monetary authorities, and the other, based on fiat. The former prevailed in various guises. The latter is a paper standard, where the supply of money is under the control of the monetary authorities, which is the norm today. Under a fiat money regime, nations can choose either fixed or floating rates.

2.4.1 Exchange rate regimes

Nowadays, there are almost as many currencies as there are independent countries. Nations have always interacted with each other through trade and investment. In addition, because countries use different national currencies, international trade and investment requires an exchange of currency. Today’s currencies are no longer backed by gold. Most countries use an exchange rate policy that best suit their economies that is overseen by a central bank. The central bank of a country then supplies a quantity of currency that is adequate for the country (Suranovic, 2010, p. 21). Thus, The exchange rate policies give

a country the option to adopt an exchange rate regime that is closely related to its country's monetary policy. Because changes in exchange rates have macroeconomic effects on a nation's economy, nations can adopt an exchange rate regime that suit best with the structure of their economy.

According to the official or "standard" classification published in the IMF's (2000) Annual Report on Exchange Rate Arrangements, today's prevalent exchange rate arrangements can be can be summarized into four categories: floating exchange rate which includes: "managed" and "free" floating, fixed exchange, pegged float exchange, and merging currencies. Moreover, the fixed exchange and pegged float exchange are also often identified as hard and soft exchange rate pegs respectively (International Monetary Fund, 2000); (Reinhart & Rogoff, 2002, p. 2); (Bordo, 2003); (Suranovic, 2010, p. 22); (Melvin & Norrbin, 2017, p. 40).

Figure 2.1 below presents a summary of the variety of exchange rate arrangements a nation or a group of nation may adopt; the floating rates in which the foreign exchange market determines the rates; the pegged rates where governments intervene to manage the exchange rate's value and a common currency where the nation adopts another country or group of countries' currency.

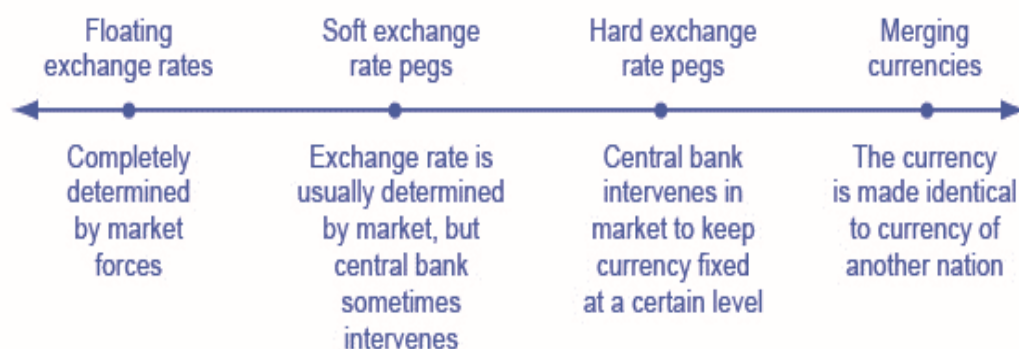


Figure 2.1. Exchange rate arrangements

Source: *Exchange Rate Policies*. Authored by: OpenStax College. Located at: <https://cnx.org/contents/vEmOH-p@4.44:cX50gTIF@3/Exchange-Rate-Policies>.

2.4.1.1 *Floating exchange rate*

A floating exchange rate policy whether it is managed or free floating ,allows the foreign exchange market forces of supply and demand for currency to determine the rates of exchange. At worst, large movements in exchange rates can drive companies into bankruptcy or trigger a nationwide banking collapse. However, movements of floating exchange rates have advantages, too. After all, prices of goods and services rise and fall throughout a market economy, as demand and supply shift. Floating exchange rates fluctuate constantly. However, proponents of floating exchange rate point out, this exchange rate system allows a central bank to focus on preventing either high inflation or deep recession, with low and reasonably steady interest rates.

2.4.1.2 *Soft peg and Hard peg*

In a peg or fixed exchange rate, a government intervenes in the foreign exchange market so that the exchange rate of its currency is different from what the market would have produced. A soft peg is the name for an exchange rate policy where the government usually allows the exchange rate to be set by the market, but in some cases, especially if the exchange rate seems to be moving rapidly in one direction, the central bank will intervene in the market. With a hard peg exchange rate policy, the central bank sets a fixed and unchanging value for the exchange rate. A central bank can implement soft peg and hard peg policies. Both a soft peg and a hard peg policy require that the central bank intervene in the foreign exchange market.

2.4.1.3 *Merged currencies*

In a merge currency policy, a nation chooses a common currency shared with one or more nations. A merged currency approach eliminates foreign exchange risk altogether. A merged currency means that a nation has given up altogether on domestic monetary policy. For examples; exchange rate movements when buying and selling between New York and California, European countries, one knows that the value of the euro will be the same in Germany and France and other European nations that have adopted the euro.

A spectrum of exchange rates policy choices, with their advantages and disadvantages, are summarized in Table 2.1 below.

Table 2.1. Trade-offs of exchange rates

Situation	Floating Exchange Rates	Soft Peg	Hard Peg	Merged Currency
Large short-run fluctuations in exchange rates?	Often a lot in the short term	Maybe less in the short run, but still large changes over time	None, unless a change in the fixed rate	None
Large long-term fluctuations in exchange rates?	Can often happen	Can often happen	Cannot happen unless hard peg changes, in which case substantial volatility can occur	Cannot happen
Power of central bank to conduct countercyclical monetary policy?	Flexible exchange rates make monetary policy stronger	Some power, although conflicts may arise between exchange rate policy and countercyclical policy	Very little; central bank must keep exchange rate fixed	None; nation does not have its own currency
Costs of holding foreign exchange reserves?	Do not need to hold reserves	Hold moderate reserves that rise and fall over time	Hold large reserves	No need to hold reserves
Risk of being stuck with an exchange rate that causes a large trade imbalance and very high inflows or outflows of financial capital?	Adjusts often	Adjusts over the medium term, if not the short term	May become stuck over time either far above or below the market level	Cannot adjust

Source: *Exchange Rate Policies*. Authored by: OpenStax College. Located at: https://cnx.org/contents/vEmOH_p@4.44:cX50gTIF@3/Exchange-Rate-Policies.

There is no consensus among economists about which exchange rate policies are best: floating, soft peg, hard peg, or merged currencies. If exchange rates

are set solely by financial markets, they fluctuate substantially as short-term portfolio investors try to anticipate tomorrow's news. If the government attempts to intervene in exchange rate markets through soft pegs or hard pegs, it gives up at least some of the power to use monetary policy to focus on domestic inflations and recessions, and it risks causing even greater fluctuations in foreign exchange markets.

Then, the choice of an exchange rate system depends both on how well a nation's central bank can implement a specific exchange rate policy and on how well a nation's firms and banks can adapt to different exchange rate policies. A national economy that does a fairly good job at achieving the four main economic goals of growth, low inflation, low unemployment, and a sustainable balance of trade will probably do just fine most of the time with any exchange rate policy; conversely, no exchange rate policy is likely to save an economy that consistently fails at achieving these goals. On the other hand, a merged currency applied across wide geographic and cultural areas carries with it its own set of problems, such as the ability for countries to conduct their own independent monetary policies (Greenlaw & Shapiro, 2017).

Moreover, in recent years, floating exchange rates have been assailed from many quarters for excessive volatility in both nominal and real exchange rates, for increasing macroeconomic instability and for raising the costs of international transactions. Despite these perceived problems, the flexible regime is able to accommodate the problems of the massive oil price shocks of the 1970s and other shocks in subsequent years without significant disruption. In addition, with the perception that pegged exchange rate arrangements amongst major countries are doomed to failure, the prospects for a significant reform of the present system at the world level seem remote (D'Arista, 2009); (Davidson, 2004). Indeed, the lessons from recent history suggest that major countries are not willing to subject their domestic policy autonomy to that of another country, whose commitment cannot be ensured in an uncertain world or to a supranational monetary authority they cannot control.

2.4.2 European monetary system (EMS)

The first benchmark that comes to mind when talking about a monetary union concept is the euro. The euro was adopted after the creation of the European monetary system (EMS). The European monetary system (EMS) was created in 1979. The aim was to help foster economic and political unity in Europe and pave the way for a future common currency, the euro, which came in to being in 1999.

After the breakdown of the Bretton Woods system, Europe moved towards creating a monetary union with pure fixed exchange rate. That reflected the desire of the members of the European Union for economic and political integration as well as their dissatisfaction with the current monetary system (Reinhart & Rogoff, 2002). Moreover, the most important part of the EMS was their exchange rate mechanism. The main objective of the European Monetary System (EMS) was to contribute to a lasting improvement of the present economic growth and employment situation of the European Community and to its economic integration, due to a greater exchange rate stability (Melvin & Norrbin, 2017, pp. 49–50); (Fратиanna & Von Hagen, 2019, pp. 11–23).

Therefore, the EMS could help achieve these objectives through exchange rate stability in two ways: a) short-term stability through ironing out excessive fluctuations; and b) longer-term stability through fostering greater convergence of the economies. This committed all member states' governments to keep their currency exchange rates within bands. This meant that no country's exchange rate could fluctuate more than 2.25% from a central point. This was designed to help create stable international trade without the fear that sudden changes in the values of currencies would dampen trade and encourage the development of trading barriers between member states. At the beginning, it created a European Currency Unit (ECU) to be used as a unit of account. Although not a real currency then, the ECU became the basis for the idea of creating a single currency. When the EMS was launched in 1979, it was not given much chance to survive. However, not only has it survived, it has expanded and prospered beyond popular dogma (Massimo & Guisepe, 1988,

pp. 303-320); (Ungerer, 1990). Thus, it is worth considering, what this experience reveals about the preconditions for maintaining pegged exchange rates.

Given the above, it can be said that arguments for the EMS were important in ensuring currency stability in the European Community at a time when international markets were very volatile. Without the European Monetary System, the completion of the single market project would have been more difficult. Yet, fixing exchange rates can be detrimental to economy because unless the correct rate is set and changed appropriately, a national economy can be forced to pursue policies that could not be better suited to domestic conditions simply in order to maintain international stability. Because, the European Monetary System was the entry point for the euro. Therefore, the introduction of the euro became easy. In addition, because the end of capital controls in 1990s had severely limited the power of central banks to fight speculative occurrences, full monetary union would end these problems. Thus, in January 1999, the European Monetary Union (EMU) started with the founding members: Belgium, France, Italy, Netherlands, Portugal, Spain, Ireland, Luxembourg, Austria, and Finland. Then, exchange rates were frozen at EMS parities, and the monetary policy transferred to European Central Bank (ECB). In January 2002, the euro coins were introduced.

The following list below in Table 2.2 displays a selection of countries with a variety of systems currently being used. The continuing existence of so much variety demonstrates that the key question, “Which is the most suitable currency system?” remains mostly unanswered (Suranovic, 2010, p. 23).

Table 2.2. Selective countries and their exchange rate system

Country/Region	Regime
Euro Area	Single currency within: floating externally
United States	Float

China	Crawling peg
Japan	Float
India	Managed float
Russia	Fixed to composite
Brazil	Float
South Korea	Float
Indonesia	Managed float
Spain	Euro zone; fixed in the European Union; float externally
South Africa	Float

Source: Suranovic, 2010, p. 22.

Table 2.2 above shows the selected set of countries followed by a currency regime. Observation here is that that currencies such as the U.S. dollar, Brazilian real, and the South African rand are independently floating, meaning that their exchange values are determined in the private market on the basis of supply and demand.

Meanwhile, India is characterized by “managed floating.” This means that the country’s central banks will sometimes allow the currency to float freely, but at other times will nudge the exchange rate in one direction or another.

Moreover, China is listed and maintaining a crawling peg, which means that the currency is essentially fixed except that the Chinese central bank is allowing its currency to appreciate slowly with respect to the U.S. dollar. In other words, the fixed rate itself is gradually but unpredictably adjusted.

Russia is listed as fixing to a composite currency. This means that instead of fixing to one other currency, such as the U.S. dollar or the euro, Russia fixes to

a basket of currencies, also called a composite currency. The most common currency basket to fix to is the Special Drawing Rights (SDR), a composite currency issued by the IMF used for central bank transactions.

Finally, the selective countries in the European Union are currently members of the euro area. Within this area, the countries have retired their own national currencies in favour of using a single currency, the euro. When all countries circulate the same currency, meaning they have fixed exchange rates among themselves because there is no need to exchange. However, with respect to other external currencies, like the U.S. dollar or the Japanese yen, the euro is allowed to float freely (Suranovic, 2010, p. 23).

2.5 PROPOSALS ON THE INTERNATIONAL MONETARY SYSTEM REFORM

Since the introduction of the European single currency monetary system, various governments have expressed the necessity to reform to the current international monetary system which it does not longer reflect the economic realities of most nations. Thus, various proposals on the monetary system reforms have been brought up.

2.5.1 Regulatory framework of the monetary system

On 16 March 2009, in connection with the G20 summit in April 2009, the Kremlin (executive branch of Russian government) called for a supranational reserve currency as part of a reform of the global financial system. It was suggested that the International Monetary Fund (IMF) should be instructed to carry out specific studies such as the diversification of the list of currencies used as reserve ones, based on agreed measures to promote the development of major regional financial centres. In this context, the Russian government stated, "...we should consider possible establishment of specific regional mechanisms which would contribute to reducing volatility of exchange rates of such reserve currencies..."

Furthermore, on 24 March 2009, Zhou Xiaochuan, President of the People's Bank of China, called for "creative reform of the existing international monetary

system towards an international reserve currency," believing it would "significantly reduce the risks of a future crisis and enhance crisis management capability." Zhou suggested that the IMF's special drawing rights (a currency basket comprising dollars, euros, renminbi, yen, and sterling) could serve as a super-sovereign reserve currency, not easily influenced by the policies of individual countries. US President Obama, however, rejected the suggestion stating, "The dollar is extraordinarily strong right now."

Additionally, on 30 March 2009, at the Second South America-Arab League Summit in Qatar, Venezuelan President Hugo Chavez proposed the creation of a Petro-currency. It would be backed by the huge oil reserves of the oil producing countries. Again, at the G8 summit in July 2009, the Russian president expressed Russia's desire for a new supranational reserve currency by showing off a coin minted with the words "unity in diversity". The coin, an example of a future world currency, emphasised his call for creating a mix of regional currencies as a way to address the global financial crisis.

Nowadays, debates involve the introduction of a supra-national reserve currency to be issued by international financial institutions. It seems appropriate to consider the role of the IMF in this process and to review the feasibility of and the need for measures to ensure the recognition of the IMF's Special Drawing Rights (SDRs) as a "supra-reserve" currency by the whole world community.

2.5.2 Proposals on a "world" currency

In March 2009, because of the global economic crisis, China and Russia compelled for a consideration of a global currency. In addition, the UN proposed to expand the SDRs. This is addressed once again the dissatisfaction of many with the current monetary system.

Mundell (2012) emphasised the failure of the flexible exchange rate system among other issues in the international monetary system and proposed that the solution lies in creating an international monetary currency that can be used by

all countries for international trade purpose. He proposed that this could be done through two steps:

Firstly, a world single currency can be created by a convergence of the major currency areas on a common unit of account, called the DEY, which stands for Dollar, Euro and Yen with a common monetary policy for the area. Then, countries could start with large margins and gradually reduce them to complete convergence.

Secondly, the Board of Governors of the IMF (or its replacement) could designate the DEY as the platform based on gold, on which it will build the new global currency to be called the INTOR. To recall, during the Bretton Woods phase, the Keynes Plan had already called for a world currency. Then, a world or global currency would consist of a hypothetical single global currency, such as the proposed the DEY. This would be produced and supported by a central bank and used for all transactions around the world, regardless of the nationality of the entities (individuals, corporations, governments, or other organisations involved in the transaction (Mundell, 2012).

As described earlier in the chapter, one of the advocates of a global currency, Keynes, argues that such a currency would not suffer from inflation, which, in extreme cases, has had disastrous effects for economies. In addition, many argue that a single global currency would make conducting international business more efficient and would encourage foreign direct investment (FDI). Furthermore, supporters often point to the euro as an example of a supranational currency successfully implemented by a union of nations with disparate languages, cultures, and economies.

A limited alternative would be a world reserve currency issued by the IMF as an evolution of the existing special drawing rights and used as reserve assets by all national and regional central banks. Another proposal of a world currency was to use conceptual currency to aid the transaction between countries. The basic idea is to utilise the balance of trade to cancel out the currency actually needed to trade. In addition to the idea of a single world currency, some evidence suggests that the world may evolve multiple global currencies that

exchange on a singular market system. Thus, the rise of digital global currencies owned by privately held companies suggest that multiple global currencies may offer wider formats for trade as they gain strength and wider acceptance. To emphasise this, a block chain offers the possibility that a decentralised system that works with little human intervention could eliminate squabbling over who would administer the world central bank (Takashi, 2006).

Rogoff (2001) is among those against the single world currency idea, who argue that a single world currency is unnecessary, because the US dollar is providing many of the benefits of a world currency while avoiding some of the costs. The opponents of single world currency argue that, because of the economically incompatible nations, nations are not able to work together closely enough to be able to produce and support a common currency. Therefore, they suggest that there has to be a high level of trust between different countries before a true world currency could be created. Moreover, they fear that a world currency might even undermine the national sovereignty of smaller states. Another problem with the single world currency in term of the recent development is wealth distribution. The interest rate set by the central bank indirectly determines the interest rate customers must pay on their bank loans. This interest rate affects the rate of interest among individuals, investments, and countries. Lending to the poor involves more risk than lending to the rich. Because of the larger differences in wealth in different areas of the world, a central bank's ability to set the interest rate to make the area prosper will be increasingly compromised, since it places wealthiest regions in conflict with the poorest regions in debt. In the future, it would not be desirable to aim for a single world currency, and from an economic point of view, it would be preferable to retain at least, say, three or four currencies (Rogoff, 2001).

However, those approving a single global currency such as Mundell (2012) argue that all the arguments for flexible exchange rates have been proved wrong. The proponents, therefore, call for an alternative world currency. However, this world currency should be made by converging major currencies of two or four big currencies of major economies group into a currency area (Mundell, 2012).

Yet, despite all the debates, such an international currency still has to come into existence. Given the above, debate on the idea of a single world currency is not new and has been discussed from Keynes's time up to today. Moreover, the proposals of a world single currency have not been entirely dismissed, even by those who have argued against the idea. Moreover, such a crucial and revolutionary idea can be considered without further integration among countries.

2.6 CONCLUDING REMARKS

This chapter has highlighted the main international monetary systems that have been known up to date. They are the Gold Standard system, the Bretton Woods Each of these systems served a specific purpose for a specific period. Nowadays, countries have a choice to adopt among a variety different exchange rate regimes.

The use of gold coins as a medium of exchange defined the origin of the Gold Standard system (1870–1914). The Gold Standard had its benefits yet also its weaknesses were underlined during the war periods. One of its advantages was that fixed assets backed the value of a country's money, which was directly attached to gold. Therefore, under this system, the exchange rate was fixed between countries and attached to the value of the gold possessed by countries. This fixed exchange rate system provided a self-regulating and stabilising effect on the economy and inflation was discouraged as governments could only supply as much money as its country needed. However, it was not long before the weaknesses of the Gold Standard were brought to light during the World Wars and various economic crises. The first problem with the Gold Standard system was the unequal distribution of gold; this system gave an advantage to the gold producer. Another problem with the Gold Standard was the system provided constraints against the measures that the central bank could use to respond to crises. Thus, although the Gold Standard brought long-run price stability, it was historically related to short-run price volatility. Some argue that the system itself was not the problem but the nations who use it. For others, the system was never without the weaknesses

and that the crises just revealed those. Thus, there was a need for a new international monetary system.

Because of its weaknesses, the Gold Standard was abandoned, and the Bretton Wood system was created after 1944 at the world leaders' conference. From the conference emerged the IMF and the World Bank. Bretton Woods system (1944- 1971) was a monetary system of a fixed but adjustable exchange rate, where currencies were pegged to the dollar which was pegged to gold. The new monetary system allowed countries to devalue their currencies against the dollar, which was approved by the IMF. The Bretton Wood system also allowed countries to pursue independent macroeconomic policies. Under this monetary system, countries relaxed most of their post-wars exchange rate restrictions, which allowed a flow of productive investment and countries could experience growth again. However, despite, this seeming success, problems emerged from the Bretton Wood system. One of the problems was that currencies were pegged against the dollar. The international demand for the dollar, eventually forced the US to run a persistent trade deficit. Thus, there was a proposition to adopt a "world" currency called the bancor. The bancor was to be a fixed exchange rate with national currencies.

Most recognised that the failure of the Bretton Wood system or part of its failure was the lack of adoption of the bancor which was the initial proposition of the Bretton Wood system. Toward the end of the Bretton Wood era, the central role of the dollar became problematic as the US ran a persistent trade deficit. The US' response to the crisis undermined confidence in the dollar. Although based on the principle of convertibility and although it became an asymmetric system, with the US rather than England as the centre country, Bretton Woods differed from the classical Gold Standard in a number of fundamental ways. Firstly, it was an arrangement mandated by an international agreement between governments, whereas the Gold Standard evolved more informally in a less centralised way. Secondly, domestic policy autonomy was encouraged even at the expense of convertibility in sharp contrast to the Gold Standard where convertibility was the key feature. Thirdly, capital movements were suppressed by controls.

The flaws of Bretton Woods reverberated those of the gold exchange standard. Adjustment was inadequate, prices were downwardly inflexible, and declining output was prevented by expansionary financial policy. According to the rules, the exchange rate could be altered but in practice rarely was because of the fear of speculative attacks, which in turn reflected market beliefs that governments would not follow the policies that were necessary to maintain convertibility. Eventually, the Bretton Wood system was demised, and from 1973, the IMF proposed a spectrum of exchange rate regime countries could adopt.

After the abandon of the Bretton Wood system, as countries were looking for alternatives monetary system of international exchange rate, a European countries created a European monetary system in 1979. Additionally, The European monetary system has a single currency euro for. This monetary integration has not only survived, despite prevalent belief, it has helped to maintain an economic and monetary stability amongst countries members. The eurozone is now the international benchmark for economic and monetary integration.

Nowadays, the lack of confidence in the U.S dollar, nations are expressing concerns and called for the emergence of a new international system involving an interdependence between nations. The IMF and the World Bank are called to be reformed to meet the demands of the current age or to look for alternative monetary system to adapt to the global economic and financial evolution, especially for emerging and developing nations.

The discussions on this chapter have showed proposals that have been made on the concept of the world currency union. This is once again to demonstrate that under certain circumstances, it would be more efficient to have a common currency.

The next chapter gives an introduction to the BRICS integration and the rationale behind it.

CHAPTER THREE. BRICS INTEGRATION AND THE NEW DEVELOPMENT BANK

3.1 INTRODUCTION

The previous chapter discussed the architecture of the international monetary system; the different international monetary systems and exchange policies used worldwide in the past as well as currently. The Bretton Wood system was led by two international monetary institutions (the World Bank and the International Monetary Fund (IMF)). The point made was that these institutions provide a source of confidence and solution for a stable international monetary system. However, with a world economic that is constantly changing, there needs of an international monetary system that is reforming as well. Yet, the process of this reform is rather slow.

In 2011, at the BRICS summit at Sanya in China, BRICS leaders have raised their concern on the need to reform the international financial system, which has to reflect the changes taking place in the world economy. In particular, there is a need for the global financial system to be more representative of the rise of emerging and developing countries.

Development finance institutions play a crucial role in the financial integration process. One of the important aspects in the process of the creation of the European monetary system after the collapsing of the Bretton Wood system, was the creation of a European financial system which later lead to the introduction of the a single currency. Accordingly, the financing of the infrastructure development and economic growth of a regional integration bloc cannot be taken care off by others, but the member partners of the regional integration. Thus, the creation of a proper mechanism of investing development, lending loans and repayment in a regional integration bloc is important. Yet, such development financing cannot be properly conduct if the members partners are still under the influence of foreign currencies such as the U.S dollar and the restrictive conditions of the IMF and the World Bank on financing the developing countries. Then, in the process pf financial integration,

there is need to create a functional development bank that would tackle the economic development and financial problems of the region.

In the previous chapter, the discussion underlined that one of the reasons of the rise regional integration, especially across the developing world is the fact the process of reform of the two international financial institutions notably the IMF and the World Bank to reflect the new economic era of emerging economies is slow. In addition, the gap of development between developed and developing countries keep widening. Therefore, the question to argue here is whether development finance institutions or development banks, notably the New Development Bank of BRICS can be an engine of its monetary integration. Amongst other actions, a BRICS New Development Bank (NDB) created in July 2015 has already aimed to mobilise resources for infrastructure and sustainable development in developing countries. In addition, the BRICS economies have also addressed their need to conduct transactions in their local currencies to boost intra-BRICS trade and investment through the Contingent Reserve Arrangement (CRA). For instance, Russia and China have already engaged in a non-dollar bilateral trade, which has been operationalised since 2012 (Pant, 2013).

This chapter provides an introduction to the BRICS integration and the rationale behind the formation of this economic bloc. Additionally, a discussion involving the role of a development finance institution in the process of financial integration with interest on the establishment of the BRICS New Development Bank (NDB) as an accelerating engine in the process of the BRICS monetary integration. Lastly, the chapter presents exchange rate regimes of BRICS economies and an evaluation of the GDP, inflation rates of these countries.

3.2 FORMATION AND RATIONALE OF THE BRICS INTEGRATION

Initially, O'Neill (2001) introduced the name BRIC to define an acronym of a group of countries made of Brazil, Russia, India and China and later joined by South Africa, the acronym became BRICS. The BRICS integration involved five countries (Brazil, Russia, India, China and South Africa) from four different continents (America, Europe, Asia and Africa). BRICS have created an

intercontinental regime whose member countries collectively and individually participate in enhancing the world economic development and growth through increasing their impact on international investment, trade and infrastructure development (O'Neill, 2001); (Ogreaan & Herciu, 2010); (Duggan, 2015).

Moreover, the five "BRICS" countries represented three billion people around 41.8% of the world's population in 2015. From 1990 to 2015, the BRICS economies moved from 5.85% of the world output to 21.6%, nearly a quarter of its economic output with a combined nominal GDP of US\$14.9 trillion, an estimated US\$4 trillion in consolidated foreign reserves and about 11% of the world's foreign direct investment (Prasad, 2012).

On another side, most international economic relations between countries, especially the developed countries are characterised by competition and reflect western dominance rather than a profound integration or coordination of the financial system. Hence, the leaders of Brazil, Russia, India, China and South Africa are using the BRICS integration as a basis for constructing, investment, financing and a shared platform for development and cooperation.

Formed in 2001, the current BRICS economic bloc, has already proved their commitment and relevance. Despite critics on the heterogeneity of their economies and differences in various economic policies, BRICS member countries still pursue clear financing objectives and maximise investment. This is achieved through growing economic and trade cooperation, collaborating on accelerating the provision of infrastructure in the developing world and increasing international economic exposure of the developing world. The BRICS economic bloc's interest can be said to amplify its voice and participation in global governance as well as showing that the members can be recognised as equal partners. The BRICS countries then can shape an evolving global financial architecture that is no longer based on hegemonic characteristics. In addition, BRICS partners also in the centre of other international regional associations in their external collaboration. For instance, China participates in the East Asia Summit (EAS), India is involved in the South Asian Association for Regional Cooperation (SAARC), Russia is in the Eurasian Economic Union (EAEU), Brazil takes part in the Union of South American

Nations (UNASUR), South Africa is in the centre of the Southern African Development Community (SADC). The Shanghai Cooperation Organization (SCO) and India-Brazil-South Africa (IBSA) are multilateral alliances. The SCO includes three of the five BRICS countries: Russia, China, India, and IBSA is an alliance of India, Brazil and South Africa (Parfinenko, 2020, pp. 427–429).

Moreover, the five “BRICS” countries are concerned about the lack of representation of emerging and developing nations in the international monetary system. Even though most of BRICS nations are developing and newly industrialised countries, with the exception of Russia, they are ahead of other developing countries in terms of large population, infrastructural developments, military influence, international economic status, exposition and engagement. The BRICS , despite the heterogeneity of its member in terms of interest, policy and culture, can commonly represent the socio-economic and political issues affecting emerging and developing countries. These differences within BRICS group and from other developing countries can be what make them a potential representation of emerging and developing countries from a global perspective (Thakur, 2014); (Toloraya & Chukov, 2016); (Cooper, 2016)

Therefore, the BRICS bloc is an institutional mechanism that is formed with specific objectives and action plans. Although just like other any powerful economic bloc, the BRICS bloc differs in substance and form (agenda) and evolve in varying structures and shapes All the above make BRICS group an important bloc to explore, as these countries go beyond the traditional western establishment of economic integration.

The BRICS countries are pursuing economic gains by integrating their economies via trade and investment flows. The rationale behind the BRICS formation is to expand their international exposure and boost economic gains. Moreover, the Infrastructure development and financing in the developing world are challenges that give a rationale for BRICS to direct its financial resources towards infrastructure supply in the developing world. Furthermore, as BRICS countries aim to improve the members’ status internationally, and to create new opportunities among themselves, therefore, forming a common currency area can enhance the process of trade, financial integration and economic

convergence among these countries. Since most of BRICS countries are developing economies that suffer from a lack of investment, then enhancing the flow of foreign direct investment into these countries could accelerate and improve the process of financing infrastructure development and economic development. Therefore, there is a need to reduce the currency risk and promote long-term investment that is consistent without risk to be constantly affected by exchange rate fluctuations (Toloraya & Chukov, 2016).

These countries have proved that they are orientated inward as well as outward in the sense that they are not just involved in trade relation. Additionally, they are also making powerful assertions about key challenges in the international financial system. These challenges range from lessening impediments to international trade agreements, security threats to environmental and climate change to the insufficiencies of existing multilateral financial institutions. As one can observe, BRICS integration may be constituted of countries with uneven economic weight, but its pointed focus on making interventions in financing infrastructure development across the developing world is a demonstration of its potential economic and financing power and willpower to contribute to the economic growth and development of the third world economies (Morazan et al., 2012, p. 10).

3.3 NEW DEVELOPMENT BANK (NDB)

With the creation of the New Development Bank (NDB), BRICS has challenged traditional ways of international development financing that usually flows from the North to the South or North to North. With the “South-South” integration, the sources of international finance flows can expand. The gap of development and funding between the developed and developing world is still wide. Yet, there are various channels that exist to bridge the current funding gap. It can be through:

- Efforts aimed at reducing or eliminating trade barriers that inhibit access to markets, impede the movement of goods and services across borders, and discourage foreign direct investment.

- Increasing official development assistance (ODA).
- Generating more revenue from domestic resource mobilization (DRM) and enhancing developments to enable an environment for private sector investment and finance.
- Or increasing foreign and domestic investment in low and middle-income countries by increasing the engagement of the development finance institutions (DFIs) and the multilateral development banks (MDBs).

The development finance channel can be used to tackle investment and development in the developing countries. One of the tool of the BRICS members is the funding of development through their development finance institution or the BRICKS development bank. If there were any doubts about the significance of BRICS to realise substantive objectives, as well as prove its commitment to emerge, the creation of the BRICS New Development Bank (NDB) should dismiss these. With, the growing importance of development finance institutions in the process of financial integration, the recently establishment of the BRICS New Development Bank (NDB), with the purpose of financing infrastructure development for emerging and developing countries, reflects the BRICS countries 'effort and willingness to commit to a deeper financial integration (Bertelsmann-Scott, Prinsloo, Sidiropoulos, Wentworth, & Wood, 2016, p. 7).

Moreover, BRICS can now provide financing to partners of the group through the Contingent Reserve Arrangement (CRA), which helps to support the countries' partners through liquidity and precautionary instruments in response to actual or potential short-term balance of payments pressures. The objective of this reserve is to provide protection against international liquidity pressures (Piper, 2015, p. 17). For instance, in 2016, BRICS New Development Bank announced their first investments. Notably, the New Development Bank's first set of loans involved financial assistance of \$811 million dollars with the new lender providing \$300 million to Brazil, \$81 million to China, \$250 million to India and \$180 million to South Africa (Dixon, 2015); (Cattaneo, Biziwick, & Fryer, 2015); (Mazenda & Ncwadi, 2016); (Toloraya & Chukov, 2016).

The following is the statement on the launch of their first loans made by Mr KV Kamath, the president of the BRICS New Development Bank:

“This is an important milestone for the Bank, and we are delighted to have met the goals and the time schedules envisioned by the leaders of the BRICS countries. With this we embark on a journey to provide speedy assistance to projects across developing nations. We are pleased that the projects deal with green and renewable energy and hope they will act as catalysts for development in our member states.”

BRICS New Development Bank President, Kundapur Vaman Kamath,
Washington, 2016.

Moreover, aligning with BRICS objectives, the NDB is not to replace or overtake any other development financial institution's function but rather work together with other international institutions including the World Bank, the International Monetary Fund (IMF), the Africa Development Bank (ADB) and the Asian Infrastructure Investment Bank (AIIB). Thus, BRICS NDB can play a vital role in elevating and contributing in filling the gap of the inadequate infrastructure and development financing distributions in the developing world (John, 2014, p. 4).

However, the New Development Bank President, Kundapur Vaman Kamath, (Washington, 2016) has also raised the concern of the influence of the USA dollar in the lending procedure and proposed to lend to each country in their own currency instead of remaining in the U.S. dollar that is dependent on fluctuating exchange rates. Therefore, among the objectives of the creation of the NDB, is the development of an intra-BRICS currency market in order to foster easy conversion of the Brazilian real, the Russian ruble, the Indian rupee, the Chinese renminbi and the South African rand (the respective currencies of the five BRICS members). On another note, this could help diversify the foreign exchange reserves (Mazenda & Ncwadi, 2016); (Shayanewako, 2018).

Because the lack of capital account convertibility of BRICS currencies is an issue. The BRICS countries have voiced their interest in internalising their national currencies. For instance, BRICS recently started using their local

currencies to trade through currencies swaps and bilateral payments arrangements. This practice can help BRICS countries to mitigate their vulnerability to the dollar exchange rate fluctuations. Furthermore, this could change the prevailing structure of external transactions and settlements in the global financial architecture (John, 2014). According to Sen (2015), such a proposal had already been introduced by the economist Keynes (1980: 42-66) in the form of a clearing account plan while addressing the reconstruction after the World War II (Sen, 2015, p. 3). In addition, Kregel (2015) pointed out that using an account clearing plan can help to alleviate some of the trade deficits problems in developing countries (Kregel, 2015).

Nevertheless, for the internationalisation of currencies to happen, one of the currencies must become an international reserve currency. This indicates the creation of a BRICS reserve currency that can help overcoming the current dependence on the dollar as the sole global reserve currency. Being positioned on par with the IMF's Special Drawing Rights (SDR) can be a welcome vision promoted by those who believe in the BRICS' ability to challenge the current financial system fundamentally. For that purpose, the Chinese currency (the renminbi) has been introduced in the world reserve in 2016. The renminbi with a weight of 11% as a new currency reserve of the IMF, presents opportunity for both developed and developing countries in term of international trade, and investment (Dixon, 2015); (IMF, 2016); (Sengupta, 2016).

Moreover, this above also shows the importance of the BRICS regional is as well political. BRICS integration is conscious of the importance of politics in international relations. As a first step, BRICS countries could open an international financial center (IFC) where capital controls are less rigid. This IFC based approach could be a better way to proceed as it allows countries to move towards capital account openness at their own pace while permitting quick market development with limited downside risk. . Hence, the path of utilising the BRICS currencies within the bloc settlements and subsequent international settlement would necessitate coordinated capital account liberalization amongst the countries members (Piper, 2015, p. 5); (Singh & Mukamba, 2015).

Therefore, giving the above, the decision to establish the NDB shows the BRICS countries' commitment to push ahead with building an institutional mechanism that will stake out financing and infrastructure development as one of their comparative advantages, given the Chinese financial blow and the massive demand in the developing world for infrastructure projects. Yet, there is still a long way to go in fleshing out its operational structure and norms. However, what became clear is that there is no intention to position the bank as a substitute for existing multilateral institutions. The BRICS leaders seem to be aware of their limited capacities and careful not to appear to be antagonising the Western countries that still have a dominance power on international financial institutions.

Besides, reducing trade barriers and eliminating the cost of transactions has become a strategic tool for development, hence the increasing regional integration. The volatility of the exchange rates among currencies is one of the main trade barriers among other issues, such as political, geographic and socio-economic constraints, to economic integration, especially for developing countries. The BRICS countries are not an exception. While, the degree of financial integration depends on many factors, currency issues are also a fundamental cornerstone. Therefore, forming a monetary union can be a catalyst to resolve the uncertainty of exchange rate volatility.

3.4 BRICS COUNTRIES AND THEIR EXCHANGE RATE REGIMES

An appropriate exchange rate mechanism is important, especially when countries are faced with economic shocks. It can play the role of self-regulating. Nevertheless, this self-adjustment role can become less effective when there are restrictions on the mobility of factors of production (labour, capital, humans) are removed; in other words, when there is no free movement of factors of production. For instance, as Kenen (1969) maintained, capital and labour can be reallocated when wages can adjust freely. Thus, the need to make exchange rate adjustments in response to economic disturbances become less effective (Kenen, 1969).

Moreover, according to Mundell (1961), the OCA is a region with internal factor mobility and external factor immobility (the determinants of an OCA are discussed in more details later in Chapter Five). Factor mobility can replace exchange rate adjustment in preventing unemployment and inflation pressure within the optimal region, with labour being the main factor in production, which in other words involves the number of workers in the labour market (Mundell, 1961, p. 664). Wage and price flexibility make it easier to overcome asymmetric shocks as flexibility in wage and price will bring a more stable common currency.

Moreover, the BRICS countries together hold 40% of the world currency reserves in USA dollars. With the increasing US national debt, the USA dollar is losing its position not only as the leading currency but also as a stable currency. This instability has been the main concern of the BRICS countries whose trade is transacted in US dollar. As explained above, some of BRICS countries notably China and Russia have already engaged in using their national currencies in trade. This strategy allows the use of local currencies in transactions and can allow countries to manage risk through diversifying their foreign reserves. In addition, according to a more optimistic view, if BRICS countries use their national currencies for transactions and the prediction of a world fast growing and leading economy is experienced, then their BRICS currencies might become the world leading currencies. Under the Bretton Woods system, currencies were fixed against the US dollar. Then after its collapse in 1973, countries, with the exception of few, followed either a mixed floating and pegged exchange rate system or one of them. Yet even though the Bretton Woods system is no longer in practice, the world currencies reserves remain constituted of the US dollar and now added the euro, pound and yen (Maradiaga, Zapata, & Pujula, 2012).

Because of different national context, and different circumstances, BRICS countries went through a process of different exchange rate systems based on their historical context, national endowments, and policy objectives. Recently, according to the IMF, the exchange rate system can be classified into three categories: the pegged exchange rate system, the limited elastic exchange rate

system and the flexible exchange rate system (Jiang, 2019). Thus, one important discussion in the literature about macroeconomic issues in emerging countries concerns which exchange rate regime is more appropriate for these countries. Countries' exchange rate regimes usually vary from a freely floating regime to a fixed exchange rate regime as it was discussed on chapter two above.

Therefore, this followings give an overview of the literature on the process of the exchange rate system of BRICS countries and compares the similarities and differences between the various exchange rate regimes.

3.4.1 Brazil

Brazil has used different economic policy strategies since 1990. From the 1990 to 1994, Brazil has implemented a crawling and pegged exchange rate regime; a mixing of fixed and floating attributes of exchange rate regimes. That resulted in a depreciated real exchange rate. Such a policy generated both a high trade balance surplus and the attraction of capital flows however at high inflation rates.

The following Table 3.1 below presents the exchange rates in function of the U.S dollar and inflation rates of Brazil for some selected years.

Table 3.1. Brazil's exchange rates and inflation rates (Selective Years)

Variables/Years	1995	2000	2005	2010	2015
Exchange rate	97.42	73.51	70.91	100	73.43
Inflation Rate	66.	7.04	6.86	5.03	9.04

Source: World Bank, 2018.

The period 1994 until 1999 was typified by the implementation of a tight monetary policy with the use of the US dollar as a nominal anchor. This helped Brazil to lower the high inflation rate experienced by the country. Yet, this resulted in exchange overvaluation that negatively affected trade and capital

inflows. This period was also marked by the global effect of the Asia crisis (1997), the Mexican crisis (1994) and the Russian crisis (1998). In 1999, the Brazilian currency crisis pushed the central bank to adopt a new economic policy characterized by the country's transition from a fixed exchange rate to a floating exchange rate system regime and an inflation targeting system. Even though Brazil showed an improvement in the 2000s, that transition resulted in volatile exchange rates (Maradiaga et al., 2012).

3.4.2 Russia

The Russian economy experienced a process of economic changes. To reduce the high inflation rate, the Russian central bank used an exchange rate pledge combined with a tight monetary policy. This resulted in poor economic performance from 1990 to 1998. Among the BRICS countries, Russia had a negative economic growth from 1990 to 2006. An international bank currency exchange rate was created after independence in 1990, determining the exchange rate to the US dollar (Maradiaga et al., 2012), (Jiang, 2019). In 1992, the exchange rate was determined by the trading market. This resulted in hyperinflation and the devaluation of the Russian currency. In 1995, the Russian government introduced the "foreign exchange corridor" system. This meant that the exchange rate was no longer completely determined by the market supply and demand exchange rate, but by the maximum and minimum range of the ruble currency against the US dollar nominal exchange rate. However, after 1998, the economy performed poorly as the result of the transition process from liberalization to market economic (Maradiaga et al., 2012).

The economy of Russia took another turn in 1998: the attempt of the government to stabilize the volatility of the exchange rate led to a currency crisis. The economic condition of Russia worsened during the 1998 Russia financial crisis. In addition, the contagious effect of the Asian currency crisis added to that poor economic performance. After the 1998 crisis, Russia administrated a floating exchange rate regime. The government had to

announce the abandonment of the target range and switched to a managed floating exchange rate system (Jiang, 2019).

The Table 3.2 (below) presents the exchange rates in function of the U.S dollar and inflation of Russia for selected years.

Table 3.2. Russia’s exchange rates and inflation rates (Selective Years)

Variables/Years	1995	2000	2005	2010	2015
Exchange rate	59.09	52.71	79.35	100	83.08
Inflation Rate	197.41	20.79	12.68	6.84	15.53

Source: World Bank, 2018.

3.4.3 India

In the late 1980s, the Indian currency experienced depreciation pressure as the current account continued to deteriorate. In 1991, the currency of India faced depreciation pressure due to the continued increase in trade deficits and external debt. India moved from the pegged exchange rate to a managed floating exchange rate regime that lasted from the Indian debt crisis of 1991 to 1993 (Maradiaga et al., 2012).

After the crisis and in order to pursue a more liberal economic policy, and the liberalization of trade and transactions of current account, the Indian government implemented an exchange rate system reflecting the supply and demand in the market. The floating exchange rate regime led to the volatility of the nominal exchange rate (Jiang, 2019).

Table 3.3 (below) presents the exchanges rates in function of the U.S dollar and inflation rates of Brazil for selective years.

Table 3.3. India's exchange rates and inflation rates (Selective Years)

Variables/Years	1995	2000	2005	2010	2015
Exchange rate	47.69	77.75	103.10	102.3	-
Inflation rate	10.21	4.00	4.24	11.99	4.90

Source: World Bank, 2018; FRED, 2018.

3.4.4 China

Among BRICS countries, China is the country that demonstrates economic transformation the most in terms of a fast-growing economy. Yet, just like the rest of BRICS countries, the China went through phases of exchange rate regimes.

In the 1970s, China implemented a fixed exchange rate regime. However, the 1980s was marked by a dual exchange rate system. Moreover, from 1994, the domestic currency, the renminbi or yuan, was fixed to the US dollar. One of the changes made by China in the early 1990s was the abolition of multiple exchange rates and the introduction of convertibility. The country was using a managing semi fixed exchange rate regime. During this period, the economy of China developed rapidly and steadily; the trade surplus expanded, applying pressure on the Chinese national currency to appreciate (Maradiaga et al., 2012), (Jiang, 2019).

From 2005, China reformed the exchange rate system regime; the country moved from the national currency yuan pegged to the US dollar to a floating exchange rate system based on the currency market supply and demand. This led to the rebirth of a process of appreciation of the national currency. Since 2015, after the reform, the Chinese exchange rate has been based on market demand and supply (Maradiaga et al., 2012), (Jiang, 2019).

Table 2.4 below presents the exchange rates in function of the U.S dollar and inflations of China for selective years.

Table 3.4. China's exchange rates and inflation rates (Selective Years)

Variables/Years	1995	2000	2005	2010	2015
Exchange rate	77.27	91.48	84.12	100	131.11
Inflation rate	10.22	4.01	4.24	11.87	4.90

Source: World Bank, 2018.

3.5.5 South Africa

The exchange rate regime in South Africa has many features over the years. This is because South Africa went through many exchange rate regimes as well, especially as its economy went through many phases from an apartheid regime dominated by the Whites to a first democratic government in 1994.

During the time of the Bretton Wood international monetary system, South Africa allowed its exchange rate to exceed a fixed marginal level in order to adjust to the imbalance in the balance of payments. The South African "pound" was fixed to the British pound. From the 1961, the South African pound was changed to South African rand. The fixed exchange rate regime was used until 1973 (Jiang, 2019).

From 1974, the government implemented a managed floating exchange rate system. This resulted in currency instability until 1979. However, the sanctions imposed by the international community, forced the central bank to introduce the dual-track exchange rate. In the 1990s, South Africa underwent various reforms, politically as well as economically. One of the reforms was the reform of the foreign market and the exchange rate; the dual exchange rate was abolished and replaced by a single exchange rate system. From then, South Africa moved toward a floating exchange rate regime led by the market factors of supply and demand (Jiang, 2019).

Table 3.5 below presents the exchange rates in function of the U.S dollar and inflation rates of South Africa for some selected years.

Table 3.5. SA's exchange rates and inflation rates (Selective Years)

Variables/Years	1995	2000	2005	2010	2015
Exchange rates	118.99	97.78	102.23	100	77.51
Inflation rates	8.68	5.33	2.06	4.06	4.50

Source: World Bank, 2018.

BRICS countries reflect similar processes in the evolution of the implementation of their different exchange rate regimes. Each country underwent changes in their exchange rate regimes, from implementing a pegged rate regime to introducing a floating exchange rate system.

As can be seen above, among the five “BRICS” countries, Brazil, India, and South Africa have been implementing a free-floating exchange rate system, while China and Russia have been implementing a system of managing floating exchange rates. As fast-growing economies in the emerging countries, it is necessary for BRICS economies to be flexible and market orientated. Moreover, with the evolution of the international financial system, the exchange rate system has changed. There is a necessity for an exchange rate regime to be closer to the market. However, due to the disparities of national conditions and historical backgrounds, BRICS countries’ motivation of an exchange rate regime has been different.

Therefore, the choice and changes of the exchange rate regime of BRICS countries are different, as they reflect their economic development at home and abroad. For instance, due to internal economic imbalances and the need to seek a more reasonable exchange rate system, both Russia and China decided to change their exchange rate regime. In India, the change of exchange rate regime was due to a domestic fiscal deficit and the need to open its capital account; Brazil was facing a serious inflation crisis, while South Africa was undergoing internal political factors. When comparing BRICS exchange rate regimes, Jiang (2019) concluded that there was no difference between the

choice of exchange rate systems and that BRICS countries follow similar processes (Jiang, 2019).

Figure 3.1 below presents the BRICS countries exchange rates from 1980 to 2015. It provides evidence that amongst the BRICS countries China has maintained a devalued currency against the US dollar since 1980. China's currency gradually strengthened against the US dollar, but not at the same rate as its BRICS counterparts.

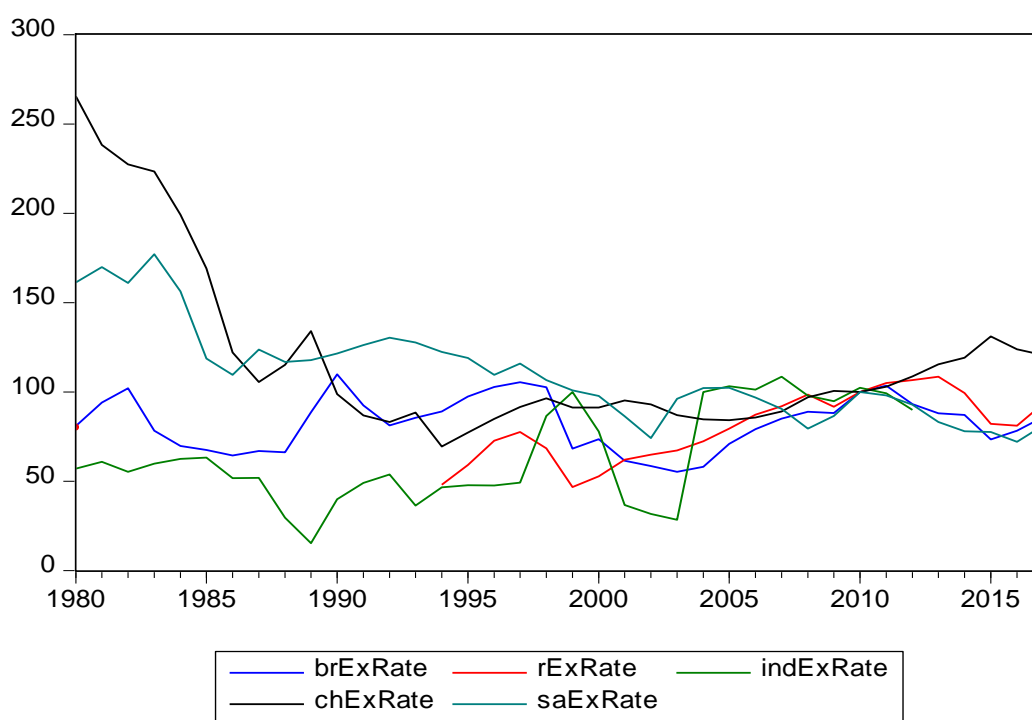


Figure 3.1. Evolution of the BRICS countries 'exchange rates (1980-2015)

Source: Author's EViews 9 result own compilation, IMF, World Bank Data (2018).

Moreover, as depicted in the Figure 3.1 above, China's currency was relatively strengthened against the dollar in comparison with South Africa during the period 1990-2000. South Africa's currency during this time was still emerging from the period of sanctions because of the apartheid regime. What is notable and interesting in the exchange rate trends depicted above is that post 2000 all BRICS currencies were somewhat gradually weakening against the USA dollar.

Using 2010 as a base year it can be noted that China was the weakest currency against the U.S dollar followed by Russia, Brazil, and South Africa respectively.

The Figure 3.2 below shows the inflation rates of BRICS countries for the same selective year as above. Once again, the year 1990 reveals hyperinflation in these countries reflecting either their economic or political condition at the time. Among the BRICS countries, Russia and Brazil managed to keep their inflation low. South Africa, India and China's inflation rate graph shows that the countries were all affected by the economic meltdown of 2008/2009.

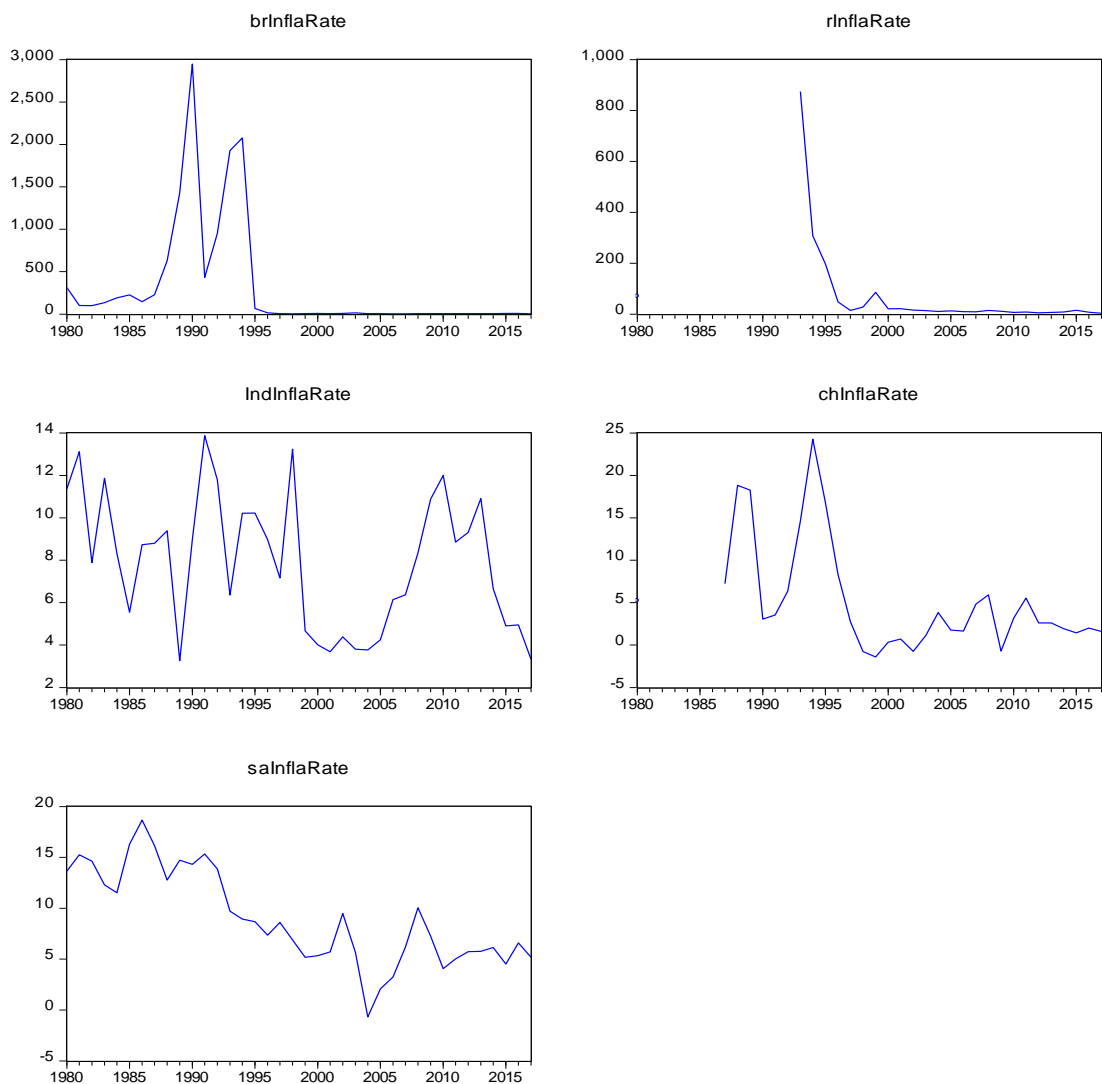


Figure 3.2. Evolution of the BRICS countries' inflation rates (1980-2015)

Source: Author's EViews 9 own compilation, IMF and World Bank Data (2018).

3.5 BRICS ECONOMIES AND THEIR GDPs

South Africa has been struggling with almost a decade of low growth compared to other BRICS economies with a significant growth rate. Russia and Brazil are currently the highest economies in term of GDP per capita values of among all BRICS countries.

Figure 3.3 below presents the evolution of the world GDP and the gross domestic product (GDP) of the BRICS countries of 1990 and 2015.

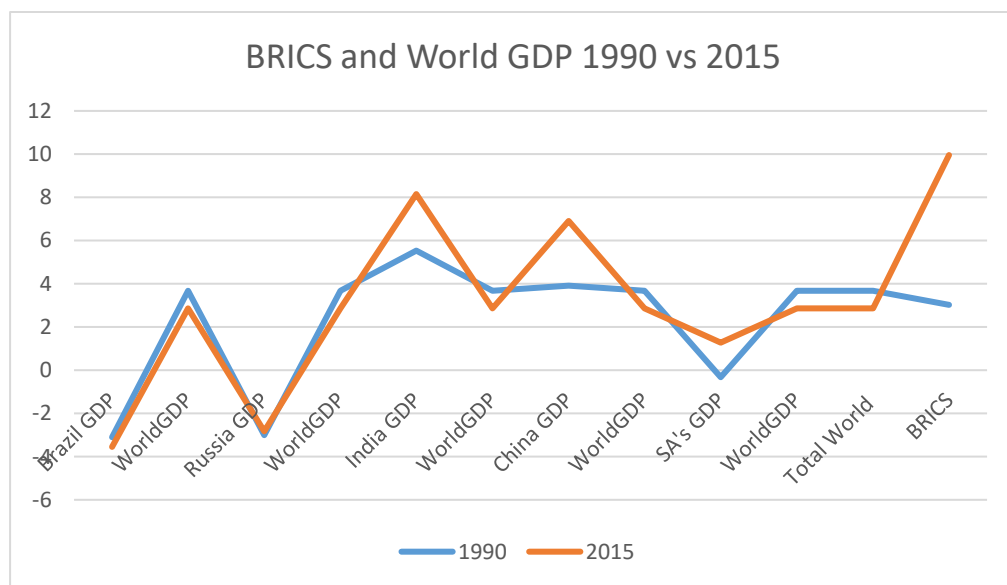


Figure 3.3. BRICS countries and world real GDP rates (1990 versus 2015)

Source: Author's own Compilation based on IMF and the World Bank data (2018).

The 1990s period shows negative real GDP rates for Brazil, Russia and South Africa. Russia and Brazil went through a financial crisis during the 1990s. The period of the 1990s displays a negative growth rate for these two countries. For South Africa, the period of the 1990s shows growth representing the country's facing international sanctions and its transition from the apartheid regime to a democratic state.

Additionally, to represent a business cycle of the growth rate of BRICS countries, the GDP rates of BRICS countries were plotted against each other

with the grey shaded areas representing the different recession periods (See Figure 3.4 below).

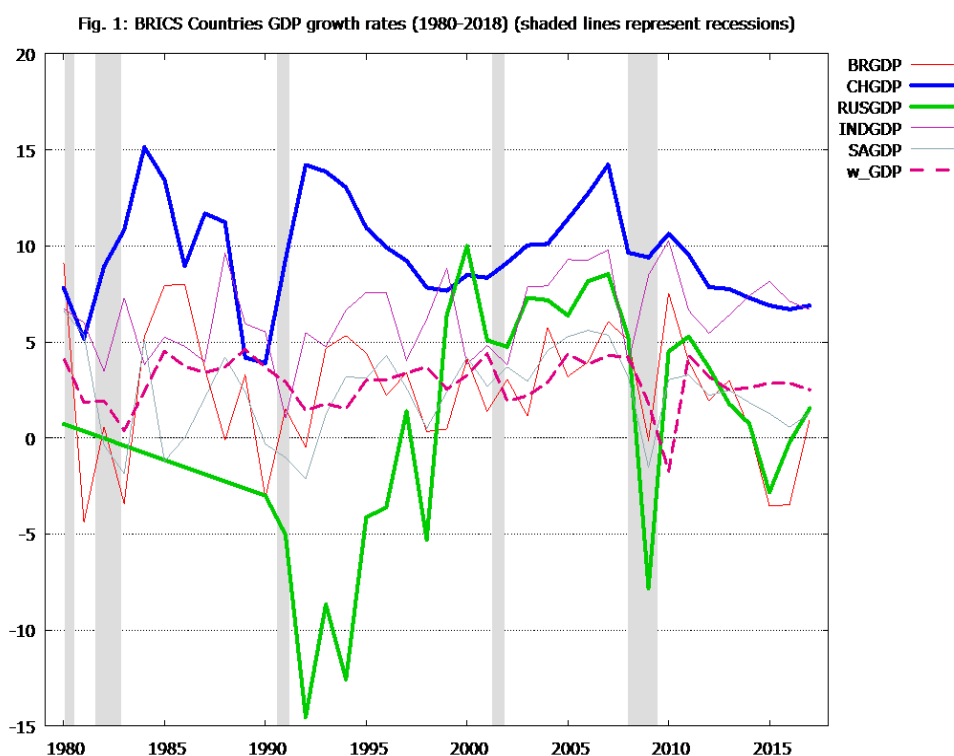


Figure 3.4. Business cycle of the BRICS GDP rates (1980-2018)

Source: EViews’ 11 author’s own computation, World Bank and IMF (2018).

The results plotted in Figure 3.3 (above) demonstrate the economic growth cycles of BRICS economies. These results show the stark differences in the sizes of the shocks in both China and Russia. Russia experienced a persistent downward trend in economic growth. This decline lasted almost a decade after the economic recession of the early 80s whilst during the same period China was experiencing a GDP growth rate of almost 10%.

The evidence shows that Russia was hardest hit by the economic meltdown of 2008, compared with its counterparts in BRICS economies. In contrast, China has been the fastest growing economy in the world since the 1980s, with an average annual growth rate of 10% from 1978 to 2005. Its GDP reached \$USD 2.225 trillion in 2005. Based on these assertions, in order to reduce asymmetric

shock in the various BRICS economies, there needs to be a concerted effort to move towards coordinated policy regimes, especially with respect to both monetary and fiscal policies.

Table 3.4 Below shows a forecast of the data for the gross national product as per capital in of a various country groups in comparison to the BRICS group (Parfinenko, 2020, pp. 429–430).

Table 3.6. Projected annual GNP rates per capital, in percentage

Country group	2008-2017	2018-2022	2030-2030
World	1.7	2.4	2.5
BRICS	5.4	4.7	4.5
USA	0.7	1.4	1.3
Europe	0.6	1.5	1.8
Other developed countries	0.8	1.2	1.4
Other emerging countries	1.1	2.8	2.8

Source: Parfinenko, 2020, p. 430.

According to the study of Parfinenko (2020), the BRICS GDP is projected to grow by 4.7% between 2018 and 2022, which is almost double the global economic growth rate. In 2023-2030, the BRICS countries, as a group, will continue to lead the world in growth in per capita income, despite the projected slowing down of growth of China and India. As Prafinenko states: “The strengthening of priority areas of bilateral economic relations between the BRICS countries, trading and investments, collaboration in economic geo-processes, ensured the establishment of the financial structure of the association, reduction of trade barriers, significant increase in trade turnover and investment flows... The schemes for further integration within the BRICS framework are defined in the sphere of the financial market, its development and integration, further expansion and deepening of foreign trade and

investments, increase in the volume of transactions in the national currency...”
(Parfinenko, 2020, p. 430).

3.6 CONCLUDING REMARKS

Reforming the international financial system will mean to accept the evidence that BRICS has becoming an crucial driver for international investment and for global growth and a political influencer. Reforming the international monetary system will mean integrating of countries such the BRICS. This integration could transform the BRICS countries' integration into a significant force influencing international economic processes in the direction of strategic orientation towards the new structure of global polycentric economic governance with reduced influence of the European Union and the United States.

The aim of this chapter was to present a discussion on the rational of the formation of the BRICS integration as well as the important role the BRICS group is playing in the global financial system. In summary, it was showed that BRICS as an economic bloc a set standard and objectives for itself. Despite pessimistic view of the success and sustainability of the BRICS, actions such the creation of the new development bank, the national currencies settlement arrangements already taken by the economic bloc shows evidence of commitment of BRICS countries to their agenda.

Thus, the chapter began by presenting discussion on the role of the DFIs in the international financial integration., notably the role of the BRICS New Development Bank was taken as the example that DFIs could be an engine to accelerate monetary union. In addition, the chapter described the different exchange rate regime that have been adopted by each of the BRICS countries over the temps. Lastly, the chapter provided data on some BRICS economies indicators as well as a forecast of the BRICS group GNP per capital as compared to other country group.

CHAPTER FOUR. CONCEPTUAL FRAMEWORK OF THE ECONOMIC INTEGRATION

4.1 INTRODUCTION

With globalisation growing, the interdependence of countries is increasing. Nations are looking for ways to increase their economic performance, tackle their unemployment issues and alleviate their poverty levels, which are still the main economic problems in the developed as well as developing countries. For instance, since the late 1980s, globalisation has increased due to increasing liberalism (free trade policy) or more precisely neoliberalism, which is characterised by free trade agreements and market integration; such as eliminating price control, deregulating the capital market, the abolition of any trade obstructions and foreign exchange market integration that notably lowers trade barriers (Gong & Kim, 2018). Samaratunga and Weerasinghe (2002: 171) emphasised that liberalisation of economic policy has lowered trade and investment barriers, which has helped, increase the flow of goods, services and factors of production (Samaratunga & Weerasinghe, 2002, p. 171).

Furthermore, the neo-liberalism led to a fundamental shift in policies thinking by emphasising the necessity of free competition, as this was seen to ensure the most efficient allocation of productive resources. This led to an extension of free trade and extensive privatisation of economic activity with the reduction of government intervention, tight budget discipline and lessened regulatory controls. In other words, trade deregulation became the dominant ideology in international economics and trade (Summer, 2000, p. 1); (Kali & Reyes, 2007, p. 595).

This chapter provides an in-depth overview of the theoretical concepts underpinning the regional economic integration. Previously, Chapter Four provides a review on the development of the BRICS financial integration. Before, in the preceding chapters, it was seen that the financial crises, notably, the 2008-2009 financial crisis have highlighted the shortcomings of the Bretton Woods international monetary institutions in helping countries efficiently adjust

during and after the crises. In addition, leaders have already addressed the biasness of these two Bretton Woods institutions (IMF and World Bank) to adopt policies that tend to favour the countries of the West and their lack of proper reform to adjust to and reflect the current international evolution that is taking place by the emerging countries. Subsequently, countries are now looking for ways to channel these financial impediments imposed the IMF and the World Bank. One of the channels employed by countries as their development strategy has been economic integration, which is the focus point to discuss in this chapter.

Moreover, proponents of economic integration point out the reduction of the level of poverty in countries that adopted it, such as China, India, Brazil, Tanzania, South Africa, countries in Latin America and Europe. Economic integration is considered a key process for future world economic development (Biswaro, 2012, p. xxiii). These objectives and ways of thinking have solidified to form the ideological cornerstone of the key bodies of the Bretton Woods Institutions within the Washington Consensus, which has highlighted the birth of the international financial system and the spread of the open market economy.

Economic integration describes a partnership agreement amongst a group of countries to adopt a set of policies that aim at reducing or eliminating trade barriers, and at coordinating monetary and fiscal policies (Balassa, 1961); (Balassa, 1973); (Balassa, 1976). Economic integration is viewed as one of the means to increase a nation's welfare while deepening its economic and political relationships with other nations. Thus, this positive view of economic integration has made policy makers describing to the use economic integration as a means of securing access to a wider market and of reinforcing growth in order to attain a higher level of national welfare and deep multilateral relations.

Nevertheless, the degree of success of integration varies between regions and nations. Despite the importance of international economic integration, which is globally recognized, economic integration among countries seems to remain still at the surface level (not as deep as it should be) and its process remains

slow. The largest economic integration groups have been among the developed countries so far, in particular the European Union (EU) (Machlup, 1977); (Jovanovic, 2006, p. 5); (Koskenkyla, 2004).

Even though the literature on economic integration is wide, it is mostly trade-related, and trade integration although important is only one of the various aspects of the economic integration.

This chapter reviews the concept of the economic integration. The different aspects and definitions of the concepts of the term “integration” are presented. Thereafter, the chapter provides an overview on the theory of economic integration. The different forms of the economic integration are presented. Then, the various international initiatives and developments in the economic integration are also discussed.

4.2 DEFINING THE TERM “INTEGRATION”

One source of ambiguity when defining the concept of economic integration is to distinguish between the various meanings of the term “integration”. The term “integration” is used in numerous fields of studies. The term “integration” generally was used to refer to the fusion of business or industries. In Economics, the term “integration”, often referred to as regional integration or economic integration or regional economic integration, is far vast and encompassed many elements such as: social integration, international cooperation, trade agreements, multilateral relations, political, and monetary integration. The term “integration” was first presented by Viner (1950), Tinbergen (1954) and Balassa (1961) to define the concept of economic integration and international relations (Viner, 1950), (Tinbergen, 1954) and (Balassa, 1961).

Viner (1950) officially used the term “economic integration” to define a combination of previously separated states into a larger entity (Viner, 1950). Tinbergen (1954) went further and defined economic “integration” as the creation of a structure of international economics removing artificial obstructions to “optimal” operation and introducing elements of co-ordination

and unification. In addition, according to Tinbergen (1954), the term “economic integration” encompassed a positive and a negative aspect attached to it. The term “negative integration” refers to the removal of discriminatory and restrictive institutions to introduce freedom of economic transactions. In contrast, the term “positive integration” defines adjustments or modifications in order to harmonise and coordinate existing instruments and to create new policies and institutions endowed with coercive powers (Tinbergen, 1954, p. 122).

Nevertheless, it is Balassa (1961) that has been considered as the founder of economic integration literature. Balassa was actually the one who incorporated the term “economic integration” in the literature of international Economics and revived the literature on economic integration. Balassa (1961, p. 1) pointed out that, while defining economic integration, one must take note to distinguish between the term “integration” and the term “co-operation”. The former includes actions at reducing the barriers to international trade. Here, Balassa (1961) defines the term “economic integration” as a state of affairs and/or a process comprising measures that involve the suppression of some forms of the trade barriers. To clarify the distinction, for example, the General Agreements on Tariffs and Trade (GATT) is a form of co-operation whereas the actual removal of the trade barriers is an act of economic integration (Balassa, 1961, p. 1). To emphasise this view, Drysdale and Garnaut (1993, p. 186) looked at the term “integration” as a process towards one single price for goods, services and factors of production (Drysdale & Garnaut, 1993).

Thus, in the concept of the international Economics, if one wants to incorporate the term “integration”, then one needs to refer also to policies and mechanisms that make that process to happen (Dunning & Robson, 1987). In addition, Pinder (1969: 143-145) defined the term “integration” as a process towards unification (Pinder, 1969). Moreover, another important aspect of the term “integration” is that it involves a voluntary and a consensual act or process of economic cohesion (Biswaro, 2012).

As can be seen, the term “integration” embraces various different aspects. To narrow down the general term of “integration” to focus on its international

Economics' facet, Balassa (1961) has brought up a formal definition of the term "integration " to be differentiate to the term "co-operation". However, this has not made any easy to define the concept of economic integration today. The Economic integration is not an easy topic to approach as it involves numerous facets, especially when it comes down to the theories underpinning the concept of economic integration. Yet, putting the term "economic" to the term "integration" has given a direction to approach in the literature of Economics. Hence, this is why it was necessary to grasp the concept of the term "integration" itself from the perspective of the Economics' literature as discussed above in order to comprehend the concept of economic integration.

4.3 CONCEPTS OF ECONOMIC INTEGRATION

This section reviews the literature on the various the concept of the economic integration. Therefore, the definitions of economic integration found in economic integration literature have been divided into the following categories discussed below.

4.3.1 Economic integration as a trade integration

The foundation of economic integration is said to be trade efficiency. Here economic integration is defined as a trade union between previously separated states to form a larger entity to abolish trade barriers among members of the union. This aspect of economic integration is characterised by the removal of tariffs and non-tariffs barriers to trade in order to allow free movement of goods and services as well as free mobility of the factors of production such as capital and labour among member states (Balassa, 1961).

To emphasise this point, Margarita (1976: 33) describes economic integration as a process of developing deep and stable relationships based on the division of labour between national economies (Margarita, 1976). In addition, El-Agraa (1988) refers to "international" economic integration as the discriminatory removal of all trade obstructions between participating nations and the establishment of certain elements of coordination between them (El-Agraa, 1988). Moreover, Bolanas (2016) stated that economic integration consists of

the reduction or the removal of the trade barriers between partners. Thus, economic integration primarily seeks to liberalise trade exchanges between partners in order to improve the overall efficiency and/or to develop the economies of the partner countries (Bolanas, 2016, p. 4).

In the same view as above, Dunning and Robson (1987: 1) noted that economic integration is concerned with the efficient use of resources. In their paper, Dunning and Robson (1987) defined economic integration as the freedom of movement of goods and factors of production and an absence of discrimination. (Dunning & Robson, 1987). Yet, freedom of movement for factors is not allowed for in some types of international economic integration, hence this definition cannot also be applied to all economic integration arrangements. Moreover, Pinder (1969, p. 143-145) defined economic integration as the removal of discrimination between the economic factors of the partners, as well as the creation and implementation of common policies (Pinder, 1969). Equally, Allen (1963: 450) also stressed this point in his review of Balassa's work (1961) by emphasising that the elimination of barriers to trade among countries members is the basis of any economic integration (Allen, 1963).

Additionally, Machlup (1977, p. 10) emphasised that trade is the essence of the economic integration (Machlup, 1977). Likewise, Pelkmans (1980) defined economic integration as the elimination of economic frontiers between two or more nations; the term an "economic frontier" here, means a demarcation line across which the mobility of goods, services and factors is relatively low. The potential mobility of certain factors of production here is the criterion for economic integration (Pelkmans, 1980). Marer and Montias (1988, p. 156) pointed out that economic integration has traditionally been equated with the division of labour in a geographical region (the regionalism aspect of economic integration is discussed later on this chapter) (Marer & Montias, 1988).

According to the World Trade Organisation (WTO), there are about four hundred and twenty regional trade agreements around the world. The World Trade Organisation (WTO) and its forerunners have also contributed to the development of international trade integration. Thus, the World Trade

Organisation (WTO) has set a benchmark for trade agreements around the world (Mbaku, 1995); (Koskenkyla, 2004, p. 16). The most significant free trade organisations include the European Free Trade, the Mercosur, the North American Free Trade Agreement, the Association of Southeast Asian Nations (ASEAN), the Common Market of Eastern and Southern Africa (COMESA), the Pacific Alliance and the recent African Continental Free Trade Area (AfCFTA); formed in May 2019.

As can be seen, agreements aimed at the removal of trade obstacles have subsequently emerged as the core of economic integration. The international free trade of capital movements is seen as a tool for boosting economic efficiency and growth. International organisations have also played an important role in promoting ideas, principles and agreements relating to common market economy and free trade. Thus, the definition of economic integration here concerns the removal of trade barriers among a group of countries in order to facilitate the mobility of goods and services, capital and labour (factors of production). This aspect of trade integration is also referred as the factor economic integration (Tinbergen, 1954); (Balassa, 1961); (El-Agraa, 1988); (Jovanovic, 2006); (Kone, 2012); (Hosney, 2013); (Baier, et al., 2014).

Given the above, it is still not made clear what minimum level of removal of barriers to trade would justify speaking of economic integration. Ultimately, the early literature on international economic integration centred principally on free trade areas. Thus, it was more common to refer to economic integration as trade integration and subdivide countries into trade areas or blocs. A trade area refers to a group of countries coming into an agreement to reduce or to eliminate trade barriers among member countries. This usually covers a preferential trading area, a free trade area, and a single market (the forms of economic integration that are discussed later in the chapter). Recently, economic integration has been assumed to consist of the internationalisation of markets for capital, labour, technology and entrepreneurship, financial system in addition to markets for goods and services. Thus, the concept of economic integration goes beyond just a trade union.

4.3.2 Economic integration as a policy integration

Any efficient economic integration process requires appropriate policies such as micro and macroeconomic policies, policies involving the mechanism and harmonisation of the system of international transaction within the group integrated. According to Balassa (1961), policy issues are also an incorporated aspect of the economic integration (Balassa, 1961). Therefore, macroeconomic convergence here can ensure the maximisation of economic integration through the integration, expansion of markets, and regulation of the development financial institutions. As a result, this can lead to the deepening of economic integration; for example, the harmonisation of the monetary, and fiscal policies within the integrated group would represent the highest form of economic integration (Madyo, 2008); (Benin, 2019).

Furthermore, El-Agraa (1988, p. xiii) added that international economic integration defines an act of agreement between two or more nations to pursue common goals and policies (El-Agraa, 1988). Thus, economic integration here refers to the harmonisation of macroeconomic policies (the fiscal and or monetary policies) within a combined group of economies in order to enhance international transactions, trade, and investment. Therefore, the countries that are members of the union can have common policies to eliminate transaction obstructions on the mobility of goods, services, the factors of production. In addition, members of the union can adopt a common system of payment policy through a monetary union to enhance economic integration between the member countries (Coleman, 1999, p. 27).

Moreover, Mbaku (1995, p. 152) emphasised that in a deeper economic integration, fiscal and monetary policies are harmonised. Economic integration as a policy integration can involve in a unification of macroeconomic policies of the member nations (Mbaku, 1995). In addition, in their reviewed work, Triffin and Diebold (1954, p. 529-530) emphasised that the success of an economic integration is measured by its success in lowering trade and currency barriers in general, not only among the members of the area but also with countries outside the area. They added that the complete abolition of trade barriers

among independent countries would be inconceivable today without simultaneous agreements on the coordination of other phases of their economic policies. Therefore, economic integration here is defined as a unification of macroeconomic policies (Triffin & Diebold, 1954).

As can be seen, apart from trade, a macroeconomic policies unification is also a significant aspect of the economic integration. In addition, macroeconomic policies harmonisation is considered also to be linked with the level of per capital income, productivity growth, capital accumulation and economic growth. Just as economic integration has the capacity to promote economic growth, it also has the potential to accelerate financial integration and financial market development (Ehigiamusoe & Lean, 2018).

4.3.3 Economic integration as a “regional” integration

As stated by Ogbeidi (2011) one can get the perception that the study of regional integration is synonymous with the study of regional co-operation, regional organisation, regionalization, and regionalism. Because in most literature of economic integration tends to englobe the terms regionalism, regionalisation, regional integration and economic integration into the same concept and uses then interchangeably (Robson, 1998, p. 1); (Suarez, 2009); (Ogbeidi, 2011); (Kone, 2012, p. 393); (Bolanias, 2016, p. 3); (Bolanias, 2016, p. 3).

Thus, another source of ambiguities in approaching the concept of economic integration is the term “region” with specific reference to regionalism, regionalisation. Generally, a region refers to the subdivision of nations to a geographically specifically determined area. Thus a regional integration concept can be understood at two levels: sub-national or supranational.

Regional integration can be organized either via the internationalization of institutional structures, an geopolitical decision-makings, or a combination of both. Region (geographic allocation) plays a vital role in economic integration. In fact, when looking at the literature on economic integration, the concepts of regional integration or regional economic integration, regionalism,

regionalisation and economic integration are often used interchangeably. Indeed, in the literature, most authors have made a habit not to distinguish between these concepts. As a result, this has often lead to a restricted definition of the concept of economic integration.

In another side, regionalisation involves the division of a large area into smaller segments. Whereas regionalism refers to the combination and unification of groups of institutions into a larger entity within a geographic area (Kenen & Meada, 2007). Therefore, the term “regionalism is related to regional integration as the foundation of a regional integration is that it is geographically defined. This definition goes hand in hand with Pelkmans’ (1980) argument that there were three dimensions of economic integration: economic, political, and regional (physical) dimension. Pelkmans (1980) went as far as to argue that regional integration could not exist if countries are not geographically interconnected (Pelkmans, 1980). Similarly, Robson (2002) also equated economic integration to regionalism but argued that regionalism has gained new meaning from the mid-1980s. Yet, Robson (2002) added that regional integration differs from economic integration because the former is based on the concept of proximity, unlike the latter encompasses the international term. Therefore, Robson defines regional integration as a regional exchange among national economies situated in the same region or same part of the world. Furthermore, he added that geographic proximity remains one of the main determinant factors of the regionalism (Robson, 2002).

Thus, the an economic integration, regional integration can be defined as an association of neighbouring or geographically closed states that enter into trade agreements or wish to trade more freely with each other. Furthermore, the literature shows that regional integration is also concerned with the removal or suppression of trade barriers among members of the union countries. Therefore, regional integration is often referred to as regional trade integration. Simply put, regional integration is also the assembly of individual states within the same geographic area region into a larger whole to remove trade barriers among the members.

Given the above, one can say regional integration or regionalism has the same features as the trade integration” stated above, except for the fact that it necessarily need to be geographically defined in the same region. Nevertheless, today, the concept of economic integration goes beyond a geographically defined area. An economic integration can also has other implications, which do not require member countries to be from the same region or neighbouring area. Examples of the establishment of trade integration not geographically linked include the South Africa-EU trade, the ACP (Africa, Caribbean, and Pacific) economic partnership agreement, the D-8 trading group.

Moreover, the literature on economic integration shows that the terms regionalism, regional economic integration and regional trade agreements tend to refer to the concept of regional economic integration or to economic integration and are often used interchangeably. This is because economic integration excludes regional integration, regionalism and trade liberalisation. Indeed, in almost all of the economic integration initiatives have been of regional type since the end of the Second World War (Greenspan, 2001).

In addition, Biswaro (2012: 13) observed that the terms “economic integration” and “regional economic integration” or “international economic integration” are used interchangeably. Notably, in other fields, such as law, sociology or politics, the “economic” term focus tends to be excluded. Therefore, economic integration tends to refer to the term such as “regional integration” or “international integration” or “trade integration”. For Biswaro (2012), all these distinctions are no longer decisive due to the ability of the concept of economic integration to include all the elements listed above (Biswaro, 2012).

From the definitions above and for clarity in this study, regionalism or regional integration or regional trade agreements refer to the same concept with geographic proximity being the main determinant factor here. Regional economic integration, economic integration and international economic integration are equated as stated above because economic integration englobes issues beyond those that are just trade related (Greenspan, 2001). In

addition, most of the literature focused on regional economic integration because as shown above, most economic integration arrangements are of the regional trade type of economic integration. It can be said that, even though part of international economic and regional economic integration is initiated by countries, international economic integration is forced to occur due to the world's continually changing economic environment and formation of international links.

4.3.4 Economic integration as a political integration

In its report, the World Bank (2000) argued that the purpose of any integration is often political, and that the economic consequences of an integration (good or bad) are the side effects of a political decision (World Bank, 2000, p. 11).

As already stated above, Pelkmans (1980) stated that there were three dimensions to an integration; including a political dimension (Pelkmans, 1980). In addition, Bolanas (2016) observed that there are two evident dimensions of integration, the political one and the economic one: Political integration in its international dimension consists of transferring the exclusive rights of state-nations to a broader unified political entity. Thus, integration, here, aims to build political entities that are more effective, while an economic dimension refers to all discussed above so far (Bolanas, 2016, p. 4). In other words, there cannot be an economic integration without an political initiation and implication.

However, Samaratinga and Weerasinghe (2002, p. 169) noted that both economic integration and political integration, even though they are similar because of the proximity of the terms, have different objective and mechanism. Political integration looks at the political implications of the economic integration process. It is determined by the institutional impacts of the integration. Yet, an economic integration cannot be done without a political initiation and decision. For its proper performance, any economic integration needs a total or a partial transfer of sovereignty (exclusive rights of state-nations) to a community institution; a wider political economic entity. Secondly, political integration can also be a final phase to reach a full and complete economic integration (Samaratinga & Weerasinghe, 2002).

Sapir (2011) emphasised that an economic integration often leads to a political integration, not the other way around. If it is based on the fact that any economic integration process start with political initiative, it cannot be true. Yet, for Sapir (2011), a political integration is a necessary step prior to an economic integration. Nevertheless, political and economic integration can be interdependent (Sapir, 2011).

In the other hand, Biswano (2012: 25) maintained that, according to the realist view, economic integration is first a political phenomenon pursued by countries for various economic reasons. Biswano (2012) stipulated that a successful process of economic integration needs to be led by political entities that are willing to use their influence to promote the economic integration process (Biswano, 2012). In the similar view, Hosney (2013: 146) emphasised that political officials are the ones who eventually sign economic integration agreements. Therefore, political motives and incentives are vital determinants of the conclusion of any economic integration agreements (Hosney, 2013). To emphasise the importance of the politics in economic integration further, Hosney (2013) quotes the following from Allen (1963: 450):

".... It is not really possible to separate the economic from the political elements of integration. Economic losses and gains from integration are in some cases systematically related to political factors..."

Quoted from (Allen, 1963).

To summarise, it has to be noted that the concepts of economic integration discussed above reveal that economic integration is a complex notion, which should be defined and approached with caution. There are numerous definitions of the term "integration" as well and It is a word used in many fields other than economics. It is important to conceptualise the term "integration" to narrow down the meaning. In this study, the term "integration" is part of the concept of economics, finance, development and international relations. Further, definitions of economic integration are often vague or too restricted and do not offer adequate tools for an easy comprehension of the process among countries within the same region or outside. However, there is consensus that

the most general definition of economic integration can be summed up as a free voluntary process that involves (a) measures to combine a group of nations to form a larger entity of economic, (b) regional trade unification, (c) elimination of trade barriers such as tariffs and non-tariffs trade, (d) policy harmonisation, and (e) monetary and/or political unification. In other words, economic integration is generally viewed as a process and a means by which a group of countries strives to increase its level of welfare and its relation not only with one another, but as well with countries outside the union. Nevertheless, in spite of this general agreement, there is still an unresolved question about what is to be integrated. Is it to be citizens, markets, production, consumption, commodities, services, regions, factors, money, resources; one at a time or altogether, or just some of these components?

The different aspects of economic integration defined above give rise to what Balassa (1961) summarises as the forms of economic integration. The next section discusses the different forms of economic integration. Each of these forms distinguishes what exactly features are involved at each form of economic integration.

4.4 FORMS OF ECONOMIC INTEGRATION

Balassa (1961)'s book is widely cited in various books, articles, or papers discussing about the economic integration whether it is theoretical or empirical studies related to economic integration. His book "The Theory of Economic Integration" can be considered as the cornerstone of all posterior studies conducted on economic integration (Sapir, 2011). From its release in 1961, Balassa's "The Theory of Economic Integration" has been listed by many such as (Machlup, 1977); (Baldwin & Anthony, J. Venables, 1995); (Panagariya, 2000); (Triffin & Diebold, 1954); (Robson, 2002); (Robson, 1998); (Samaratunga & Weerasinghe, 2002); (Kone, 2012); (Hosney, 2013); (Ogbeidi, 2011); (Sapir, 2011).

The following literature has identified and listed the same forms of economic integration as Balassa (1961; 1976): (Biswaro, 2012); (Kone, 2012, p. 396);

(Hosney, 2013, p. 133); (Jovanovic, 2006, pp. 10-11); (Bhagwati & Panagariya, 1996); (Allen, 1963); (Baier, et al., 2014); (Bolanos, 2016); (Coleman, 1999); (Panagariva, 2000); (Panagariya, 1999); (Pelkmans, 1980); (Robson, 2002); and (Samaratunga & Weerasinghe, 2002).

Similarly, as Hosney (2013) also identified four stages involved in the process of economic integration: customs union (CU), free trade areas (FTA), the common market (CM) and the economic union (EU). In another hand authors such as (Bolanos, 2016), distinguished five stages or forms of economic integration, he added a fifth form which is a monetary and political (complete union). Hence, in his book, he stated there are two extremes degrees of economic integration: a customs union (CU) at one extreme; corresponding to the lower or basic degree of economic integration and a monetary union (MU); corresponding to the highest degree of economic integration with harmonisation or co-ordination of policies (Bolanos, 2016).

Another point identified by the study is that there is no consensus about the exact number of forms or stages involved in economic integration. Some authors group the forms or stages into three, others grouped them into four or even five. For instance, authors such as Panagariva (2000) combined the FTA and the CU into one form of economic integration. Additionally, Panagariva (1999, p. 456; 2000, p. 288) argues that the term PTA, standing for preferential trade area or preferential trade arrangement, describes what is the custom union (CU), the free trade area (FTA), and any partial trade arrangement. In other words, that means that in preferential trade area arrangements, one finds the principles of customs union and free trade area and PTAs you find FTAs and CUs. He defined PTAs as the partial trade arrangements between two or more countries that entail lowering but not eliminating tariff barriers among participating nations rather than with non-member nations. It involves the lowering of trade barriers for goods produced within the union rather than the goods produced outside the partnership (Panagariya, 1999, p. 456); (Panagariva, 2000, p. 288).

On the other hand, authors such as Hosney (2013) identified four forms of economic integration and has combined the “monetary union” and “political union” into one group called “economic union” to be the fourth form of economic integration. Yet, he has distinguished between FTA and CU to be two separated form of economic integration (Hosney, 2013).

Given the definition by Balassa (1961) of economic integration by Balassa as a state of affair or a process. One will find in economic integration literature that the terms “types”, “degrees” or “stages” to can be used interchangeably to refer to the forms of economic integration. Therefore, whatever of the terms used, these usually refer to the different strategies adopted in the pursuance of economic integration. Thus, to be more specific, this study has identified six forms of economic integration. The study here will refer also to levels and types to identify the form of economic integration.

The following Figure 4.1 below shows the six forms of economic integration that countries can attain. The six identified forms of economic integration are extracted from the work of (Hosney, 2013); (Robson, 2002; Robson, 2010); (Balassa, 1961); (Panagariya, 1999).

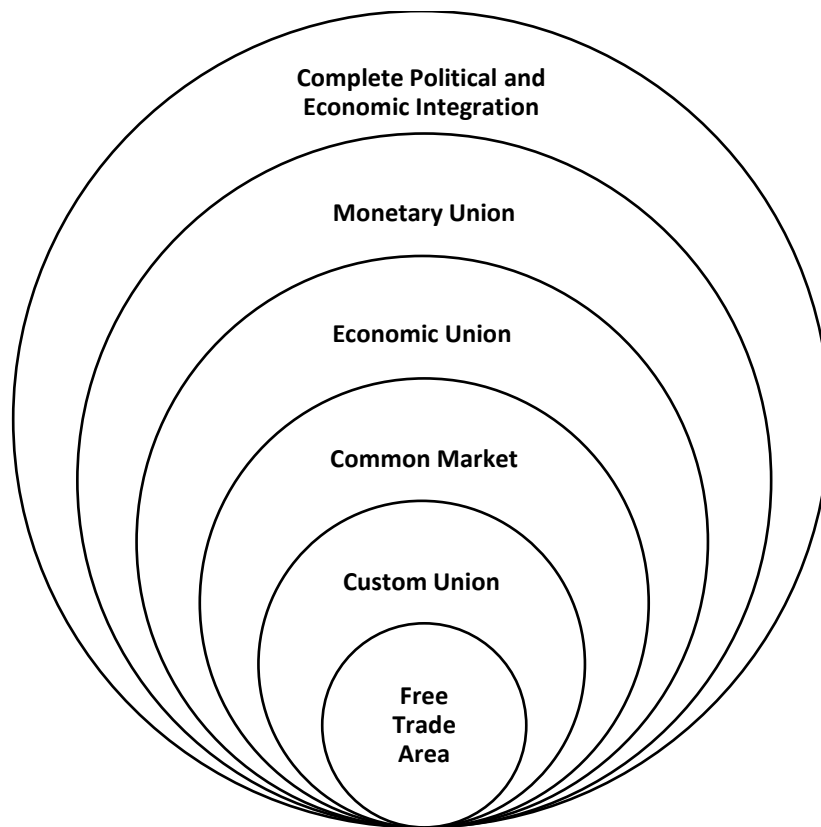


Figure 4.1. Forms of the economic integration

Source: Author's own compilation based on above literature.

4.4.1 Free trade area (FTA)

The Free Trade Area (FTA) is the most basic form of economic integration. It is defined as a trade agreement between two or more countries in which members do not impose any trade barriers such as tariffs and quotas on goods produced within the countries' union. Yet, each member countries keep their own trade policies with regard to non-member countries.

More specifically, paragraph (8) of article (XXIV) of the GATT defines a FTA as follows:

"For the purposes of this Agreement:

(b) A free-trade area shall be understood to mean a group of two or more customs territories in which the duties and other restrictive regulations of

commerce are eliminated on substantially all the trade between the constituent territories in products originating in such territories."

Quoted from Par.8, art. XXIV,
GATT.

Currently this form of economic integration enjoys significant support, free trade arrangements outnumber customs union (CU) agreements. Here are some free trade arrangements around the world. The European Free Trade Association (EFTA), established in reaction to the formation of the European Economic Community (EEC), is a leading example of the FTA form of economic integration. It was set up in 1960 by its then seven member states for the promotion of free trade and economic integration between its members. Another example of a FTA is the North America Free Trade Agreement (NAFTA) between the United States of America, Canada and Mexico. It was created in 1993. The Canada-US Free Trade Agreement (CUFTA) takes a form of FTA as well. Then there is the recently, African Continental Free Trade Area (AfCFTA) established in May 2019, with a ratification of twenty-two African countries.

4.4.2 Customs union (CU)

A custom union is a free trade agreement where trade barriers are eliminated among members of the union and in addition all members agree to adopt a common external trade tariffs with non-members of the union. Thus, once goods have been admitted anywhere into the customs union, they may circulate freely among members of the union. As example of a custom union: the ANDEAN Pact, formed in 1969. This pact sought to integrate the economies of Colombia, Ecuador, Peru, Bolivia, and Chile; Venezuela joined in 1973, and Chile withdrew in 1976. The primary objective of the Andean Pact was to promote regional industrialisation.

Further, most nations entering a custom union desire a further integration degree in the future. Another example of a custom union is the European Community (Germany, France, Italy, Belgium, Netherland and Luxembourg)

formed in 1957. This union uses a common external tariff that can differ across goods but not across union partners. The most famous example is the European Community (EC), formed in 1957 by West Germany, France, Italy, Belgium, the Netherlands, and Luxembourg.

More specifically paragraph (8) of article (XXIV) of the GATT defines a Customs union as follows:

"For the purposes of this Agreement:

A customs union shall be understood to mean the substitution of a single customs territory for two or more customs territories, so that duties and other restrictive regulations of commerce are eliminated with respect to substantially all the trade between the constituent territories of the union or at least with respect to substantially all the trade in products originating in such territories, and, subject to the provisions of paragraph 9, substantially the same duties and other regulations of commerce are applied by each of the members of the union to the trade of territories not included in the union"

Quoted from Par.8, art. XXIV, GATT.

a) The advantages of a customs union

Without a unified external tariff, trade flows would become distorted. If, for example, Germany imposes a 10% tariff on Japanese cars, while France imposes a 2% tariff, Japan would export its cars to French car dealers, and then sell them on to Germany, thereby avoiding 80% of the tariff. This is avoided if a common tariff is shared between Germany and France (and other members of the customs union). Moreover, a common external tariff effectively removes the possibility of arbitrage and, some would argue, is one of the fundamental building blocks of economic integration.

b) The disadvantages of a customs union

Union members must negotiate collectively with non-members or organisations like the WTO as a single group of countries. While this is essential to maintain

the customs union, it means that members are not free to negotiate individual trade deals. For example, if a member wishes to protect a declining or infant industry it cannot do so through imposing its own tariffs. Equally, if it wishes to open up to complete free trade, it cannot do so if a common tariff exists. In addition, it makes little sense for a particular member to impose a tariff on the import of a good that is not produced at all within that country.

Furthermore, there is a potential disadvantage to single members in how the tariff revenue is allocated. Members that trade relatively more with countries outside the union, such as the United Kingdom (UK), may not get their 'fair share' of tariff revenue. The UK's status as a customs union member is one of the dilemmas facing the UK as a result of Brexit. If it wishes to create individual trade deals with, say the USA and China, it cannot retain its current status as a full member of the customs union.

4.4.3 Common market (CM)

A common market agreement removes trade barriers among member countries, sets a common external trade policy with regard to non-members, and in addition allows free movement of the factors of production, such as goods, services, capital and labour. The term "capital" defines not only physical capital, but also to knowledge and financial capital (Balassa, 1973, pp. 92-96). As example of a common market: the European Union has previously functioned as a common market. The now European Union achieved the status of common market in 1993. The EEC was popularly termed a "common market" from its inception, but it only began to fulfil the requirements of a fully unified market thirty years, following the adoption of wide-ranging proposals to complete the internal market. The action taken to implement these proposals in a variety of spheres was a necessary precursor to the inauguration of the Single European Market in 1993. The MERCOSUR, the trade agreement among Brazil, Argentina, Paraguay and Uruguay is hoping to achieve common market status. Further, common market is a more difficult level of integration to achieve and tends to require harmony among members in terms of fiscal, monetary and employment policies as well.

4.4.4 Economic union (EU)

An economic union is economic integration form that involves a high level of co-ordination or unification of the macroeconomic policies such as market regulation, financial system reforms as well income redistribution policy of member countries. This is usually referred to as policy integration. This form of economic union is known by most as one of the most developed form of economic integration. It often later led to a monetary union. For instance, the European Union with a single currency system (the euro) is the most widely known economic and monetary union so far (Hosney, 2013, p. 134); (Robson, 2002); (Robson, 2010, p. 2); (Balassa, 1961); (Balassa, 1973, p. 2).

4.4.5 Monetary union (MU)

A monetary union (MU) is an establishment that requires a setting of both fixed exchange rates and full convertibility of the currencies of the member states into one common currency created for the use of all member states. This form can require the adoption of a single currency, central bank and monetary policy. It is normally found only in conjunction with a customs union or a common market. Conventionally, it is suggested that a monetary union should follow and not precede the institution of arrangements for market integration (Mintz, 1970). Thus, an economic and monetary union is key towards a deeper economic integration that involves a single economic market, a common trade policy, a single currency and a common monetary policy.

Moreover, according to Corden (1972), monetary integration is composed of two components: the exchange rate union and currency convertibility. The first component is an area within which exchange rates bear a permanently fixed relationship to each other even though the rates may vary in the union relative to non-union members. The second component is the permanent absence of all exchange controls for transactions within the union (Corden, 1972, p. 2).

Few examples exist of monetary unions amongst independent states. Under the Maastricht Treaty on European Union of 1992 (CEC, 1992a), the EU was committed to the establishment of a monetary union and it was planned that a

single currency would be introduced on 1st January 1999. The European Union (EU) under the Maastricht Treaty involves both a common market, a common money and the integration or harmonisation of a range of policies in other areas. As far as the EU is concerned, fiscal criteria were laid down in the Maastricht Treaty that not only defined the fiscal qualifications for entry into the monetary union, but also governed the subsequent national budgetary practice.

There are many monetary union proposals being undertaken around the world, such as the Economic and Monetary Community of Central Africa (CEMAC), which has a common currency, although it is not (yet) a common market. The same goes for the West African Economic and Monetary Union (UEMOA).

Monetary integration is the centre of this study. the study analyses whether the macroeconomic shocks faced by the BRICS nations are either symmetrical or asymmetric in order to determine if these countries might form an optimum currency area (OCA). This means that countries are likely to form a monetary integration if the shocks they face are symmetric (Mundell, 1961). Yet, literature lacks on specific theories that encompass the economic integration. Therefore, with the specification of the monetary union, the only theory that underpins the monetary integration has been the optimum currency area (OCA) theory so far.

4.4.6 Political and economic integration

An economic union led by a monetary union that is then followed by a political union is considered the highest developed form of economic integration. Whether and to what extent the operation of an economic and monetary union requires fiscal integration in the shape of a co-ordination and convergence of national budgetary policies in relation to deficit financing and debt policies is a subject of debate.

In a political integration, the first foremost step is a full macroeconomic policies integration, which enables economies to converge even more closely. A monetary union involves scrapping individual currencies and adopting a common single. This means that there is a common fixed exchange rate, a common monetary policy, including interest rates, the regulation of the quantity

of money by a single central bank. Thus, complete political and economic integration involves a single economic market, a common trade policy, a single currency, a common monetary policy, together with a single fiscal policy, including common tax and benefit rates. In other words, it means a complete harmonisation of all policies as well as the setting-up of a supra-national authority whose decisions are binding for the member states”, giving the same situation as within one country.

Thus, complete economic integration cannot be done without a political initiation and decision. For its proper performance, any economic integration needs a total or a partial transfer of sovereignty (exclusive rights of state-nations) to a community institution; a wider political economic entity. Secondly, political integration can also be a final phase to reach a full and complete economic integration (Samaratunga & Weerasinghe, 2002).

Table 4.1 below presents a summary of the six forms of economic integration as well as the degree of policy involved in each level. In addition, examples of each form are also provided.

Table 4.1. Summary of the forms of the economic integration

Forms of the Economic Integration		
Forms	Degree	Examples
Free Trade Area (FTA)	Elimination of trade tariffs	NAFTA, AFCFTA, EFTA
Custom Union (CU)	Elimination of trade tariffs & Equalisation of tariffs with non-members	ANDEAN Pact
Common market (MC)	Higher form of integration: Elimination of trade restriction & Free movement of factors of production	MERCOSUR
Economic union	All the above & Harmonisation of national economic policies	The European union
Monetary Union	fixed exchange rates & full convertibility of the currencies of the member states are	The European Union

	set, or one common currency is created for all member states	
Complete/political economic integration	Unification of monetary, fiscal, social and political policies & Set-up of a supra-national authority whose decisions are binding with union members	The United States of America (U.S.A)

Source: Author's own compilation table based on Balassa (1961; 1976).

Given the above, even though most of the literature found on economic integration is more about trade-related integration, the trade integration is still the dominating form of economic integration. Economic integration affects most of the countries in the world and it is becoming an unavoidable element in most economic policy decisions. For instance, most of the countries throughout the world are attempting to integrate with another. Countries in other areas of the world have tried to copy some of the integration achievements that took place in Europe (Rodrick, 2000, p. 14). European integration has paved the way and developed a sense of confidence in leaders to loosen up their tariffs and open up their borders in order to become more integrated and to improve the welfare of their nations (Robson, 2002); (Raja & Reyes, 2007).

4.5 THEORIES ON ECONOMIC INTEGRATION

Theories are necessary as they help to explain how a concept works and can give an approach to study the concept. Economic integration theory is regarded as part of international economics. The theory enlarges the field of international trade theory through exploring the impact of a union of national markets on growth and examining the need for the coordination of economic policies in a union (Balassa, 1961). In addition, Grimwade (2013) stated that the theory of economic integration is the branch of economics concerned with analysing the effects of different forms of integration on the economies of member states and the rest of the world (Grimwade, 2013).

The literature shows that neo-liberalism theory has been the foundation of economic integration analysis. The neo-liberalisation theory is based on free trade (the abolition of trade barriers) and market policies (the deregulation of the capital market and the foreign exchange rate, for example). Bolanas (2016)

stated that in the early 1960s, the economic thinking about regional economic integration was limited to the theory of international trade (Bolanas, 2016). With developments in economic theories and technical progress, economic integration has been seen in a different light. The new theories of analysing economic integration considered the impacts of economic integration on international trade, economic growth, and welfare of the nations.

Research done notably by Viner (1950) and Balassa (1961) introduced the theories on economic integration by looking at the welfare effects of economic integration. This section 4.5 present an overview of these theories: the static or classical theory and the dynamic or new theory of economic integration.

4.5.1 Static (Classical) theory

The classical or traditional theory of economic integration explains the potential benefits of economic integration through a static analysis. This analysis of economic integration was introduced by Jacob Viner (1950) in his seminal book; "The customs union issue". He made a distinction between the advantages and disadvantages of economic integration. The Viner's static analysis of economic integration established the now known as the effects of trade creation and trade diversion that resulted from a custom union (Viner, 1950). These two concepts are explained by Hosney (2013) as follows:

"Trade creation refers to the case when two or more countries enter into a trade agreement, and trade shifts from a high-cost supplier member country to a low-cost supplier member country in the union" (Hosney, 2013).

"Trade diversion may occur when imports are shifted from a low-cost supplier of a non-member country of the union (third country) to a high-cost supplier member country inside the union. This may be the case if common tariff after the union protects the high cost supplier member country inside the union" (Hosney, 2013).

Viner (1950) claimed that trade creation increases welfare while trade diversion decreases it. This means that trade creation replaces domestic production by

obtaining cheaper imports from a country member. Through the production effect, trade creation reduces inefficient local production and minimises the inefficient use of resources. In addition, through the consumption effect, it increases demand as price falls, whereas trade diversion replace imports from cheaper non-member countries by obtaining expensive imports from members of the union (Viner, 1950).

There is no doubt that that free trade enables production and consumption efficiency. In fact, eliminating the internal trade barriers in a custom union (trade creation) leads to more trade among members of the union and this should enhance welfare. The other result of a custom union can be a reduction of trade between members and the rest of the world (trade diversion). Thus, a misallocation of resources appears if outside producers are actually more efficient when compared with those within the union. Therefore, according to the static analysis theory, countries are involved in economic integration when the benefits exceed the costs. In other words, when integration leads to trade creation rather than trade diversion. Moreover, economic integration has a positive impact on welfare if the trade creation's effects are greater than those of the trade diversion. That is if the union is more inclusive (Lawrence, 1996).

However, according to some theorists, the Viner's static analysis of economic integration based on trade creation and trade diversion is not sufficient in an analysis of the effects of an economic integration. Thus, static analysis does not fully assess the impact of integration on welfare. The analysis of the effect of economic integration must extend beyond the orthodox theory of trade. The allocation of gains from market integration is only one aspect of the economic integration (Hosney, 2013); (Marinov, 2014).

For instance, Hosney (2013: 136-140) listed Cooper and Massell (1965)'s work: "A new look at customs union theory" published in his work "the Economic Journal" as critics of the Viner (1950) customs union static analysis. Cooper and Massell (1965) questioned the usefulness of static analysis in evaluating custom unions. They pointed out that the formation of a customs union may not necessarily reduce the tariffs of a participating country depending on its initial

tariff level (Cooper & Massell, 1965a); (Cooper & Massell, 1965b); (Hosney, 2013).

Lastly, another important point to emphasise is that developments made to Viner's theory of customs union have all generally concluded that there is no possible direct answer to whether a customs union increases world welfare or not. Thus, Hasson (1962) stated as follows:

“Static analysis of trade division and trade creation is insufficient”
(Hasson,1962, p.614).

4.5.2 Dynamic (New) theory

Balassa (1961) introduced the dynamic analysis or the new theory of the economic integration. The dynamic analysis of economic integration is viewed as a complementary theory in analysing an economic integration and its effect on welfare.

Balassa (1961, p. 1) defined economic integration as a process (measures to eliminate economic barriers between units belonging to different national state) and/or as a state of affairs or an end (absence of forms of discrimination between nations). According to the Balassa (1961), the theory of economic integration is concerned with the economic effects of integration in its various forms and with problems that arise from divergences in national monetary, fiscal, and other policies. Thus, the new theory brings about changes in economic conditions and the trade environment through a dynamic analysis. thus, the new theory is based on the long-term outcome of economic integration, such as an increase in economic growth through the elimination of risks and uncertainty from foreign transactions, leading to expanded trade and investment.

Among the effects of the dynamic analysis theory of economic integration are large-scale economies, technological transfer, the impact on market structure and increased competition, productivity growth and improved investment flows. These can be summed up as:

- Economies of scale: the reduction of costs due to an increase of production volumes;
- Economies of scope: the effective combination of the production factors and their interchangeability;
- Growth of companies: with the market expansion there is a surge of opportunities for mobilising more resources and for more production (Hosney, 2013); (Marinov, 2014).

Furthermore, in his other work, Balassa (1973) identified four criteria to analyse the welfare resulting from integration arrangements:

- A change in the quantity of goods produced,
- A change in the degree of discrimination between domestic and foreign goods,
- A redistribution of income between nationals of different countries and income redistribution within an individual country.
- Anything that affects the economic growth rate as a result of a trade arrangement is considered as a dynamic effect (Balassa, 1973).

Other authors such as, (Bhagwati & Panagariya, 1996); (Marinov, 2014), and (Peiris, et al., 2012) supported this analysis.

Given the above, one can say that a static analysis of economic integration lies on the resources allocation to measure the potential welfare of the integration whereas the dynamic analysis lies on the hypothetical growth of the national income. Further, the traditional theory focuses on the benefits to the bloc as a whole. Since it cannot be assumed that, even though integration is potentially beneficial to a bloc, market forces would necessarily produce an acceptable outcome for all member states, thus the compensation issue cannot be ignored. Market integration may also have effects on capital accumulation and growth. Thus, a monetary integration may have important implications for a stability of an economy (Robson, 2002, pp. 4-6).

Furthermore, as stated by Krauss (1972), a proper trade policy is greater than a customs union as a trade liberalising strategy as stated. Thus, the economic

integration in the orthodox paradigm that has been modelled as a custom union or a free trade area (internal free trade and external different tariffs), has largely ignored the existence of different national institutions. This traditional analysis is mainly the maximisation of global welfare through multilateral free trade. Yet the removal of internal border barriers to trade is only one part of economic integration according to its various definitions and forms. Hence, this classical, orthodox approach to economic integration can be said to be incomplete because after removing tariffs, there are still remaining policies problems. Therefore, one cannot rely only on the static approach when analysing the welfare impact of customs union.

Lastly, according to Biswano (2012), Viner's (1950) "Static" analysis is based on the neo-classical theory of trade and economic growth under perfect competition, constant return to scale and diminishing returns. New thinking about economic integration incorporates economies of scale, increasing returns, imperfect competition and other favourable effects of integration (Biswano, 2012).

Lawrence (1997, p.19) made a comparison between old and new region integration theory as shown in Table 4.2 below.

Table 4.2. Sum up of the Old and New theory of integration

Old (Integration) Theory	New (Integration) Theory
Import substitution	Export orientation
Planned allocation of resources	Planned allocation of resources
Mainly industrial products	All goods, services and investment

Source: Lawrence (1997, p.19) in Hosney (2013).

Whether it is called old and new theory of integration, or first wave and second wave of theory of integration, they all refer to the static and dynamic effects of economic integration analysis.

To conclude this section, it is necessary to highlight that the dynamic effects of economic integration have recently emerged as a result of recent changes that are shaping the world economy today. While the above theories present some useful insights, they are however not without some shortcomings. Nonetheless, such discussion falls beyond the scope of this study as the focus here is not the theories that underpin the basic concepts of the economic integration. But rather, the study focus on the monetary integration part of economic integration and the theory underpinning this concept is the optimum currency area theory; developed by Mundell (1960).

4.6 DEVELOPMENTS IN THE ECONOMIC INTEGRATION

Until the last decade, most regional integration in the developing countries still operated behind highly protectionist tariffs and non-tariff barriers that were designed to stimulate import substitution. Almost everywhere, their performance has been poor and frequently punctuated by severe stresses prompted by controversy over distributional issues.

Developing countries have altered their past inward-looking integration strategies of 1960s. However, because of the changed aspirations, past experiences in integration in the developing world, developing countries have not been are not useful guides for future integration policy until recently. None the less, international economic integration has remained an attractive economic strategy in the developing world. This is because integration can serve as a reliable insurance policy against sudden changes in the trading behaviour of partner countries (Jovanovic, 2006, p. 1); (Rodrick, 2000, p. 14).

Hence, the new wave of integration among developing countries is taking place in the context of the widespread adoption of trade liberalisation initiatives as those countries have moved to outward-looking trade policies. That context, together with a better understanding of the sources of benefit and of the

operational issues of integration, suggests that the schemes of the new waves of economic integration have the potential to perform far better than their antecedents did. The aptitude of this potential to attain success would likely depend on what extent the new initiatives can prove themselves able to implement policy-deepening measures of regional integration, on which their contribution to cost reduction and investment creation will upsurge.

Furthermore, the current developments involve strategies to liberalise and open economies. Hence, economic integration has also created pressure to reconcile divergent national policies or practices through international agreements and governance. Another factor of the economic integration is adhering to specific macroeconomic convergence criteria and pushing countries to create a macroeconomic environment that is supportive of international competition. This in turn can facilitate an all-encompassing economic outcomes such as low inflation, low deficits and consistent exchange rates (Biswaro, 2012).

4.7 BLOCS OF ECONOMIC INTEGRATION

Various economic blocs have been formed across the globe. Countries are forming more and bloc economic integration and adopting different type of economic integration.

4.7.1 Africa

In Africa alone, eight or nine groupings of economic integration have been established. One reform involves the Economic Community of West African States (ECOWAS). This is the largest African integration bloc and includes both the Anglophone and the Francophone countries that generate much of the gross domestic product (GDP) of the West Africa. However, this group has made little real progress since its establishment in 1975.

The West African Monetary Union (WAMU) is distinguished by the recognition of a monetary with the Franc of the African financial community, or CFA Franc, which is issued by the BCEAO being the common currency. The West African

Economic and Monetary Union was formally initiated in 1994. Its objective was to transform the existing successful monetary union of West Africa into a full economic and monetary union. It intended to do this by undertaking operations previously carried out by the roughly coterminous but now abolished Economic Community of West Africa (CEAO), which was a purely francophone trade bloc (Mbaku, 1995, pp. 152, 160).

Another reform is on the Southern African Customs Union, which has an unbroken and, in its limited sphere, a successful history that goes back some eighty years. It is the only African instance of a fully operational customs union. The agreement is currently being renegotiated with every prospect of a successful outcome.

4.7.2 America

In Latin America, apart from the Latin American Integration Association (LAIA) that was set up under the Treaty of Montevideo of 1980 in succession to the Latin American Free Trade Association (LAFTA) of 1960; three main regional blocs exist. The one with perhaps the greatest potential results from the major new initiative is taken by Argentina, Brazil, Uruguay and Paraguay in 1991 in which the four countries, which account for a large part of the population and income of Latin America, committed themselves to establish a Common Market of the Southern Cone (MERCOSUR) (Mbaku, 1995, p. 148).

The Central American Common Market (CACM), which was set up under the Managua Treaty of 1960, to include Guatemala, Honduras, Costa Rica, Nicaragua and El Salvador, is a second arrangement, which initially achieved a considerable measure of success. The third arrangement is the Andean Group, which was set up under the Cartagena Agreement of 1969 and which now includes Colombia, Venezuela, Ecuador, Peru and Bolivia. The establishment of MERCOSUR has reinforced the Andean Pact's initiatives for the creation of a customs union and common market.

Following the possibility indicated by the president Bush in 1990 of the establishment of free trade areas between the US and Latin American

countries, there is the subsequent formation of NAFTA, which incorporates Canada, the US and Mexico, the development of far-reaching free trade arrangements covering a large part of the western hemisphere became a real prospect.

A Caribbean Community (CARICOM) was set up in 1973 on the foundations of the Caribbean Free Trade Area (CARIFTA) by the English-speaking countries of the area, with the exception of some of the smallest countries of that group and the Bahamas. An important element of CARICOM is the Caribbean Common Market. A special regime exists within it for its less developed members in the shape of the Eastern Caribbean Common Market (ECCM). The West Indian Commission (1992) recommended a move towards a Single Market and Economy.

4.7.3 Asia

In Asia, policy led the institutionalization of the regional economic integration. This has also made little economic integration progress. The only example is represented by the Association of South East Asian Nations (ASEAN), whose foundations go back to 1967. Although the ASEAN's origins lie in political and strategic considerations, it has already developed an interest in economic co-operation. The institution of the ASEAN Free Trade Area (AFTA) in 1992 and the formation of a free trade area by 2003 had been agreed upon (Mbaku, 1995, p. 149).

Another new initiative for regional economic co-operation in Asia involved the formation of the wider Asian Pacific Economic Co-operation (APEC) forum. This body includes the advanced countries of the Pacific Rim, the newly industrialising economies and the developing countries of the region. At the end of 1994, the forum had already adopted an agreement to institute free trade by 2020, with the industrialised countries reaching that goal by 2010.

In general, Asia has been unenthusiastic about formal regional integration with an institutional basis. What is favoured is sometimes described as 'open

regionalism'. This is characterised by informal efforts to widen markets without tariff discrimination.

The study chooses not to mention the different economic integration in the Europe, as it is way more vast to mention without going into the details. The European economic integration constitutes up to now the most sophisticated and fully integration bloc of economies whether it is theme of trade union, monetary union or political union. Studying the European economic integration would be a whole research on its own.

4.8 CONCLUDING REMARKS

The aim of this chapter was to provide an overview of the definition of the various terms comprising the economic integration concept and provide a clarification on the divergences on the terms such as “regionalization”, “regionalism”, and “regional integration”. This was in order to grasp an idea of the approach to understand the concept of economic integration as well as the theory embodying this concept.

This chapter started by providing a review on the various aspects of the term “integration”. This was followed by a review of the definition of the concept of economic integration. It was seen that, in relation to international economics and finance, according to its simplest and most general definition, economic integration is defined as a combination of separate economies into one larger entity in order to remove transaction obstructions. Thus, one point to note first is that economic integration refers to the formation of a group of independent nations into a larger entity with the objective of facilitating their relations through economic agreements by which each member states is bound. Of course, the definition of economic integration among nations is much deeper and depends on the degree of integration or the deepening of the agreement binding the member countries.

Thus, in the international economics, economic integration is then defined as economic, financial political, social arrangements of previously separated nations that become one entity. These arrangements are from free trade areas

through customs union and common markets to complete economic unions. However, international economic integration literature does not have a consensus definition of economic integration because the concept “economic integration” may have different meanings to different people.

Throughout all the definitions, economic integration can be defined as the process, the end and/or the means by which members states strive to enhance their welfare. It is recognised that strong and less strong nations can achieve/attain this goal more efficiently by integrating than by unilaterally or independently coming together. Yet, economic integration requires some level of requirements. Nations must be willingly ready to accept some restrictions and give up some macroeconomic freedom, such as free mobility of factors of production and free movement of goods and services within the integrated group.

The structure of economic integration varies, but all have one element in common, which is the objective of reducing barriers to trade or economic corporation between member countries. At their simplest, they merely remove tariffs on intra-bloc trade in goods, but many go beyond that to cover nontariff barriers and to extend liberalisation to trade and investment. At their deepest, they have the objective of economic union, and this involves the construction of shared executive, judicial, and legislative institutions.

Economic integration does not have a single, straightforward definition. This is because of the divergences in what the term “integration” means and what exactly is to be integrated. Moreover, divergences also come from the concept of economic integration because many authors use different terms such as “integration”, “regionalism”, “regionalisation”, “regional integration”, or “regional economic integration” to mean economic integration. This somehow has created a source of confusion in defining the concept and difficulties in finding appropriate literature on economic integration. Therefore, in the literature, authors use groups of various terms when defining the concept of economic integration in order to clarify the concept. However, these terms do not always have the same meaning and sometimes restrict the ways to approach the

concept of economic integration. Differences also persist between authors and policymakers because the concept of economic integration englobes the notion of economics, socioeconomics, politics, governance and international relations. Hence, the conceptualisation of economic integration is still under construction.

Recently, international economic integration is defined more in terms of market integration, capital market integration and foreign exchange market integration. Notably the integration of foreign exchange markets refers to monetary integration with a common currency indicating strong monetary integration. However, it is better to understand monetary integration as a necessary complement to the success of any advanced real economic integration, which is the focus of this research.

This study adopted a definition of economic integration based on the various authors' definitions discussed above. Therefore, it defines economic integration as a voluntary and consensual economic combination of independent nations from different regions into one economic entity with the objectives to reduce transaction barriers on goods and services and factors of production progressively, with a convergence of the transaction costs associated with doing business to attain complete full integration eventually.

Because the term "economic integration" has various definitions, the main interest of this study is the economic (positive) perspective of integration. As Tinger (1954) points out an economic union involves aspects of positive integration, as it is concerned with the modification of existing instruments to create new institutions (Tinbergen, 1954). This is not to say that aspects such as those that are political and social are not of importance. In fact, no economic integration takes place without a certain degree of political coordination.

The second section of this chapter identified the different forms of economic integration. Since a concept cannot be completely explained without the theory backing it, a review of the theory of economic integration was provided. It was explained that the early work on international economic integration centred principally on free trade areas. Now it is common to subdivide economic

integration into policies convergence, political integration, monetary integration, international relations and not just regional trade integration.

The process of trade and macroeconomic convergence are the main driving principles of economic integration. Although integration theory has evolved in various perspective, there is a pattern of literature that is trade-related and that interprets results based on the classical orthodox economic integration theory. This then tends to produce only a partial description of the economic integration progress. In the classical or traditional dogma theory of integration, economic integration has been analysed in term of the size of trade volume.

The world economy is constantly evolving. New theories, challenges and controversies arise. Therefore, the theory of economic integration is not exempt from being of a dynamic, mutable character. Despite there being a growing debate at conferences as in literature and policy, economic integration is still a controversial concept to define and adopt.

The process toward economic integration does not have to be gradual. As Balassa points out, economic integration can be a process and/or a state of affairs. The establishment of any forms/types of economic integration will depend on the arrangements among member countries.

The theory of economic integration can be included in international economic theory and enlarge the field of international trade theory. Thus, economic integration, which is defined as the reduction or removal of the trade barriers, is seen as a way to increase or enhance partner countries' economic flows, services, direct investment and finance capital. Thus, economic integration can be viewed as an instrument or tool to push nations' economies into the global economy.

The literature review involved an investigation of the theoretical aspects of economic integration. Most studies found on economic integration dealt with trade-related integration (integration of exchange rate systems). Thus, economic integration encompasses the formulation of the application of common regional trade, exchange and labour markets. The common fiscal and

monetary policies at regional level will lead to the development of a common currency and a single central bank and monetary authority. The movement of the production's factors and technology as well as monetary and financial integration are interrelated.

A consensus theory of economic integration is not yet possible. This is because there is also not a general theory of international trade except the traditional and modern trade theory that are well known. However, the essential point here is that integrated countries look after each other. The process of integration can be unlimited, with continuously more conditions of integration such as monetary fiscal and political integration. From another perspective, economic integration can be a finite process. However, as the world economy evolves, so markets change, and continuous adjustments are required.

CHAPTER FIVE. THEORETICAL AND EMIPIRICAL REVIEW OF THE OPTIMUM CURRENCY AREA (OCA) THEORY

5.1 INTRODUCTION

Exchange rates variations cause fluctuations in the national currencies. Currency fluctuations create economic uncertainty and instability, which affects capital flows and international trade. This is often followed by a low volume of trade and capital flows because of the costs associated with currency transactions and the risks associated with exchange rate volatility. Furthermore, the fluctuations in currencies can lower countries' economic confidence to for investors (Alesina & Barro, 2000); (Alesina, et al., 2002, pp. 301-302).

More countries abandon their own currencies to use a multinational currency. Two factors have contributed to these trends. One is the increase in international trade in goods and services, expanded cross-border financial transactions, and heightened cross-country flows of technology; in one word, "globalisation". Another factor is the increased necessity of price stability, as opposed to active macroeconomic stabilisation, as a goal for monetary policy (Alesina & Barro, 2000, p. 1).

Thus, financial integration has been central to international finance as it can expand economic growth via risk sharing, improvements in resource allocation, reductions in macroeconomic volatility and transaction costs. Baele, Ferrando, Hördahl, Krylova, and Monnet (2004) in their definition, emphasised that financial integration deals with "the symmetric or asymmetric effects of existing frictions on different areas". In other words, areas experience financial integration when the frictions affecting these areas are symmetric (Baele, Lieven; Ferrando, Annalisa; Hördahl, Peter; Krylova, Elizaveta; Monnet, 2004).

Various channels can help achieve the financial integration. It can be via:

- Monetary integration, either through a currency union (Euro, Western and Central Africa or through dollarization such as in Latin America);

- Liberalisation of the capital account;
- Regulatory convergence and harmonisation of the instruments of the financial markets system;
- Subcontracting abroad of financial infrastructure and services (Liebscher, et al., 2007).

Financial integration is a broad field of study that encompasses not only the monetary integration but other economic, social and political dimensions as well. As for the monetary integration, integration includes the integration of financial, banking systems along with policy coordination towards the ultimate adoption of a common currency. Additionally, the unification of currencies is linked to a reduction of exchange rate volatility and transaction costs, convergences of interest rate, efficient capital allocation, improved liquidity and a deepened capital market (De Grauwe & Mongelli, 2005). Therefore, the introduction of a common currency is important in international finance (global financial market) as it can deepen and expand the global financial system.

The literature on the financial integration has revealed that the theory encompassing the approach to the monetary integration is the optimum currency area (OCA) theory. The term of "OCA" owes its definition to Robert Mundell. By definition, an optimum currency area defines a geographical region within which it is established or will be preferable to establish a single currency (Mundell, 1961). Grubel (1970) defined a single currency area as a territory with one currency whose relative values are fixed permanently but whose common external value is determined in markets free from official intervention (Grubel, 1970). Thus, a common currency area adopts an irrevocably fixed exchange rate regime or a single currency within its area, while still maintaining a flexible exchange rate with the rest of the world. Furthermore, the extent to which a currency union implies larger adjustments costs more than a flexible exchange rate regime. Furthermore, the adoption of a common currency depends on the effectiveness and efficiency of the exchange rate as an instrument of short run adjustments (Ricci, 1997, pp. 5–6).

There is limited literature on the optimum currency area theory. Hence, most literature of the optimum currency area theory is related to the regional integration theory. This is why it was necessary to discuss the regional integration theories in Chapter Four above. There is need to emphasise that there is no actually one theory relating to regional integration, however, little with regard to an optimum currency area, though the importance of this study. Therefore, this study is trying to determine the link with regard to how these regional integration theories are related to the optimum currency area theory or there is minimal in terms of this. Thus, the literature on exchange rate policies is also related to the OCA theory, which attempts to give an answer to the choice of an exchange rate regime. Literature on monetary integration and exchange rate policies can be added to the OCA theory as an approach for thinking about monetary integration.

The previous chapter discussed the phenomenon of increasing integration of economies. Economic integration can lead to macroeconomic convergence allowing countries with a low gross domestic product (GDP) to catch up with higher gross domestic product countries. In other words, macroeconomic convergence happens when low and high-income countries join forces to increase their physical and human capital mobility in order to increase their welfare. This growing integration of nations shows that the world economy is moving away from the classical one nation one currency dogma. For instance, twenty-seven countries in Europe have adopted a single currency; the adoption of dollarization is being considered in many countries in Latin America and is currently being implemented in Ecuador. Moreover, a currency union is being discussed in Central America and recently a currency union was being investigated in West Africa, in East Africa, in southern Africa and in Asian countries. The increasing integration of economies implies that the number of currencies would tend to decrease.

Yet, with structural differences and a difference in the nature of the shocks, a uniform policy may not be appropriate. Hence, identifying the nature of shocks and finding their symmetry is a key to assess whether countries are suitable candidates to form an OCA. There is a growing interest in the theoretical and

empirical analysis of OCAs. As the theoretical framework for discussion about monetary integration, the subject of OCAs has been the object of extensive research. However, in spite of the large number of theoretical and empirical contributions on the subject, there still are few attempts to model a comprehensive and integrated analysis of the various economic aspects involved.

Therefore, the purpose of this chapter is to provide an insight into the different literature discussions on the OCA theory, within the framework developed by (Mundell, 1961) as a theoretical background. The chapter is to provide a literature review on the optimum currency area theory. This chapter is structured as follows:

The first section provides a discussion on the conceptual framework of monetary integration with specific reference to the definitions of a monetary union and to a description of the different models of monetary unions.

The second section presents a discussion on what the OCA theory entails, followed by insights on OCA criteria. This is followed by a theoretical analysis of the symmetry of shocks. Moreover, this section provides a review of the empirical literature with regard to previous studies of the feasibility of monetary integration in various regions of the world. Lastly, the last section provides some concluding remarks.

5.2 CONCEPTUAL FRAMEWORK OF MONETARY INTEGRATION

Before engaging in the OCA theory, it is first necessary to discuss what the monetary integration entails, and the different types of monetary integration countries can adopt.

As discussed in the previous chapter, the theory of economic integration explores the impact of a fusion of national markets on growth and examines the need for a coordination of macroeconomic (fiscal, monetary) policies in a union. One of the main forms of economic integration is the monetary integration through the harmonisation of exchange rate policies and/or the harmonisation

of currencies. Regarded as a counterpart of economic integration, monetary integration can be independently undertaken (Kone, 2012, p. 394). Various scholars such Chipeta and Mkandawire (1994); Cobham and Robson (1996); Laporte (1996); Mundell (2000); Venables (2000); Alesina and Barro (2000); Alesina, et al (2002) and Kone (2012) to list just these, have made contributions toward the conceptualization of the monetary integration.

5.2.1 Purchasing power parity (PPP)

First and foremost, before commencing the discussion on the possibility of the monetary integration, there needs to first introduce the theory of the purchasing power parity (PPP) which is based on the Law of One Price (LOP). The purchasing power is the buying capacity or the value of a currency expressed in terms of the goods and services. In others word, purchasing power tells how much of the goods and services one's currency can buy. The Law of One Price (LOP) states that consumers should be able to purchase similar or similar types of goods at the same price despite the difference in the currencies of the countries. This is in order to bring equilibrium in the exchange rates between currencies. Thus, the LOP can be as an "equilibrium attractor," despite large price differentials between markets, as long as the price differential reflects transport and transaction costs and if they are not prohibitively high (Arize, Malindretos, & Ghosh, 2015, pp. 69–70).

The Law of One Price (LOP) can be expressed as follows:

$$P_d = S^* P_f$$

P_d is price of the good in the domestic economy.

P_f is the price of the good in a foreign economy.

S^* is the nominal exchange rate between the two economies.

The concept of purchasing power parity (PPP) implies that the nominal exchange rate between two currencies should be equal to the ratio of aggregate price levels between two countries. Therefore, the purchasing power parity

(PPP) is an economic theory of exchange rate determination that states that the price levels between two countries should be equal. The PPP theory determines the adjustments needed to be made in the exchange rates of two currencies to make them at par with the purchasing power of each other. This means that goods in each country will cost the same once the currencies have been exchanged. The basis of the PPP theory is therefore, the law of one price (LOOP); the expenditure on a similar commodity must be the same in both currencies when accounted for exchange rate (Giovannini, 1988); (Arize et al., 2015); (Persson, 2008).

Furthermore, The purchasing power parity theory is an importance of the international finance. The PPP goes hand to hand with the LOP and can also be viewed as the international version of the Law of One Price (LOP)". For instance, if two countries are engaging in free trade, arbitrage should make the purchasing powers of the two countries' currencies equal. One of aims of the PPP theory is that it can be used to predict the exchange rate. Thus, the PPP theory can be used to predict the exchange rate and determine whether a currency is over or undervalued, which is particularly important for less developed countries and countries experiencing large differences between domestic and foreign inflation rates. Secondly, the concept of PPP is also used as the foundation on which many theories of exchange rate determination are built. Hence, the use of any monetary approach to determine the exchange rate necessitates that the PPP hypothesis hold true. Thus, the validity of the PPP theory can be an indication of whether two countries are financially integrated or not (Chang & Tzeng, 2011, p. 1383); (Ma, Li, & Park, 2017, p. 211).

This economic theory is often broken down into two main concepts: the Absolute purchasing power parity and the relative purchasing power parity. The "absolute" purchasing power parity (APPP) is the fundamental of the PPP theory, which states that once two currencies have been exchanged, a basket of goods should have the same value. Usually, the theory is based on converting other world currencies into the US dollar. Moreover, the APPP suggests that the currency exchange rate will change over time until the goods are of equal value as without any barriers to trade, there should be an

equilibrium in the price of goods. This is also known as the price level theory. However, the theory ignores the existence of inflation and consumer spending, as well as transportation costs and tariffs, which can impact the short-term exchange rate. Without these inclusions, a currency's power is poorly represented (Arize et al., 2015, p. 71).

As for the "relative" purchasing power parity theory, the difference in the rate of change in prices at home and abroad (taking into account the difference in the inflation rates) is equal to the percentage depreciation or appreciation of the exchange rate. Moreover, In its strict version, PPP assumes that, no matter what the monetary or real situations are in an economy, the prices of a common basket of goods in the two countries measured in a common currency will be the same at all times (Arize et al., 2015, p. 71).

Moreover, tariffs affect the equilibrium price differential very much like transport and transaction costs. The relationship between the convergence of prices on identical goods and the law of one price is not as straightforward. Yet, the law of one price can also be applied to factors of the market such as the capital and the labour. For capital markets the law of one price would be such that interest rate or return differentials on identical assets traded in different locations or nations converge to zero or close to zero that is the ratio of interest rates should converge to 1. The international capital market restrictions affect interest rate spreads. Periods of open capital markets, such as the Gold Standard period from 1870 to 1914, were periods of small and falling interest rate differentials. Whereas, the disintegration of the international capital markets and the introduction of capital market controls during and after the Great Depression in the 1930s witnessed an increase in interest rate spreads which remained substantial also under the Bretton Woods System c.1945 to 1973 (Giovannini, 1988); (Persson, 2008).

Factor mobility and non-restrictions on trade are conditions under which The law of one price may succeed. Therefore, the PPP theory can be also an effective tool to examine the possibility of an OCA in the sense defined by Mundell (1961) that real output levels and probably expenditure pattern will

share a common trend in an OCA. In addition, according to the GPPP theory independently non-stationary real exchange rates between two countries may be cointegrated, if their long-run macroeconomic determinants or 'driving variables' are highly related. The GPPP theory is based on the foundation that real exchange rates of a group of countries may be independently non-stationary, however, if the fundamental macroeconomic factors that drive exchange rate are sufficiently integrated across countries, a linear combination of these non-stationary real exchange rates will be stationary and they will share common trends in the long-run. Hence, the theory of GPPP also suggests that if the economic integration among a group of countries is high, the bilateral real exchange rate of a country is influenced by the exchange rates and the fundamentals of other countries present in the group (Mishra & Sharma, 2010, p. 206).

5.2.2 Monetary integration

Kenen and Medea (2007) defined a monetary union as currency consolidation. They emphasised that monetary integration is characterised either by the creation of a single currency or by the adoption of a regional currency. A monetary union can be processed through firstly, a collective decision by two or more countries to form a full-fledged monetary union such as the European Monetary Union, and secondly, through a unilateral decision by a single country to adopt another country's currency such as dollarisation or 'Euroization' (Kenen & Meada, 2007, pp. 3-4, 13).

In other cases, a monetary union also called a currency union area, or a common currency area defines the creation of a new multinational currency by a number of countries from different nations as their medium of exchange. Moreover, Masson and Taylor defined a monetary union zone or exchange rate union area as an area within which the exchange rates are permanently fixed to one another. This exchange rate stability can involve into the creation or adoption of a common currency to replace the national currencies, thus leading to the formation of currency union (Masson & Taylor, 1993, p. 3). In addition, a monetary union involves the transfer of responsibility of a monetary policy to a

new supranational institution. The best-known example of a monetary union is the European Monetary Union with the European Central Bank (EMU) (Gregory Mankiw, et al., 2018, p. 332). On the other side, Horvath (2003; 2002) identified a type of currency union whereby countries within the union retain their national currencies while adopting a fixed exchange rate with a central or dominant currency. Moreover, the exchange rate can be guaranteed by a currency board (Horvath, 2003); (Horvath & Komarek, 2002).

According to Alesina and Barro (2000), a currency union typically can take one of two forms. In one, which is most common, partner countries adopt the currency of a large anchor country. In the other, a group of countries creates a new currency and a new joint central bank (Alesina & Barro, 2000, p. 309). Mundell (2000) summed up that a monetary union can start from a fixed exchange rate to the tightest form, which is a single currency (Mundell, 2000).

The common currency area models known are up to now are as follows:

a) European monetary system (EMS) model

This system essentially involves the harmonisation of exchange rates through co-operative intervention in countries' foreign exchange markets to eliminate or minimize exchange risks in their trade and other economic relations. Its long-term goal is economic and monetary unity in which a single currency replaces the existing national currencies. Moreover, the implementation of the scheme requires the use of sophisticated mechanisms to maintain stability in exchange rates that have to be learnt.

Furthermore, foreign exchange markets have to be developed. Whether the national banks have the resources to offer credit facilities to fund balance of payments deficits is another matter.

b) Parallel union currency model

A "parallel currency" arrangement is a system whereby a common union currency is issued to circulate side by side with national currencies to which it has a defined and fixed relationship.

c) Single common currency model

This model involves an arrangement by which a number of countries are grouped in a monetary area with a single currency and a common monetary authority.

d) Complete monetary and economic union (USA) model

This model entails the complete displacement of all existing autonomous national banks with regional banks in a federal reserve type system such as the one that operates in the U.S.A. Moreover, a common external exchange rate as well as monetary and credit policies replace the multiplicity of national policies in the area.

Dollarization represents one of the dominant approach to a single currency monetary union. The alternative of a new currency created by political agreement (such as the euro, or Herbert Grubel's plan for an "Amero" in North America), involves a high degree of political cooperation and sharing of sovereignty. Multiple-currency monetary unions could include currency board arrangements and a parallel currency system, both of which could be looked at as stages toward a more complete single-currency monetary union. The less tight monetary unions depend on credibility for their success. Thus, the literature shows that a monetary union can comprise the following elements:

- A creation of a new multinational currency.
- A transfer of responsibility for monetary policy to a new supranational institution.
- A common monetary and fiscal policy to ensure collective control over the rate of creation of high-powered money and the expansion of government debt.
- An Union management of the common pool of foreign exchange reserves, external debt and exchange rate policy.
- A harmonisation of domestic credit achieved by the imposition of maximum credit ceilings. The allocation and distribution of domestic credit between sectors are retained by the national monetary authorities.

- An existence of a regional monetary authority or central bank in the case of a common currency which is the sole issuer of the common currency.
- A common development bank to finance regional and national projects to assist in the integration process and reduce economic disparities between the union member countries.

Limited currency convertibility is an important step towards a monetary union for a group of countries that agree to harmonise or unify their exchange rate policies and adopt a policy of uniform variation of their exchange rates with the rest of the world. However, for countries to gain efficiently from such formation, certain requirements are necessary in order for them to form an OCA that gives primacy to economic gains (efficiency allocation of resources) over political considerations (such as national sovereignty).

Having outlined the conceptual framework of monetary integration and the different types of currency unions, this chapter presents in the following section OCA theory, which is subdivided into the traditional OCA theory (from the 1960s to 1970s period) and the new OCA theory (from the 1970s).

5.3 OPTIMUM CURRENCY AREA (OCA) THEORY

The theory of the optimal currency area (OCA) was developed in an era when international financial integration was limited. During the Bretton Woods period, foreign exchange and capital controls were the norm. Things are rather different today. The literature on economic integration has provided an explanation for the most monetary integration processes, especially that in Europe. By definition, a currency area should be a region, whose borders need not necessarily coincide with state borders. An OCA owes its definition first to Mundell (1961) who defined an OCA as an area for which the costs of relinquishing the exchange rate as an internal instrument of adjustments within the area are outweighed by the benefits of adopting a single currency or fixed exchange rate regime. Put simply, in an OCA, members maintain a fixed exchange rate and adopt a single currency. When economies face shocks of a

similar nature, they can respond by adopting a uniform policy (Mundell, 1961); (Mundell, 2000, pp. 224-225).

The theoretical framework for analysing the concept of monetary integration is the OCA theory. This OCA theory has contributed to the theory of monetary integration and has been fundamental in the design of Europe's Economic and Monetary Union (EMU). It also provides a standard point of departure in discussions of dollarisation and a creation of new monetary unions (Horvath, 2003).

OCA theory was introduced and presented by Mundell (1961) and early in its introduction, it was supplemented by McKinnon (1963) and Kenen (1969). Thus, Mundell (1961), McKinnon (1963) and Kenen (1969) are considered the first pioneers of OCA literature. Although Mundell (1961), McKinnon (1963) and Kenen (1969) provided the foundation of OCA theory. These are other scholars who have provided additional extensive reviews and discussions on the OCA theory: See (Horvath & Komarek, 2002); (Alesina & Barro, 2000); (Chow & Kim, 2003); (Bayoumi & Eichengreen, 1993); (Bayoumi & Eichengreen, 1994); (Tavlas, 1993); (Mongelli, 2002); (Fleming, 1971); (Flood & Aizenman, 1992); (Gregory Mankiw, et al., 2018); (Cobham & Robson, 1996) (Alesina, et al., 2002); (Ishiyama, 1975); (Kunroo, 2015); (Venables, 2000); (Sheikh, 2014); (De Grauwe & Mongelli, 2005); (Ingram, 1969); (Grubel, 1970); (Ishiyama, 1975); (Tavlas, 1993); (Masson & Taylor, 1994); (Ricci, 1997); (Horvath, 2003); (Senegas, 2010, pp. 383, 392); (Masson & Taylor, 1994); (Alesina & Barro, 2000); (Ricci, 1997); (Appleyard & Field Jr, 2017, p. 719); and (Horvath, 2003), to list just these.

Literature on the OCA theory can be organised into four phases. The first is the "pioneering phase" from the early 1960s to the early 1970s. The achievement of this phase was to put forward OCA properties, start the debate on the borders of a currency area, and initiate the analysis of the benefits and costs of monetary integration. The second phase of the literature on the OCA was called the reconciliation phase, which was during the 1970s. This involved the analysis of OCA criteria. In the 1990s, the proprieties of an OCA started to be analysed

and weighed with one another, which provided new insights such as the similarity of shocks as criteria to form or join an OCA; however, the research was still without empirical evidence. Then later came the reassessment phase from the 1980s to early 1990s. Gradual theoretical and empirical evidence on the costs and benefits of a monetary union formed part of this phase (Mongelli, 2002). Therefore, the literature on OCA theory can be perceived as being in two main phases: the 1960s to the 1970s period and the period from the 1970s to the present. The phase of the 1960s to the 1970s represents the traditional OCA theory, also called the criteria theory of OCA. Thus, the traditional OCA theory prescribes the prerequisite criteria to consider before joining or forming an OCA. Traditional OCA theory is more of a criteria-based theory that sets pre-conditions that potential economic partners should possess before forming/joining a currency union.

The second wave of literature, from the 1970s up to the present describes what is called the new OCA theory. This theory is more of a cost and benefit analysis-based theory. New OCA theory is primarily concerned with potential benefits rather than costs. The 1970s phase of OCA theory states under the concept of one country one currency that any country already fulfils requirements to be a currency area. What is important is to weigh the costs and benefits of joining or forming a currency union.

Presented by Frankel and Rose (1996) and based on the new OCA theory, the endogeneity of OCA criteria argues that countries are more likely to satisfy traditional OCA criteria to form a currency union after actually joining or forming a monetary union. Thus, countries' assessment to form a currency area should not only be based on "ex ante" or pre condition of an independent monetary union, but they should also consider "ex post" situations that allow the economic impacts of monetary union (Frankel & Rose, 1996); (Mongelli, 2002); (De Grauwe & Mongelli, 2005); (Sheikh, 2014).

Although traditional OCA theory sets the theoretical foundation of the analysis of OCAs, it experienced a fair amount of criticism. Critics argued that traditional OCA theory did not consider the positive effects resulting from the creation of

a currency union. The formation of currency areas would result in economies becoming stronger and fulfil the suggested properties of traditional OCA theory. This criticism was based on the limitations of the traditional analysis of the OCAs. Another perspective of the critics is that the traditional criteria cannot be tested against each other and tend to be contradictory. In addition, the critics pointed out that the traditional theory of OCA did not outline the beneficial effect of forming/joining a currency union but rather pointed out only the costs. Thus, the critics of traditional OCA theory had triggered many positive responses to the new theoretical model of OCA that began to emerge in the 1990s. This new theoretical model considers both the benefits and costs of forming monetary areas.

Thus, in general, OCA theory specifies the trade-off of the loss of economic stability adjustment. Examples are losing a national monetary policy against the economic efficiency gain, such as a competitiveness gain due to a decline in the general price level and a stimulated aggregate demand and enhanced exports of adopting a common currency. In addition, OCA theory involves relationships among countries, regions and currencies that are not necessary geographical nor politically determined (Horvath, 2003, p. 11); (Jager & Hafner, 2013, p. 315); (De Grauwe, 2018).

The endogenous OCA theory recognises the criteria to form an OCA. Yet, those criteria should not be pre-requisite or conditional. Whether it is called traditional theory or new OCA theory, the theory as a whole outlines the criteria to consider among potential countries with regard to forming or joining a currency union and the costs' benefit (Horvath, 2003, p. 11).

The following section outlines and discusses the criteria of a OCA.

5.3.1 Criteria for an optimum currency area

The literature has identified the following OCA properties: price and wage flexibility; labour mobility (Mundell, 1961); the degree of economic openness (McKinnon, 1963); diversified composition of output and trade across countries (Kenen, 1969); and similar inflation rates (Fleming, 1971, Ishiyama, 1975,

Eichengreen, 1990). Other properties are the synchronisation of external shocks to which countries are exposed (Mundell, 1973); low and similar levels of public debts; the absence of fiscal dominance in individual countries; financial market integration; and political co-ordination between countries. The most important criteria are discussed in the following section.

5.3.1.1 *Mobility of the factors of production: labour; wages and price*

Factor mobility essentially comprises the free movement of labour and capital. With regard to the mobility of factors of production, the theory states that the greater the labour mobility, the more feasible it is to form a common currency area. Moreover, De Grauwe (2018) emphasised that the monetary union between two or more countries is optimal if either wages or labours are flexible (De Grauwe, 2018, p. 8).

As it is commonly observed, a country's prices and wages are relatively rigid, and these factors are immobile in many countries. As a result, under a negative demand or a supply shock the only instrument to avoid higher inflation or unemployment is a change in the flexible exchange rate (that means appreciation or depreciation of the currency).

As an illustration, Mundell argued that there is a money illusion, which is the argument for holding flexible exchange rate. Mundell maintained that economic agents suffer from money illusion. For instance, there is a currency depreciation due to low demand of domestic products; heities may tend to increase the prices of imports to compensate the low price or low demand of domestic products. This leads to a general increase in price level. Thus, workers are ready to accept a decrease of their real wage as long as their nominal wages remain the same. Moreover, if workers accept this decline in wages through the rise in general price level, then employment will be maintained. Mundell called that money illusion and an economy cannot persistently rely on such an illusion. This can be seen in countries where exports and imports constitute a greater part of their gross domestic product. For these cases, the depreciation effects are immediate, and the money illusion eventually falls. In addition, inflation also can occur when a country constantly relies on the depreciation of national

currency to stimulate employment; wages adjusting to the increase in price level will lead to inflation (Mundell, 1961); (Mundell, 2000); (Swobada, 1999).

Thus, according to Mundell, an OCA is a region with internal factor and external factor immobility. Factor mobility can replace exchange rate adjustment in preventing unemployment and inflation pressure within the optimal region, with labour being the main factor in production. In other words, the number of workers in the labour market, which affects wages and unemployment, is the main factor (Mundell, 1961, p. 664).

Labour market law, which affects the potential candidates of countries, plays a crucial role in determining whether these countries form a currency area. The lack of labour mobility or a transfer payment system can limit the capabilities of the members to adjust to disturbances. If there is a wide difference among the member countries in term of labour market laws, the greater will be their response to shock asymmetrically (Swobada, 1999).

Mundell (1961) emphasised factor mobility, especially labour mobility, as a crucial criterion in forming an OCA. He argued that if the exchange rate regime within a region causes unemployment in one part of the region, or if it forces another part of the same region to accept inflation as the cure for unemployment, then this regime is not optimal (Jager & Hafner, 2013). On the other hand, in Swobada (1999), Mundell (1973) still advocated factor mobility, but this time, he argued that if a common currency area is financially integrated, symmetric shocks inside the area, even though desirable, are no longer a firm precondition. He stresses the need to promote asset diversification for international risk sharing. Mundell argued that factor mobility of capital could be substituted for adjustment to labour mobility. Thus, a monetary union is a factor of integration itself, which increases the mobility of factors of production and reduces the asymmetry of shocks. One of the advantages of a monetary union is its effects and its integration factor on the financial market that is sometimes underestimated (Swobada, 1999).

Kenen (1969) emphasised the point of factor mobility. He pointed out that “When regions are defined by their activities, not geographically or politically,

perfect interregional labour mobility requires perfect occupational mobility". McKinnon (1963), unlike Mundell (1961), distinguished factor mobility in two distinct senses: geographic factor mobility among regions and factor mobility among industries. McKinnon considered a case of factor immobility between regions (each region has its own specialised industries), where it is difficult to distinguish geographical and inter-industrial immobility. However, McKinnon and Mundell concluded that, if there is factor mobility between regions, then those regions should form a common currency area.

From the above discussion, it can be seen that factors such as wage and prices actually can fall into the discussion of the factor mobility criterion above. Countries with wage and price flexibility are better candidates to form a common currency area. Wage and price flexibility make it easier to overcome asymmetric shocks, as it will lead to a more stable common currency.

5.3.1.2 *Degree of economic openness*

The degree of participation in international trade reflects the openness of a country. McKinnon (1963) introduces the idea of openness as a key characteristic in assessing OCAs; the more open the economy, the greater the desirability of fixed exchange rate arrangements.

McKinnon (1963) noted that, in an open economy, an unstable exchange rate translates into an unstable price level, decreasing the "liquidity". Thus, he argued that the more the economy is open the more opportunities there are for having a fixed exchange rate. In contrast, if the economy is rather closed, a flexible exchange rate is more advantageous. The reason for this is that when there is a higher degree of openness in the economy, the likelihood that foreign prices of tradable goods will be transmitted to the domestic cost of living that is high. When countries are open economies, they are more flexible in their macroeconomic policies and more attractive for investment and trade. Thus, the more open economies are, the stronger the likelihood that their countries will form a common currency area. Thus, according to McKinnon (1963), the more countries' economy is opened, the better chance they have to form a currency union (McKinnon, 1963).

In addition, Mongelli (2002) observed that economic openness has various dimensions including the degree of trade integration (the ratio of reciprocal exports plus imports over GDP) with the partner countries; the share of tradable versus non-tradable goods and services in production and consumption; the marginal propensity to import; and international capital mobility. These concepts overlap but are not necessarily synonymous. For instance, an economy could display a high share of tradable goods but have low imports and exports (and exhibit a low foreign trade multiplier) (Mongelli, 2002).

5.3.1.3 *Diversification in production*

Kenen (1969) introduced product diversification as an important criterion of an OCA. He argued that perfect labour mobility rarely exists and brought a new criterion to determine whether the economy should have a fixed exchange rate (join a currency union) or a flexible exchange rate. Kenen (1969, p. 49) argued, "...diversity in a nation's product mix, the number of single-product regions contained in a single country, may be more relevant than labour mobility." He proposed that highly diversified economies are better candidates for currency areas than are less diversified ones, since the diversification provides some insulation against a variety of terms-of-trade shocks. Moreover, countries that possess similar production structures are deemed suitable for currency areas, since a term of trade shock is likely to affect them symmetrically. To further his point of view, Kenen (1969) added that a well-diversified economy also has a diversified export sector. In addition, Kenen (1969) mentioned one more important viewpoint. He pointed out that, if a diverse shock hits a common currency area, fiscal integration between regions can mitigate the impact through fiscal transfers between regions (Kenen, 1969).

5.3.1.4 *Degree of financial market, fiscal and political integration*

Ingram (1962) noted that financial integration could reduce the need for exchange rate adjustments. For, under a high degree of financial integration, even modest changes in interest rates would elicit equilibrating capital movements across partner countries. This would reduce differences in long-term interest rates, not only easing the financing of external imbalances but also

fostering an efficient allocation of resources (Ingram, 1962); (Mongelli, 2002, p. 9).

Countries sharing a supra-national fiscal transfer system, which would allow them to redistribute funds to a member country affected by an adverse asymmetric shock, would also be facilitated in the adjustment to such shocks and might require less nominal exchange rate adjustments. In addition, if a monetary policy is not effective, the loss of monetary independence is not a high cost. A flexible exchange rate will be more feasible if a country is facing real shocks (domestic or foreign). Thus, there cannot be any currency union without fiscal unity (Kenen, 1969); (Mongelli, 2002, p. 10).

The arguments concerning the criteria mentioned above link up with the argument presented by Frankel and Rose (1996) who maintained that “increased integration makes countries fulfil the criteria of forming a monetary union ex post rather than ex ante” (Sheikh, 2014); (Frankel & Rose, 1996). Moreover, political factors often govern decisions about joining/forming a common currency area. Even Mundell (1961) stated the following:

“...actual currency reorganization would be feasible only if it were accompanied by profound political changes. The concept of an optimum currency area therefore has direct practical applicability only in areas where political organization is in a state of flux...”

(Mundell, 1961, p. 661).

Ingram (1969) stressed the importance of government willingness and commitment to form an OCA (Ingram, 1969). While Mintz (1970) noted that political commitment is actually the most crucial factor of forming or joining a currency union (Mintz, 1970). In addition, Mongelli (2002) observed that political integration would foster compliance with joint commitments, sustain co-operation on various economic policies and encourage more institutional linkages (Mongelli, 2002).

5.3.1.5 *Similarity of inflation rates*

Fleming (1971) argued that countries with similar inflation rates should join a currency area, since similar inflation rates imply that an equilibrated flow of current-account transactions will take place with fixed rates within the area. If there is an inflation differential between countries, it will be harder to maintain the fixed exchange rate (Fleming, 1971).

Ishiyama (1975) proposed identifying other criteria such as differences in inflation rates and wage increases among the countries forming the common currency area that results from different social preference. He was one of the first to acknowledge that there should not be only one criterion in determining OCA (Ishiyama, 1975).

5.3.1.6 *Symmetry of shocks*

The symmetry of shocks, and policy responses to shocks, is a “catch all” OCA criteria. This criterion of an OCA englobes the essential of the OCA theory. The more potential members of a currency area experience symmetric macroeconomic shocks, the less necessary there is a need for an independent monetary policy. This means that the need for an autonomy monetary policy is reduced when countries responses similarly to supply and demand shocks as the speed with which the economy adjust also takes into consideration that the policy responses to shocks are similar across partner countries. Then the net benefits from adopting a single currency might be higher.

The evaluation of underlying shocks, including supply shocks, demand shocks and monetary shocks, is necessary to assess the feasibility of creating an optimum currency area. the correlation of shocks is generally accepted as the main criterion for a country to join a currency union (Huang & Guo, 2006). This aims at understanding the underlying forces that drive the economic movements across BRICS. It also helps in the distinguishing of the correlation of economic variables (output, exchange rates and prices) and those of structural shocks (demand, supply and monetary shocks). Because, according to the OCA theory, countries are better candidates for a common currency arrangement if these shocks are correlated.

Table 5.1 below presents a summary of the discussed criteria influencing the decision of forming an OCA.

Table 5.1 Summary of the OCAs criteria

CRITERIA	EFFECT
Labour mobility and/or real wage flexibility	The higher they are, the easier it is to form a monetary union (MU).
Degree of openness	The more open the economies, the more suitable they are for a MU
Level of fiscal integration	When the level of integration is high, countries are highly suitable for a MU.
Similarity of economic structures	When production structures are similar, countries are highly suitable for a monetary union.
Degree of product diversification	When economies are diversified, countries are more suitable to form a MU.
Effectiveness and credibility of monetary policy	When the monetary policy is ineffective and the monetary authorities are not credible, the loss of monetary independence is not a high cost.
Monetary shocks	When shocks are correlated, the loss of flexibility from losing monetary autonomy is reduced.
External shocks	A country more vulnerable to monetary shocks is better off with a fixed exchange rate.
Synchronization of business cycles	When a country is more vulnerable to external shocks, a floating exchange rate is desirable.
Labour market institutions	When business cycles of the members of a currency area are synchronized, the cost of not having an independent monetary policy as an adjustment mechanism is reduced.
Nominal and real convergence	Countries with different labour market institutions may face higher costs by forming a MU.

Political factors High monetary and fiscal policy coordination is desirable before the establishment of the MU.	Prior to the creation of a MU, it is preferable that countries have similar policy preferences regarding their macroeconomic variables
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Source: Author's own Compilation based on the literature review

The contributions of Mundell (1961), McKinnon (1963) and Kenen (1969) and Ishiyama (1975) can be said to reflect the state of the economy of the countries forming or joining a currency union: labour mobility, price and wage flexibility, economic openness, and similarity in inflation rate and product diversification. Other criteria of an OCA such as the symmetry of shocks and business cycles, financial, fiscal and political integration reflect countries' relationship with economic external factors and their ability to respond to economic shocks. Thus, to sum up, the main properties of OCA theory include a diversification of production, openness, factor mobility, similarity of production structure, price and wage flexibility, similarity of inflation rates, financial, fiscal and political integration, degree of the size of economic openness and symmetric of shocks.

5.3.2 Discussion on the symmetry of shocks criteria

One of the aspects in the analysis of OCAs is the assessment of (economic) shocks faced by the areas to form or join a monetary union. The methodological analysis of symmetry of shocks have gained momentum in most literature on OCA theory. This method is one of the key requirements for an analysis of a monetary union. As it is known, economic shocks are unforeseeable. They can be short-term and can return to equilibrium without fundamental changes or they can be structural or persistent if triggered by the deteriorated macroeconomic fundamentals of an economy. Its effects in turn require a comprehensive reform measure with a particular long-term objective.

Furthermore, one important aspect of monetary integration is its generally recognized macroeconomic benefits in the form of monetary policy which can better manage aggregate demand and promote investment in regional economies. In addition, the monetary shock can be an important source to estimate how the BRICS countries respond to a change in their exchange rates.

It is also useful in the contemplation of an optimal exchange rate policy. Thus, a positive correlation of shocks would strengthen the case of a currency union.

In the analysis of the OCAs, one of the criteria is the degree of asymmetry of shocks among countries who are participants in the analysis of the costs associated with joining or participating in a monetary union. These costs arise when shocks affecting the country participants of different region are asymmetric. Shocks' asymmetries are viewed as an indicator to assess whether a set of countries can adopt a single currency. Thus, the degree of symmetry of shocks appears as a determinant criterion when establishing an OCA or currency union.

Moreover, asymmetric shocks lead to the need for real exchange rates adjustments or reallocation of the factors of production as this affects inflation and unemployment. Asymmetric shocks mean that shocks or economic distortions are specific to a country. The challenge in the case of an asymmetric shock is that it affects only some countries and not the entire region. Therefore, the currency union cannot provide the same response(s) to the economic disturbance. On the other hand, a shock is considered to be symmetric if the shock hits each member state within the region and causes relatively similar effects. For example, the oil crises of the 1970s were typically classified as symmetric shocks. Thus, Mundell maintains that countries with symmetric shocks, meaning countries with positively correlated shocks, are better candidates to form a currency union. The asymmetries of shocks represent an important component in the choice of the exchange rate regime in the context of an OCA (Mundell, 2000).

Furthermore, the determination of the degree of symmetry between shocks across countries has been thus far the most popular criterion used in empirical works to evaluate the OCAs. According to this approach, one needs to test whether aggregate demand (AD) and aggregate supply (AS) shocks are positively and significantly correlated across member countries to conclude whether a monetary union is feasible or not, *ceteris paribus*. Thus, When measuring the shocks symmetry, there is need to identify whether countries are

facing the demand or supply shocks and whether these shocks are temporary or permanent (Horváth & Komárek, 2002, p. 17).

Moreover, volatile capital flow and exchange rate are sources of economic instability. Uncertainty arises from demand, supply and monetary shocks. These two factors are sources of reasons to form a monetary integration. Because flexible exchange rates are seen as the cause of shocks, Mundell (1961) criticised the use of flexible exchange rates. He points out that the more the ability of money to function as a means of payment declines, and the (transactions) costs of currency conversion increase, the larger the number of currencies under flexible rates. He emphasised the exchange rate inconsistency. For Mundell (1961), through a currency union, countries can eliminate transaction costs and decrease the instability of domestic prices. This leads to an increase in the flow of private capital and foreign direct investment. Thus, according to the Mundell's theory of OCA, the fixed exchange rate applies if two countries can form an OCA, otherwise the flexible exchange rate regime holds (Mundell, 1961).

In addition, to emphasise the Mundell's theory, Ricci (1997) stated there are two monetary aspects central to the analysis of the OCAs: firstly, the degree of asymmetry of monetary shocks and secondly, the difference in domestic inflation levels. This emphasises the role of asymmetries in the functioning of a monetary union. An asymmetry of shocks represents an important component when choosing an exchange rate regime in an OCA context. Additionally, an asymmetric aggregate supply and demand disturbance across a region can prevent the smooth functioning of a currency union. Moreover, he adds that the exchange rate between two areas is effective in the short-run adjustment when facing the following conditions (Ricci, 1997, p. 6):

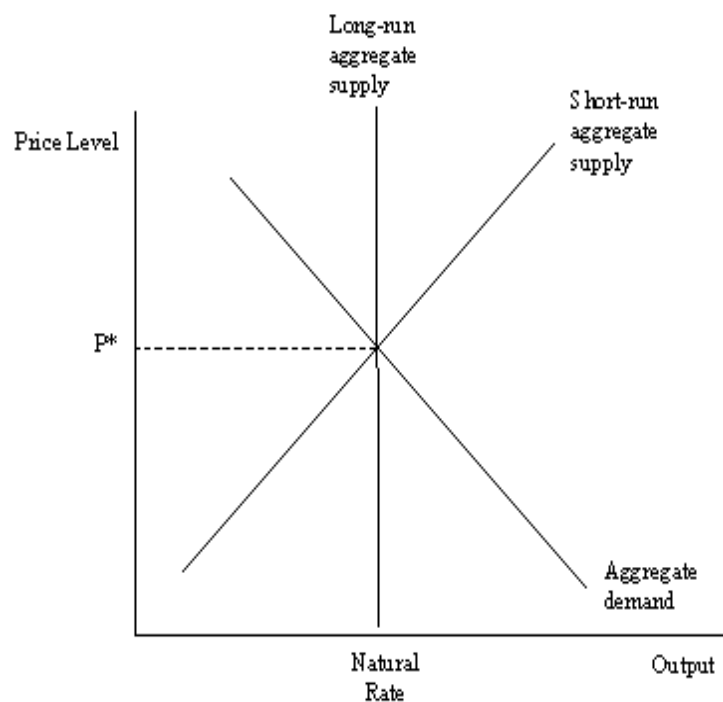
- The asymmetric shocks.
- The domestic prices do not adjust immediately to shocks.
- The exchange rate is not neutralised by domestic price movements.
- Other mechanisms of adjustments such as factor movements are absent.

- The adjustments through the exchange rate are less costly than through other instruments.

In sum, the OCA theory focuses on features of the constituent member countries and facilitates adjustments to asymmetric shocks in the absence of exchange rate adjustments. Thus, the researcher's aim here was not a cost-benefit analysis study but rather an analysis of the asymmetries of shocks (demand, supply and monetary shocks) faced by the BRICS economies.

Thus, the empirical research assessed whether the shocks (demand and supply and monetary) faced by the BRICS countries were symmetric or asymmetric. The research then adopted the Mundell's OCA approach, as it is the theoretical framework for exploring whether there is a possibility of macroeconomic convergences among a group of countries. Because, the asymmetric aggregate supply and demand disturbances across a region prevent the smooth functioning of a currency union.

The following figure illustrates a representation of the aggregate and aggregate demand model as well as the effects of demand and supply shocks on the demand and supply curves.



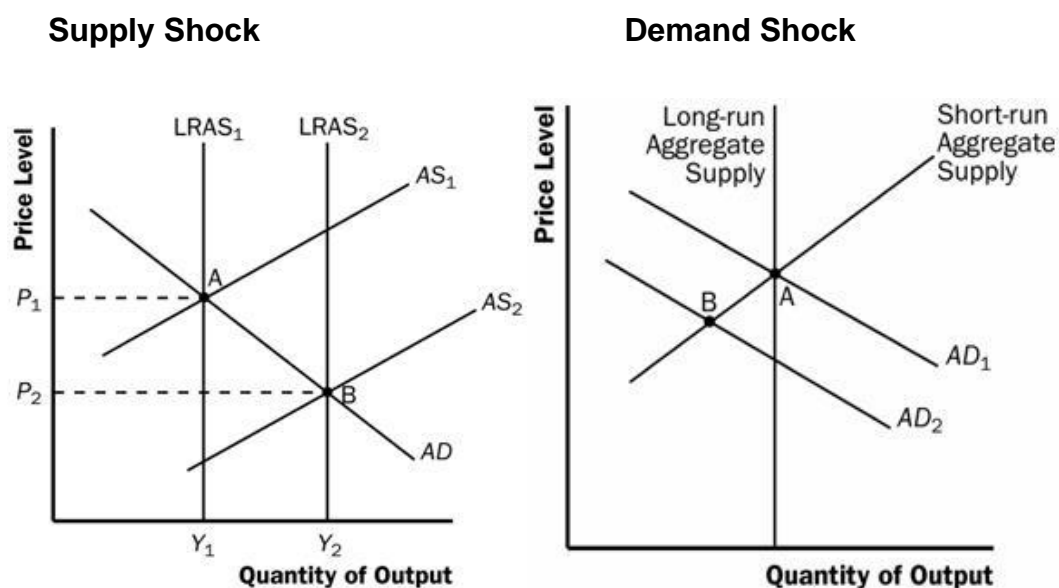


Figure 5.1. Aggregate Supply and Aggregate Demand Model

Source: based on Appleyard and Field Jr, 2017. P. 690.

In the AS-AD model above, the supply curve is vertical in the long run and prevents demand shocks from having long-term real effects on output but has a permanent effect on price level. The demand curve is a downward sloped curve in both the short and long run. Therefore, a positive supply shock will shift aggregate supply (AS) curve right and increase output and decrease price permanently. In the other side, a demand shock (positive) has no effect on output in a long-run, yet will shift the demand curve to the left, followed by a short-run decrease in price (Appleyard & Field Jr, 2017, pp. 614–700); (Greenlaw & Shapiro, 2017, p. 701).

The use of this model in the SVAR methodology was popularised by (Blanchard and Quah, 1988); (Gottschalk, 2001); (Kazerooni & Razzagh, 2014); (Sheikh, 2014); (Harvey & Cushing, 2015); (Huang & Guo, 2006) to list just these authors.

5.4 EMPIRICAL LITERATURE REVIEW ON OPTIMUM CURRENCY AREAS

The interest in a monetary union among bloc economies has stimulated various empirical researches, for example, researches on the ASEAN, the

MERCOSUR, in the North America, the MENA, the Western and Central Africa as well as in the East and Southern Africa areas. These studies aimed at understanding whether the adoption of a single currency would really imply higher costs of adjustments to shocks. The main emphasis was on comparing the degree of shocks symmetry, the role of labour mobility, the extent of regional capital mobility, and the use of fiscal instruments (Rusuhuzwa & Masson, 2013).

Much of the new empirical literature applies the criteria developed by Mundell (1961). Mundell (1961) provided the foundations in his seminal paper. Other literature sources provided additional extensive reviews and discussions of the OCA, for example: (De Grauwe & Mongelli, 2005), (Ishiyama, 1975), (Masson & Taylor, 1994), (Masson & Taylor, 1993), (Tavlas, 1993) to list just these.

Meanwhile, there is no standard theory of OCA nor a widely accepted rule to indicate clearly the benefits and costs of joining a country to a currency area. Instead there are different approaches to assessing the feasibility of a monetary union. Thus, these empirical models found in the literature that analyse the feasibility of a monetary union in a region or group of countries count among the following:

- Structural vector auto-regression model.
- Business cycle synchronisation.
- Generalised purchasing power parity analysis.
- The dynamic stochastic general equilibrium model.
- Trade gravity.
- Correlation and cluster analysis.

The followings are empirical literature reviews on the feasibility of the single currency areas.

In Europe, Bayoumi and Eichengreen (1993) used the method of structural vector auto regression to identify the incidence of aggregate supply and demand disturbances in Europe and to analyse the European economies' response. He found that supply shocks to the core countries were both smaller

and more correlated across neighbouring countries. Moreover, the demand shocks experienced by the core countries were also smaller and more inter-correlated. Thus, there was evidence of some convergence as countries also exhibited a slower response to aggregate shocks (Bayoumi & Eichengreen, 1993). It is worth mentioning that this study was conducted before the adoption of the 1999 single euro currency in Europe.

Gosh and Wolf (1994) adopted a model similar to Bayoumi (1994) and investigated how each of certain zones of the world (US, Europe, the G-7, Former Soviet Union, CFA zones and the world itself) could be divided into OCAs. Their program recognised an OCA when the correlation of output shocks inside the area implied that the costs of adjustment are below an exogenous level of benefits. Their results suggested that neither Europe nor the United States form an OCA, for both regions the costs of adopting a single currency exceeds estimates of the transaction of cost savings (Bayoumi & Eichengreen, 1994); (Gosh & Wolf, 1994).

Mkenda (2001) investigated whether the East African Community comprised of Kenya, Tanzania, and Uganda could form an OCA. Her paper employed the generalized purchasing power parity (G-PPP) method. The method helped in establishing the cointegration of results between the real exchange rates within the region. The findings showed that the three countries tended to be affected by similar shocks (Mkenda, 2001).

Ismath Bacha (2005) examined the feasibility of a common currency area (CCA) among 10 (Middle East and North Africa) MENA Countries, using the vector auto-regression model. The results showed the symmetry seen in the impulse response functions. The variance decomposition showed the absence of any meaningful influence of countries on each other within the bloc among the GCC countries, while the results showed no correlation in real output growth. There was some correlation among monetary variables but no symmetry whatsoever in the responses to external shock amongst the Agadir nations. He concluded that there was no future hope of a common currency area among Agadir nations. However, for the GCC group, the lack of real sector

integration presented a challenge to the desired goal of a common currency (Ismath Bacha, 2005).

Huang and Guo (2006) investigated empirically the feasibility of creating a currency union in East Asia following closer monetary integration in recent years. Huang and Guo identified various types of symmetric shocks in nine East Asian economies, with nine European Monetary Union countries adopted as benchmarks. The analysis of structural disturbances suggested that it might be beneficial for Hong Kong, Indonesia, Korea, Malaysia, Singapore and Thailand to take the lead in endorsing and fostering a common currency zone (Huang & Guo, 2006).

Houssa (2008) used the dynamic structural factor model to extract aggregate demand and aggregate supply shocks for the West African countries. The results showed a positive demand shocks correlation in most French regions of West Africa and the same for the English regions. However, supply shocks turned out to be asymmetric among the potential countries. Thus, the results did not favour a monetary union in the West Africa (Houssa, 2008).

Agbeyegbe investigated the feasibility of a monetary union in the Southern Africa Development Community (SADC) by looking at evidence of nominal exchange rate and inflation convergence. Using a methodology based on estimating time-varying parameters, the results suggested non-convergence. The non-convergence of nominal exchange rate and consumer price inflation suggested that presently the chances of SADC member countries to form monetary union were low (Agbeyegbe, 2008).

Falagiarda (2009) empirically investigated the regional bloc of the East African Community (EAC) having a monetary union using two different SVAR models, which allowed the identification of the underlying structural shocks of economies. He studied the behaviour of the nominal exchange rates of all five countries and uncovered some degree of economic integration. However, the findings were unsatisfactory about convergence in all five countries. The results indicated that the business cycles of these countries were generally not

symmetric, and the five economies responded quite differently to shocks, suggesting that the EAC did not yet constitute an OCA (Falagiarda, 2009).

Kishor and Ssozi (2009) investigated whether the East African Community (EAC) was an OCA. They estimated the degree and evolution of business cycle synchronisation between the EAC countries using an unobserved components model of structural shocks obtained from a structural VAR model and a time varying parameter model to estimate the evolution of business cycle synchronisation. Kishor and Ssozi's aim was based on three main tasks: firstly, using a structural VAR model they examined the synchronisation of structural shocks in the EAC. Secondly, using a state-space model they measured the degree to which these shocks were explained by some unobserved common shock. Thirdly, they set up a time-varying parameter model to estimate the evolution of synchronisation with the common demand shocks over time. They found that the shares of the common shocks in the EAC were low; the share of common demand shocks was highest in Tanzania at 33.5 percent, while the share of common supply shocks was highest in Rwanda at 36 percent. This shows a consistency in the correlations between the three countries (Burundi, Kenya and Rwanda). The degree of synchronisation had improved since the EAC Treaty came into force in 2000. Thus, the East African Community could be a potential OCA (Kishor & Ssozi, 2009).

Warin, Wunnava, Tengia and Wandschneider (2009) used a variation of the gravity model of trade to investigate the feasibility of creating a common currency union consisting of 16 countries in Southern Africa (SADC). The model predicted that in Southern Africa, bilateral trade between country pairs was positively correlated with the product of the economic size of the countries in a given pair. Thus, empirical evidence in support of the endogenous OCA theory suggested that increased trade after adopting a common currency might eventually lead to synchronisation in business cycles (Warin, Wunnava, Tengia, & Wandschneider, 2009).

Hsu (2010) used a three-variable SVAR model to identify three types of shocks: global, regional and domestic shocks. The findings showed that the asymmetric

domestic shocks had declined sharply, whereas that of symmetric global and regional shocks had increased. Empirical results showed that most East Asian economies responded to global and regional shocks in a symmetric way. Although, most East Asian economies had become relatively symmetric in terms of economic shocks and adjustments, implying the viability of a common currency through a deepening integration, his findings could not support a formation of a common currency at least not at that stage (Hsu, 2010).

Buigut (2011) used co-integration techniques by testing the existence of long-run relationships that tie together variables in each criterion across the EAC countries in order to determine whether the member countries would form a successful monetary union based on the long-run behaviour of nominal and real exchange rates, the monetary base and real GDP. The four variables were each analysed for co-movements among the five countries. The results analysis indicated only partial convergence for the variables considered. Thus, there could be substantial costs for the member countries and this implied that the EAC countries (Kenya, Tanzania, Uganda, Rwanda and Burundi) needed significant adjustments to align their monetary policies (Buigut, 2011).

Numa (2011) investigated the feasibility of a monetary union in MERCOSUR (Argentina, Brazil, Paraguay and Uruguay) in Latin America. He applied three econometric models: ordinary least square regression, Granger causality and vector auto regression (VAR). These models established the relationship amongst the four countries while the last model measured the level of trade amongst each country. Based on the results from the OLS Regression model, the paper suggested that Latin America (MERCOSUR) was not economically and politically ready for a currency union (Numa, 2011).

Gabriela and Bolaños (2011) conducted a SVAR approach with non-recursive contemporaneous restrictions and a correlation analysis of responses in order to measure the symmetry of the external shock reactions within the CAN (Bolivia, Colombia, Ecuador and Peru) Latin American countries. He concluded that, even though the results affirmed a similarity of external shocks within the

region, the CAN region was not ready yet to form a monetary union (Gabriela & Bolaños, 2011).

Sheikh, Yusuf and Aslam (2013) in their research paper used a structural auto regression model and the synchronised business cycle to assess the suitability of a monetary union among the East African community (EAC) members. They found that the EAC showed some degree of shocks correlation (Sheikh, et al., 2013).

Kazerooni, and Razzagh (2014) assessed the feasibility of a common currency area among the D-8 countries' members (Turkey, Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, and Pakistan) using a three- variable SVAR approach. The empirical results of the structural shocks showed positive correlated and symmetric shocks in Turkey, Malaysia, Nigerian and Pakistan. In addition, the magnitude and the speed of adjustment to shocks results by the impulse responses as well as the variance decomposition were also the same among these countries. They concluded that a currency union was possible among the subgroup Malaysia, Turkey, Nigeria and Pakistan (Kazerooni & Razzagh, 2014).

Zerihun, Breitenbach and Kemegue (2014; 2015) investigated the structural symmetry among SADC countries in order to establish which countries of the SADC region would be suitable for an OCA. These authors used a nonparametric method called the triple test to detect symmetry. Their results showed that half of the countries in the SADC region had an asymmetric business cycle and the other half demonstrated a positive correlation of business cycle. However, there was a lack of co-movement of the business cycle in general in the region. These findings did not support the region's entry into the monetary union. This implies that a common monetary policy will not be optimal for all countries in the region, especially in the short run (Zehirun, Breitenbach, & Kemegue, 2014). These same authors a year later performed the generalised purchasing power parity (GPPP) hypothesis to test the monetary union in the same SADC region by applying the Johansen's multivariate co-integration technique. Their findings this time supported a

monetary union in the region except for Angola and Mauritius. Their study (2015) concluded that the GPPP hypothesis holds for SADC economies given the stationary panel of RER series and the cointegrating relationships amongst the system of RERs. This implied that the region was potentially an OCA that could proceed with monetary integration (Zehirun, Breitenbach, & Kemegue, 2015).

Harvey and Cushing (2015) tested whether the West African Monetary Zone (WAMZ) was a common currency area by using an SVAR model to study the variance decomposition, impulse responses of key economic variables and linear dependence of the underlying structural shocks of the countries in the zone. Their empirical results showed that, because of the expected diversity in the region economic structure, the variance decomposition showed that the whole region did not have common sources of shock. In addition, results of the structure shocks correlation showed that these countries responded asymmetrically to common supply, demand and monetary shocks. Thus, the countries would respond differently to a common monetary policy. He suggested further integration and convergence before embarking on the common currency formation or it would be more costly than beneficial for the countries (Harvey & Cushing, 2015); (Kamara, 2015).

Contrary to Harvey (2015), Ogunkola (2005), Debrun, Masson and Pattillo (2005) found, using a real exchange rate model that only the lack of fiscal convergence is the obstacle to the formation of a monetary union. These two studies considered both the CFA and non-CFA zones and the conclusion was based on the two zones forming a single monetary union (Debrun, Masson, & Pattillo, 2005); (Ogunkola, 2005).

Basnet and Pradhan (2017) explored economic interdependence in Mercosur by examining common trends and common cycles among the MERCOSUR countries. He's results of the serial correlation common features test revealed that the key macroeconomic variables (real output, investment, and intra-regional trade) shared common trends in the long run, suggesting that macroeconomic interdependence in the Mercosur economies was strong as

well as the long-run co-movement of exchange rates. Thus, findings supported a deeper integration in Mercosur. This is contrary to the findings of (Numa, 2011) listed above (Basnet & Pradhan, 2017).

Redda and Muzindutsi (2017) tested the feasibility of a monetary union in two economic blocs: The Southern African Development Community (SADC) and the East African Community (EAC). Using the VAR model, the study determined that is no similarities of the economic structures in the regions through business cycle synchronisation. The results of the correlation analysis and T-Y Granger causality test suggest that there was a lack of business cycle synchronisation in the two economic regions. Although it was not feasible to form a monetary union in these two economic regions, he found that the East African Community region was a better candidate than the Southern African Development Community for forming an OCA (Redda & Muzindutsi, 2017).

From the studies above, it can be said that the extra degree of integration associated with a common currency is not only substantial but also finite. Moreover, the empirical literature shows that asymmetric shocks constitute the core of the debate on monetary union topics. Many research papers that described studies of the synchronisation of business cycles and the asymmetry of shocks across potential monetary union countries used structural vector autoregressive (SVAR) models.

The foregoing discussion of the empirical literature on the feasibility of currency union is summarised on the following Table 5.2 below.

Table 5.2. Summary of the empirical studies on OCAs

AUTHOR	TITLE	REGION	METHODS	FINDINGS
Bayoumi and Eichengreen (1993)	Shocking Aspects of European Monetary Integration	EU	SVAR	Although small, European countries exhibited correlation of shock, the region had slow response to

				aggregate shocks in general.
Gosh and Wolf (1994)	How Many Monies? A Genetic Approach to Findings Optimum Currency Areas	US, Europe, the G-7, Former Soviet Union, CFA zones, and world	Genetic Algorithm	The costs outweighed the benefits of adopting a single currency and costs the US states some 2.6 percent of gross state product (GSP) each year
Mkenda and Beatrice Kalinda (2001)	Is East Africa an Optimum Currency Area?	EAC	G-PPP	The three countries tend to be affected by similar shocks
Ismath Bacha, O (2005)	A Common Currency Area for MENA Countries? A VAR Analysis of Viability	MENA	VAR	Despite the symmetry seen in the impulse response functions, variance decomposition showed the absence of any meaningful influence of countries on each other within the bloc
Huang, Ying and Guo, Feng (2006)	Is a Common Currency a Feasible Option in East Asian	ASEAN	SVAR	Identified various types of symmetric shocks in nine East Asian economies
Houssa, Romain (2008)	Monetary Union in West Africa and Asymmetric Shocks: A Dynamic Structural Factor Model Approach	WAMZ	Dynamic structural factor	Positive demand shocks correlation in both region but asymmetric supply shocks.

Falagiarda, M (2009)	Are East African Countries Ready for a Common Currency? A Structural Vector Autoregression Analysis	East African Community	SVAR	Asymmetric of shocks: the five economies respond quite differently to shocks
Kishor and Ssozi (2009)	Is the East African Community an Optimum Currency Area?	East African Community	SVAR	Degree of synchronization
Hsu, Hsiu-Fen (2010)	Is a Common Currency Feasible for East Asia? A Multivariate Structure Vector Autoregression	ASEAN	SVAR	Symmetric global and regional shocks
Buigut, Steven (2011)	A Fast-Track East African Community Monetary Union? Convergence Evidence from a Cointegration Analysis	EAC	VAR	Partial convergence for the variables considered.
Numa, Moises (2011)	The Feasibility of a Monetary Union in MERCOSUR	MERCOSUR	OLS, Granger Causality and VAR	Based on the results from the OLS Regression model, the paper suggested that Latin America (MERCOSUR) was not economically and politically ready for a currency union

Sheikh, Yusuf and Aslam (2013)	Feasibility of a Monetary Union in the East African Community: A Structural Autoregression model	EAC	SVAR and the synchronised business cycle	EAC region shows some degree of shocks correlation
Zerihun, Breitenbach and Kemegue (2014)	A Greek Wedding in SADC? Testing for Structural Symmetry toward SADC Monetary Integration	SADC	Triples test	Half of the countries in the SADC region have asymmetric business cycle and the other half demonstrated positive correlation of business cycle.
Zerihun, Breitenbach and Kemegue (2015)	Assessment of Monetary Union in SADC: Evidence from Cointegration and Panel Unit Root Tests	SADC	GPPP	Cointegrating relationships amongst the system of RERs
Harvey and Cushing (2015)	Is West African Monetary Zone (WAMZ) a Common Currency area?	WAMZ	SVAR	Region does not have common sources of shock and asymmetrically to common supply, demand and monetary shocks
Ogunkola, O (2015)	An Evaluation of the Viability of a Single Monetary Zone in ECOWAS	ECOWAS	Real exchange rate model	Only the lack of fiscal convergence is the obstacle to the formation of a monetary union

Basnet and Pradhan (2017)	Regional Economic Integration in Mercosur: The Role of Real and Financial Sectors	MERCOSUR	VAR	The key macroeconomic variables (real output, investment, and intra-regional trade) share common trends in the long run
Redda and Muzindutsi (2017)	Feasibility of Monetary Union in the SADC and EAC: Evidence from Business Cycle Synchronisation	SADC & EAC	VAR	There is a lack of business cycle synchronisation in the two economic regions.

Source: Author's own compilation based on the empirical literature.

5.5 CONCLUDING REMARKS

This chapter has presented the theoretical framework of Monetary integration which is the OCA theory. It was showed that monetary integration encompasses the integration of financial and banking systems along with policy coordination for the ultimate adoption of a common currency. In addition, the unification of currencies is linked to a reduction of exchange rate volatility and transaction costs. The macroeconomic cost of monetary unification is that monetary policy becomes powerless. The benefit to countries is that a large currency area increases the usefulness of money, decreases transaction costs, and eliminates the exchange rate risk. The pursuit and interest of a currency union is becoming as an increasingly important phenomenon in economic development and financial integration.

Further, the conceptual framework of monetary integration is based on the benefits that forming a currency union can bring to the group within the monetary union. A monetary union is defined as a currency's consolidation of two or more previously independent economies. The benefits of a common currency should be stability. Thus, the adoption of another country's currency can be viewed as a more credible commitment tool than simply a way of

managing the exchange rate. Despite benefits, a common currency requires strong monetary policy coordination as well as fiscal policy coordination. Moreover, the OCA theory shows that under certain circumstances, it would be more efficient to have a common currency in a region consisting of countries with their own currencies.

The term optimum implies the requirements for an efficiency-enhancing common currency. The role of the exchange rate adjustments is to absorb the asymmetric shocks that may arise while using flexible exchange rate regime. This is why before forming a currency union or adopting a single currency, countries need to form an OCA and have to assess the economic shocks (whether asymmetric or symmetric) of the region. In other words, they need to assess if the shocks affect only part of or the whole region of optimality.

Thus, the chapter has provided that the OCA theory served as an approach for thinking about monetary integration. Despite the various debates and discussions on the traditional and new OCA theory, both sum up that there are certain criteria that need to be taken into consideration to determine an OCA.

The OCA criteria are specific to the type of monetary integration one wish to adopt. In general, these criteria can therefore be grouped into two categories. On the one hand, there are criteria that reduce the exposure of members of countries to asymmetric shocks, such as similarity of economic structure, openness to interregional trade and a low degree of Specialization. On the other hand, there are criteria that facilitate the adjustment to asymmetric shocks such as factor mobility (labour, capital, wage, price), homogeneity of preference and transfer payment. In addition, the viability of monetary unions is best assessed using the OCA theories (Mundell, 1961).

Yet, the proponents of these theories argue that potential monetary unions should exhibit similarity in economic structures characterised by a high degree of wage flexibility to allow for the adjustment of asymmetric shocks; a high degree of labour mobility; and a high degree of goods and market integration across states. The size and openness of the economy, degree of commodity

diversification and fiscal integration are also important for the formation of a successful monetary union.

This chapter also provided a list variety of econometric techniques that have been used to determine an OCA. The research methodology used in this study uses is the econometric model: the structural vector auto regressive (SVAR) model. This model allows to determine shocks symmetry across potential monetary union countries.

The following Figure 5.2 below presents the structural framework of the theoretical and empirical literature review of the study.

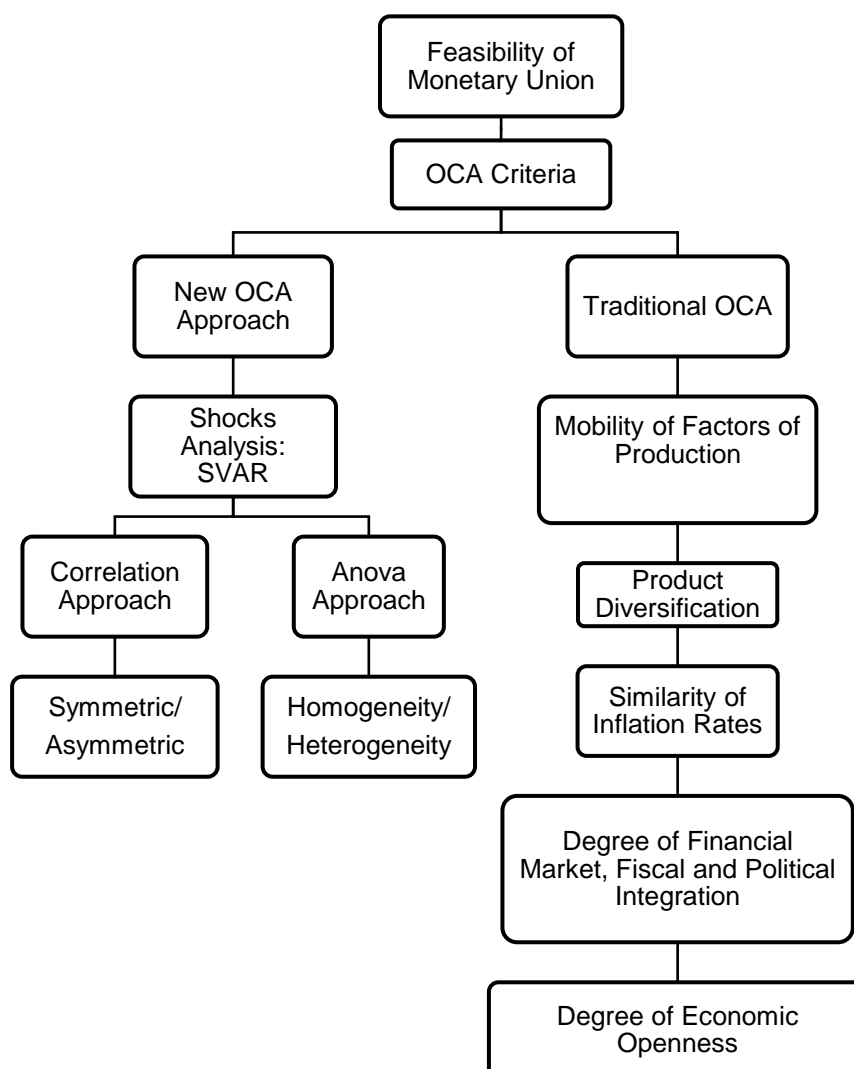


Figure 5.2. Structural framework of the Theoretical and Empirical literature of this study.

Source: Author's own compilation based on the above theoretical and empirical literature review.

CHAPTER SIX. RESEARCH METHODOLOGY, MODEL SPECIFICATION AND ESTIMATION TECHNIQUES

6.1 INTRODUCTION

Previously in Chapter Five, it was seen that the feasibility of an OCA is based on the economics of OCA theory. The first approach is the SVAR approach, which is based on an aggregate demand and an aggregate supply framework. The operationalisation of OCA theory through the analysis of supply and demand shocks was first introduced by (Tamin Bayoumi & Eichengreen, 1992).

This chapter presents SVAR modelling as the model used to investigate the feasibility of a monetary union in the Brazil, Russia, India, China and South Africa (BRICS) economies. As seen in the reviewing of past empirical studies on OCAs, most studies used the SVAR model to obtain shocks among bloc economies because of its usefulness in capturing the evolution and the interdependence between multiple time-series (Gottschalk, 2001).

The SVAR model allows the measurement of the symmetry of shocks using correlation analysis, impulse response and variance decomposition. After testing the correlation of shocks, the research extended the study by applying a second method of analysis used in the study based on the One-Way ANOVA (analysis of variance), which is used to determine the statistical significance of the differences between the means of two or more groups of values (Blanchard & Quah, 1988); (Tamin Bayoumi & Eichengreen, 1992).

This chapter provides the theoretical framework of the SVAR model and the One-Way ANOVA approach in order to understand how the process of modelling take place. This is followed by the specification of the model: a description of the data that used and the source of data. Then follows a description of the unit root test, normality test and the stability test. The next section presents the symmetry of shock analysis of the SVAR model: the identification of shocks, the impulse response function and the variance

decomposition test. This will be followed by a presentation of the ANOVA approach. The last section will provide concluding remarks on the chapter.

6.2 THEORETICAL FRAMEWORK OF SVAR MODEL

The number of methods, especially models to analyse the correlation of shocks among countries, to test their readiness for or the feasibility of forming an OCA has increased. A VAR model is an econometric methodology that helps record the effects of shocks and the analysis and inter-correlation of multiple time series. One weakness of VAR is that it cannot help in analysing the policies as structural models. So, in response to the criticism about the use of non-restricted VAR models to analyse the impulse propagation, SVAR was introduced.

First introduced by Sims (1977), SVAR is used in modern macro-econometric analysis (Sims, 1977). The long-run restrictions on the analysis of supply and demand shocks was first conducted by Blanchard and Quah (1988) and Bayoumi. and Eichengreen (1992) were the first scholars to apply the SVAR model in assessing the correlation of shocks to test countries' potentiality to form a currency union (Fernández-Villaverde & Rubio-Ramírez., 2010); (Sheikh, 2014); (Harvey & Cushing, 2015); (Blanchard & Quah, 1988); (Tamin Bayoumi & Eichengreen, 1992).

Moreover, Fernandez-Villaverde and Rubio-Ramirez (2010) define SVAR as a multivariate, linear representation of a vector of observables on its own lags and (possibly) other variables as a trend or a constant (Fernández-Villaverde and Rubio-Ramírez., 2010).

The SVAR methodology is based on the fundamental economic theories. Thus, the model considers economic theories to impose restrictions on the long run or short run effects of shocks on macroeconomic variables. In this study case, the SVAR model allows then to examine the asymmetry or symmetry of shocks using correlation analysis, impulse response function, the variance decomposition. Furthermore, the impulse response function isolates the disturbances and differentiate the response of the economies to the shocks in

terms of intensity and speed of adjustment. Thus, in the case of a currency union, the larger the size of shocks, the more fractious its impacts will be on the economy.

In addition, the similarity in the size of the shocks among the partner countries determines their suitability to adopt a single currency or form an OCA. Thus, the slower they adjust to disturbances, the less likely the particular group of countries is to form a common currency. Then, the variance decompositions identify the contribution of each shocks to the movements in the variables and show the most effective of the shocks. This helps for better interpretation of the results. ANOVA tests if there are significant differences among the means of the shocks (Kazerooni & Razzagh, 2014); (Fernández-Villaverde & Rubio-Ramírez., 2010); (Sheikh, 2014); (Harvey & Cushing, 2015).

The rationale behind the SVAR model is that countries sharing a symmetric or similar disturbances of aggregate supply and aggregate demand can form a monetary union. One of the objectives of this thesis was to find out if the BRICS economies share and respond symmetrically to shocks (supply, demand and monetary). Thus, the study was based on the OCA theory that forms the structure of the theoretical framework of a monetary union. Countries with symmetric shocks are suitable for adopting a common currency. Countries with structural shocks are expected to have linearly dependent shocks. In addition, if the source of the shocks is common, then the structure of variance decomposition will be similar across the region.

Hence, the theoretical framework of this study is the optimum currency area (OCA) theory and the aggregate demand and aggregate supply (AD-AS) model. To assess the feasibility of monetary convergence among BRICS countries, the study employed the structural vector autoregression (SVAR) model. This model helps in the analysis of the correlation of macroeconomic structural shocks, the evaluation of the impulsive responses of key economic variables and the determining of the linear dependence of the underlining structural shocks of BRICS countries. This is to determine if there is a probability of monetary convergence among BRICS countries. Thus, this

empirical model helps in finding out if BRICS respond symmetrically or asymmetrically to common structural shocks. Countries with symmetric shocks are linearly dependent or share a common source of shocks then are more likely to form an OCA.

Based on the Bayoumi and Eichengreen (1992) study, the empirical literature on the feasibility of a currency union among bloc economies shows that most studies used the SVAR model because of its usefulness in identifying the relevant structural shocks, defining their correlation as well as capturing the evolution and the interdependence between multiple time-series (Tamin Bayoumi & Eichengreen, 1992). Therefore, according to the OCA theory predictions and the AD-AS model, the observable macroeconomic variables are correlated across a group of countries. Then the study uses a four-variable SVAR model to examine the shocks (supply, demand and monetary) faced by the BRICS countries.

Restrictions based on theoretical foundations are crucial to the SVAR model. Restrictions imposed in the model are based on the AD-AS model. After the restrictions are identified, a set of assumptions can then be made; ultimately, the restrictions are the assumptions. Without these identified restrictions, no conclusion regarding the structural parameters can be drawn from the data. The model is expressed in a reduced form and a matrix form which allows the expression of each endogenous variable solely as a function of predetermined variables (Gali, 1992), (Gottschalk, 2001), (Rubio-Ramirez, Waggoner, & Zha, 2010), (Amisano & Giannini, 2012); (Kazerooni & Razzagh, 2014), (Huang & Guo, 2006).

The SVAR model has its limitations; one source of problems with it is its restrictions. There is a widespread use of informal restrictions in the model, which can lead to misinterpretation of results. Restrictions also tend to lead to limited assumptions. Furthermore, SVAR is not an easy model to conduct. Despite its limitations, however, SVAR remains a spreading, new and useful model, in contrast to non-restricted VAR, to analyse monetary transmission and

the business cycle fluctuations (Gottschalk, 2001), (Rubio-Ramirez et al., 2010), (Amisano & Giannini, 2012).

Given the above these macroeconomic variables (output, exchange rate, price level) are affected by these structural shocks (supply, demand and monetary shocks). Thus, this study uses a multivariate SVAR model; a four-variable SVAR.

6.3 VARIABLES

According to OCA predictions and the AD-AS model, the observable macroeconomic variables (GDP growth rates, inflation rates, exchange rates etc.) are correlated across a group of countries or provinces. This research used a four-variable structural VAR model to examine the shocks according to the OCA literature. The aim was to use proxies that had been commonly used in previous studies to investigate the feasibility of OCAs.

The data set of the research consisted of four variables:

- The world GDP as proxy of the World output represented as (gdp*);
- The domestic GDP represented as (gdp);
- The inflation rate (inf) and
- The exchange rate (ex) of each BRICS countries.

These variables were log differences of world GDP ($gdpt^*$), domestic output ($gdpt$), exchange rate (ext) and the inflation rate (inf_t).

6.4 DATA SOURCES

The data set was extracted from the World Bank (2018) and the International Monetary Fund (2018), at the except for the Indian exchange rates which were extracted from the Federal Reserve Economic Data (2018).

The data set covers the period from 1980 to 2017. The time series data were extracted annually. This chosen period allowed the availability of data for all the variables of all BRICS countries. The beginning period of the estimation

ensured that a sufficient number of observations was collected and included the maximum number of observations to estimate the econometric model.

6.5 SVAR MODEL SPECIFICATION

The study made use of the SVAR modelling responses on E-views (11). The identification of structural shocks is based on Bayoumi and Eichengreen's (1994) identification framework which is based on Blanchard and Quah's (1988) VAR (Vector Autoregression) structure.

After identifying the shocks, the model helped in the measuring of the countries' symmetry or asymmetry of shocks through:

- a) The correlation of external global shock, supply shock, monetary and demand shocks
- b) The impulse response analysis of key economic variables
- c) The variance decomposition analysis
- d) The one-way ANOVA (analysis of variance) and coefficient of variance analysis (non-linear dependence of the underlying macroeconomic structural shocks in the BRICS countries).

Thus, when world GDP (gdp^*), domestic GDP (gdp), exchange rate (ex) and the inflation rate (inf) are stationary and all in log form, the mentioned process can be represented as in the following section.

6.5.1 Identification of shocks

Let consider a K-dimension time series y_t , $t = 1, \dots, T$. y_t can be a vector autoregression of finite order p .

Thus, $y_t = (x_{1t} \ x_{2t} \ x_{3t} \ x_{4t}) = (gdp^*, gdp, ex, inf)$, be a vector of the four endogenous variables where:

x_{1t} is the world economic growth with Global Real GDP (gdp^*) as proxy,

x_{2t} is the growth economy of each country with Domestic GDP(gdp) as proxy,

x_{3t} is the real exchange rate between each country represented as (ex) and

x_{4t} is the inflation rate (inf).

Then, the dynamic structural representation of the model is as follows:

$$A(L)y_t = u_t$$

$$\text{Or } Ay_t = u + \sum_{i=1}^p A_i y_{t-i} + v_t$$

A is a 4*4 matrix of Structural coefficients among endogenous variables

u_t is a zero-mean serial uncorrelated error term, also called structural shocks

v_t is a vector of orthogonal structural shocks to the system so that;

$$i = 1, \dots, p$$

The variance co-variance matrix of the structural error-term is as follows:

$$\sum_u \varepsilon = (v_t v_t') = (u_t u_t') = I_k.$$

(k) the number of variables,

This means that: i) there are as many structured shocks as variables in the model, ii) Structural shocks are uncorrelated, implying \sum_u is diagonal, iii) variance of all structural shocks are normalised to 1.

The next step is to derive a reduced form of equation (1), meaning expressing y_t as a function of lagged y_t only.

The reduced form of the equation above is:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + \varepsilon_t$$

Compactly the model can be written as:

$$A(L)y_t = \varepsilon_t$$

$$y_t = A^{-1}u + \sum A^{-1} B_t y_{t-j} + A^{-1}v_t$$

Rewritten as;

$$y_t = v + \sum_{i=1} \theta_i y_t + \varepsilon_t$$

Where, $A^{-1}u$, $\theta_j = A_j^{-1}B_j$ and $\varepsilon_t = A^{-1}v_t$

Thus, the equations above can be rewritten as:

$$y_t = v + \theta(L)y_t + \varepsilon_t$$

Where, $\theta(L) = L + L^2 + \dots + L^p$

The corresponding structural vector moving average (VMA) representation is:

$$y_t = B(L)^{-1}u_t = \Theta(L)u_t$$

The corresponding reduced-form vector moving average (VMA) representation is:

$$y_t = A(L)^{-1}\varepsilon_t = \Phi(L)\varepsilon_t$$

Next is to orthogonalize the reduced form errors, meaning making the errors uncorrelated by defining the lower triangular $k \times k$ matrix p with positive main diagonal such that $pp' = \Sigma_\varepsilon$.

By definition:

$$\varepsilon_t = B_0^{-1}u_t$$

$$\Sigma_\varepsilon = B_0^{-1}B_0^{-1'}$$

$B_0^{-1} = p$ being one possible way to recover u_t .

p is the lower triangle. It has $k(k+1)/2$ parameters so that all p 's parameters are identified.

Where it is imposed that, $\Sigma_u = I_K = I_4$

Thus, the above process can be represented by an infinite moving average representation as following.

$$X_t = A_0\varepsilon_t + A_1\varepsilon_{t-1} + A_2\varepsilon_{t-2} + \dots = \sum_{i=0}^{\infty} L^i A_i \varepsilon_{t-i}$$

Where,

L is the lag operator determined by Shoartz Beyzian criteria?

A_i is 4*4 matrix representing the response of variables to the structural shock (the elements of the vector X_t).

ε_{t-1} shows the structural shocks, which are assumed to be serially uncorrelated with a variance-covariance matrix normalised to matrix: $Var(u_t) = I$. This means that it transmits the effects of the shocks to the variables. The matrix defines the responses of these endogenous variables to the structural shocks.

The reduced matrix form of the equation above will be:

$$X_t = A(L) \varepsilon_t$$

Therefore, the structural model of decomposition process of variables will be as follows:

$$X_t = A_0\varepsilon_t + A_1\varepsilon_{t-1} + A_2\varepsilon_{t-2} + \dots = A(L)\varepsilon_t$$

$$\Delta gdp_t^* = A_{11}(L) \varepsilon_t^{s*}$$

$$\Delta gdp = A_{21}(L) \varepsilon_t^{s*} + A_{22}(L) \varepsilon_t^s + A_{23}(L) \varepsilon_t^d + A_{24}(L) \varepsilon_t^m$$

$$\Delta ex_t = A_{31}(L) \varepsilon_t^{s*} + A_{32}(L) \varepsilon_t^s + A_{33}(L) \varepsilon_t^d + A_{34}(L) \varepsilon_t^m$$

$$\Delta inf_t = A_{41}(L) \varepsilon_t^{s*} + A_{42}(L) \varepsilon_t^s + A_{43}(L) \varepsilon_t^d + A_{44}(L) \varepsilon_t^m$$

Where, X_t is the vector of variables:

$$\begin{bmatrix} \Delta gdp_t^* \\ \Delta gdp_t \\ \Delta ex_t \\ \Delta inf_t \end{bmatrix}$$

ε_t , the vector of structural shocks:

$$\varepsilon_t = \begin{bmatrix} \varepsilon_t^{s*} \\ \varepsilon_t^s \\ \varepsilon_t^d \\ \varepsilon_t^m \end{bmatrix}$$

The above equation consists of all the shocks: ε_t^d , ε_t^s , ε_t^m and ε_t^{s*} that are the independent white noise demand, supply, monetary and world supply shocks, respectively.

As stated earlier in Chapter Five (above), the SVAR restrictions are based on economic theories. According to economic theory of the AD-AS model, the following restrictions follow:

- Supply shocks affect output in the long run, but has no effect on price level,
- Supply shocks and demand shocks both can affect the real exchange rates in the long run, and
- Monetary shocks have no real effect on both output and exchange rates.

The orthogonality restriction is based on the above underlying assumptions. Therefore, world output is exogenous so that country specific (domestic) supply, demand and monetary shock do not affect the world GDP in the long-run. That is represented by the following equations.

$$\sum_{i=0}^{\infty} A_{12i} = 0$$

$$\sum_{i=0}^{\infty} A_{13i} = 0$$

$$\sum_{i=0}^{\infty} A_{14i} = 0$$

Domestic (country specific) supply shock (\mathcal{E}_t^s) is allowed to have a long run effect on domestic (country specific) output level, but neither monetary shock (\mathcal{E}_t^m) nor demand shock \mathcal{E}_t^d imposes a long run impact on domestic output (meaning only supply shocks affect country specific output). That is,

$$\sum_{i=0}^{\infty} A_{22i} \neq 0$$

$$\sum_{i=0}^{\infty} A_{23i} = 0$$

$$\sum_{i=0}^{\infty} A_{24i} = 0$$

And lastly, monetary shock (\mathcal{E}_t^m) is stated to have no long run effect on the exchange rates. That is,

$$\sum_{i=0}^{\infty} A_{34i} = 0$$

Therefore, these restrictions system can be rewritten as following in a matrix form:

$$\begin{bmatrix} \Delta gdp_t^* \\ \Delta gdp_t \\ \Delta ex_t \\ \Delta inf_t \end{bmatrix} = \sum_{t=0}^{\infty} \begin{bmatrix} A_{11}(L) & 0 & 0 & 0 \\ A_{21}(L) & A_{22}(L) & 0 & 0 \\ A_{31}(L) & A_{32}(L) & A_{33}(L) & 0 \\ A_{41}(L) & A_{42}(L) & A_{43}(L) & A_{44}(L) \end{bmatrix} \begin{bmatrix} \mathcal{E}_{t-i}^{S*} \\ \mathcal{E}_{t-i}^s \\ \mathcal{E}_{t-i}^d \\ \mathcal{E}_{t-i}^m \end{bmatrix}$$

The equations obtained through the variance decomposition came from the matrix by multiplying through each term on the right-hand side.

Each reduced-form shock is a weighted average of selected structural shocks. The letters $A_{11}, A_{21}, A_{31}, A_{41}, A_{22}, A_{32}, A_{42}, A_{33}, A_{43}, A_{44}$ represent the weights attached to the structural shocks.

In the above equations, the external variable follows an autoregressive process and the domestic variables are modelled as functions of their own lags. Given the above restrictions, the structural shocks can be recovered as linear combinations of reduced-form innovations and they were serially uncorrelated and orthonormal. For each country, the study uses the first difference of the natural logs of all the variables.

Thus, the SVAR co-integration result would identify:

- the shocks faced by these countries
- the correlation of these shocks across these countries

6.5.2 Impulse response function

The modeling process described above uses a series of SVAR simultaneous equation models to analyse the potentiality of symmetric shocks among BRICS economies. The approach is based on estimating the parameters that allow the computation of the error terms. To extend the study, one can also investigate the effects of monetary policy using a SVAR model, and obtain an impulse response function showing how output responds to a monetary policy shock.

The impulse response function (IMF) helps in the learning of the dynamic properties of vector autoregressions of interest to forecasters. This test determines the responsiveness of the dependent variables in the SVAR to the corresponding shocks of each variable. In other words, a unit shock is applied to the error for every variable in the equation to identify the effect of shocks upon SVAR over time. Therefore, if there are k variables in a system, a total of k^2 impulse responses could be generated. The way that this is achieved in practice is by expressing the SVAR model as a vector autoregressive model. When SVAR models are stable, the shock should gradually decapitate (Sheikh, 2014), (Kazerooni & Razzagh, 2014).

Thus, the impulse response function analysis helps in the examination of the pattern of the variables: (real GDP, real exchange rate, cpi) responses to shocks in real GDP, real exchange rate and cpi. This is because the similar

response patterns of variables across economies indicate that variables become less obstruction instruments and consequently reduce the cost of joining or adopting a common currency. In addition, if the magnitude of the variables to respond to the structural shocks converge across economies, then it will be ideal to form an OCA. Thus, the slower the speed of adjustment after disturbances, the higher will be the cost of maintaining a common currency (Kazerooni & Razzagh, 2014).

6.5.3 One-way ANOVA analysis

Finally, the ANOVA test tested the quality of means and variances of the shocks between the BRICS countries. This ANOVA method is a flexible tool with various uses; it was originally developed by Fisher in the 1920s and has a wide application in diverse fields. Sheikh (2014) was the first to apply this method in a monetary union case in his research (Sheikh, 2014).

One-way ANOVA is used to test the equality of means and variances of shocks and cycles between the BRICS economies. As OCA theory suggests, countries with similar economic structures can be expected to have similar business cycles and symmetric shocks. Therefore, it is useful to determine whether there are mean differences in the different shocks and business cycles.

ANOVA is a useful technique to compare the means of several groups. A simple one-way classification is an extension of the student's t test on more than two groups. ANOVA is very popular in experiments where the objective of the researcher is to compare differences between two groups (control group and experimental group). Thus, this study examined the mean differences of underlying macroeconomic disturbances among the BRICS countries (demand shock, supply shock, monetary shock, business cycle and trends). ANOVA uses the mean, variance and a table of critical values for F-Distribution to calculate the F value. There are certain assumptions involved in one-way ANOVA; if these assumptions are fulfilled, the results and analysis are reliable. One assumption is that the variables under investigation are normally distributed in the population from which the samples are drawn. It is also assumed that the variances in the populations from which the samples are

drawn are equal; as in the case of the t-test, this assumption is referred to as the homogeneity of variance. Finally, it is assumed that all data entries in the study were drawn randomly and independently from the population. In practice, at times data do not entirely satisfy these assumptions. In such cases, a non-parametric test should be considered as an alternative procedure (Sheikh, 2014).

The null hypothesis tested by a one-way ANOVA is that two or more population means are equal. Examples of hypotheses follow below:

- a. There is no difference in the average economic shocks and business cycles of the five BRICS member countries.
- b. There is a difference in the average economic shocks and business cycles of the five BRICS member countries.

6.6 ESTIMATION TECHNIQUES

The study used E-views software 11 to make an analysis of how variables affect economic growth. This analysis, therefore, includes stationary tests, as the first step, to ascertain the properties of the time series data used. The Augmented Dickey Fuller (ADF) approach is used to estimate long run elasticity of these variables; and the last step of the analysis was to establish the short run behaviours of the series. Then follows diagnostic testing.

6.6.1 Unit root test

The unit root testing allows the detection of the presence of a unit root in a time series models; that is it tests if variables are stationary or not using the testing procedure of Dickey and Fuller (1979). The stationary series means that the mean, variance, and autocorrelation structure are constant (do not change) over time. ARMA (autoregressive moving average) and ARIMA (autoregressive integrated moving average) are built with the assumption that the series is stationary. If the series is not then the prediction will be incorrect (Phillips & Perron, 1988), (Dickey & Fuller, 1979).

The study used time series data that is prone to be non-stationary. Time series data is stationary if its statistical properties do not depend on time. This means that the stationary variables have the same mean and variance for every time period and they do not depend on the time lag.

Regressions systems with non-stationary data have serious problems. Among these problems is the fact that the t-ratios and the adjusted R-squares tend to be overestimated. Therefore, this test is conducted using the augmented Dickey-Fuller (ADF) test in order to examine the time series properties of the data. The augmented Dickey-Fuller test removes all the structural effects in the time series.

The hypotheses are as follows:

The null hypothesis: H_0 : variable is not stationary or have unit root.

Alternative: H_1 : there is stationarity.

Note on the conditions of stationarity;

$$E [X_t] = u$$

$$Var [X_t] = \sigma^2$$

$$COV [X_t, X_{t-k}] = \int (k) = \rho_k$$

If p-value < 5% then reject H_0 : meaning there is stationary.

If p-value > 5% then accept H_0 : variable is not stationary.

Therefore, before implementing the multivariate SVAR model, the variables were screened in order to avoid a spurious regression and ascertain the order of integration (stationarity) of the series by employing the augmented Dickey-Fuller (ADF) and Phillips-Perron tests.

6.6.2 Diagnostic tests

Statistical hypothesis:

H_0 : the k population means are equal.

H_1 : the k population means are not all equal.

The decision rule, which is the rejection or acceptance of the statistical significance of the differences in two or more means, is based on a standard that no more than 5% of the difference is due to chance or sampling error, and that the same difference would occur 95% of the time should the test be repeated.

The following summarises the diagnostics tests and should not be able to reject hypothesis (H_0).

6.6.2.1 *Serial correlation*

This group of tests examine whether the regression residuals are not auto-correlated. They assume that observations are ordered by time. The study uses the Durbin-Watson test value to test for no autocorrelation among the variables.

6.6.2.1 *Stability test*

The estimated VAR is stable if all roots have a modulus less than one and lie inside the unit circle. Furthermore, results such as impulse responses standard errors cannot be valid if the VAR is not stable (Agung, 2011).

Thus, the study uses the stability test to test for Structural Change and Parameter Stability. This test testes whether all or some regression coefficients were constant over the entire data sample.

6.7 CONCLUDING REMARKS

The pursuit and interest of many developing and emerging countries in deepening their financial integration is growing. Like many emerging and

developing countries, the BRICS countries are moving towards further integration of their economies in order to enhance intra-trade and investment.

The recent quest of the BRICS economies has been to establish a new vehicle currency to rival the competitive dollar and enhance the flow of their transactions. Thus, it is important for the BRICS economies to investigate the macroeconomic convergence of their economies before embarking on such crucial process. Econometric investigations such as the findings of this study could be useful for BRICS officials in selecting the appropriate monetary tool, as it could involve an irrevocable action and long-term vision. The importance of symmetric shocks within the region would constitute proof in favour of a currency peg. If, on the other hand, the country-specific shocks were prevalent and uncorrelated across countries, a currency area would be difficult to sustain. If global shocks are predominant, a more global arrangement might be more attractive.

The SVAR model is widely used to determine whether future members of a monetary union can form an OCA. Based on the theoretical framework of the OCA theory, this method allows the assessment of the degree of symmetry of shocks and the speed at which the economies can adjust to the structural shocks. Assessing the symmetry of structural shocks through SVAR is one of the most popular methods to investigate the feasibility of a monetary union among members of a group of countries. This SVAR method has been used to analyse the suitability of various group of countries in the same geographical region or not, such as the D-8, the EAC, the SADC, the MENA, the EU, the ECOWAS.

This investigation opens routes for further research in the BRICS economies. The SVAR model is an interesting and useful model to apply as an econometric approach. However, there are new econometric, statistic and technology models. Using different models, such as the dynamic stochastic general equilibrium modelling (DSGE) or the general purchasing power parity (GPPP) method might be appropriate for further studies in analysing the feasibility of a monetary union among BRICS countries. In addition, another study suggestion

can be to investigate the cost-benefits analysis of the BRICS economies forming a currency union.

The following Figure 6.1 below presents a summary of the empirical framework of the study.

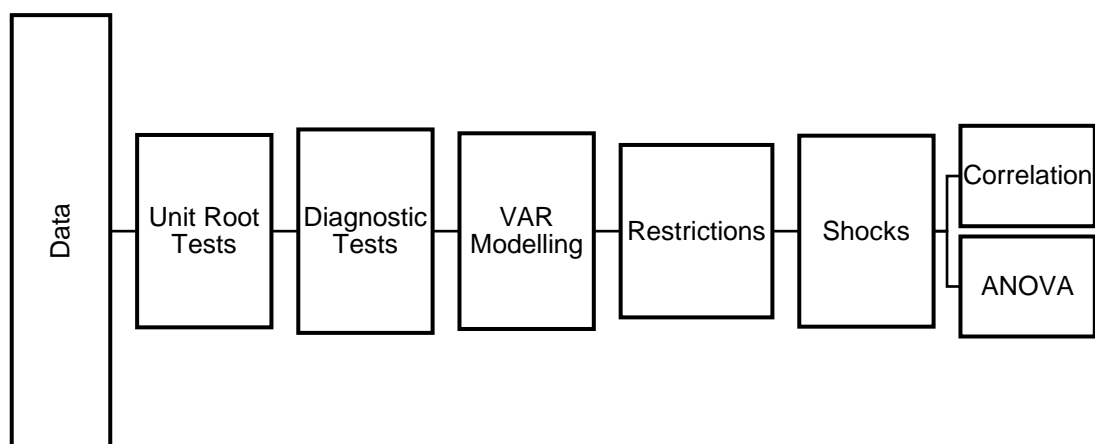


Figure 6.1. Structural framework of the research methodology

Source: Author's own compilation based on the above empirical literature.

CHAPTER SEVEN. RESULTS ANALYSIS OF THE EMPIRICAL MODELLING

7.1 INTRODUCTION

The theoretical framework that underpins the methodology of this study is based on the OCA theory discussed in Chapter Four of this research thesis. The OCA theory states that countries with symmetric shocks are linearly dependent or share a common source of shocks. Thus, they are more suitable to form a currency union.

The aim of this study was to engage with the empirical literature on the feasibility of a currency union in BRICS countries, employing Bayoumi and Eichengreen (1994) methodology to estimate a multivariate SVAR with four variables including the world GDP, the domestic real GDP, the exchange rate and the (inflation rate) as a proxy for local price level.

The world GDP captures exogenous global disturbances while domestic shocks comprise supply, demand and monetary shocks. The estimation follows identifying the SVAR using long-run restrictions in order to extract structural economic shocks across the BRICS members.

Thus, this chapter presents the results of the preliminary analysis of data, such as the unit root test and diagnostic test, followed by an analysis of results

7.2 UNIT ROOT

Since the augmented Dickey-Fuller test is susceptible to the lag length used in the test, the study used the Schwartz Information Criterion (SIC) procedure to choose the suitable lag length in the ADF test. To double check the time series of statistical properties of the data, the Phillips-Perron test was conducted using the Newey-West Bandwidth selection criterion.

Table 7.1 (below) provides the results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron series tests for Brazil variables, including the world GDP.

Table 7.1. Unit root test: Brazil and World GDP

BRAZIL	ADF at Levels				Phillips Perron (PP) at Levels			
	GDP	Exchange Rate	Inflation	World GDP	GDP	Exchange Rate	Inflation	World GDP
With Constant	-5.3058	-2.2693	-1.1406	-4.8700	-2.8107	-4.1464	-2.3893	-4.7672
	0.0001***	0.1868	0.6892	0.0003***	0.0665	0.0025	0.1515	0.0004
With Constant & Trend	-5.2091	-2.2418	-1.7901	-4.7980	-2.5251	-5.7848	-2.5753	-4.6823
	0.0008***	0.4537	0.6892	0.0023***	0.3150	0.0002***	0.2930	-1.5413
Without Constant & Trend	-2.0619	-0.0182	-1.3445	-1.7498	-0.5263	-2.8181	-1.7759	0.1142
	0.0391**	0.6702	0.1625	0.0761*	0.4820	0.0061**	0.0721	1.5413
BRAZIL	Differenced ADF				Differenced (PP)			
	ADF	Exchange Rate	Inflation	World GDP	GDP	Exchange Rate	Inflation	World GDP
With Constant	-10.5580	-5.0931	-4.8330	-6.2491	-5.9145	-4.1431	-8.3647	-21.9560
	0.0000***	0.0002***	0.0004***	0.0000***	0.0000	0.0026	0.0000	0.0001
With Constant & Trend	-10.4679	-5.0257	-4.7549	-6.1563	-6.2571	-5.7209	-8.3790	-23.3618
	0.0000***	0.0013***	0.0027***	0.0001***	0.0000	0.0002	0.0000	0.0000
Without Constant & Trend	-10.7502	-5.1660	-4.8550	-6.3459	-6.0435	-4.0829	-7.9415	-22.3639
	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0002***	0.0000***	0.0000***

Level of significance: *** (1%), ** (5%), *(10%)

Source: EViews' 11 author's own computation using yearly data (1980-2017).

Table 7.2 (below) provides the results of the nit root test for Russia.

Table 7.2. Unit root test: Russia

<i>RUSSIA</i>	<i>ADF at Level</i>			<i>ADF DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>
		<i>Rate</i>			<i>Rate</i>	
<i>With Constant</i>	-2.7179	-1.0147	-0.3636	-8.2284	-4.9973	-5.3448
	0.0806*	0.7372	0.9051	0.0000***	0.0002***	0.0001***
<i>With Constant & Trend</i>	-2.9745	-2.8561	-2.7987	-8.1074	-5.0711	-5.3774
	0.1527	0.1880	0.2067	0.0000***	0.0012**	0.0005***
<i>Without Constant & Trend</i>	-2.7517	0.2983	-0.9305	-8.3487	-5.0612	-5.2712
	0.0073***	0.7665	0.3070	0.0000***	0.0000***	0.0000***
<i>RUSSIA</i>	<i>Phillips Perron at Levels</i>			<i>Phillips Perron DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>
		<i>Rate</i>			<i>Rate</i>	
<i>With Constant</i>	-2.5972	-1.1571	-1.4678	-8.7822	-3.3365	-4.6636
	0.1026	0.6824	0.5385	0.0000***	0.0204**	0.0006***
<i>With Constant & Trend</i>	-2.8794	-2.0582	-2.2890	-8.6373	-4.0598	-4.6454
	0.1804	0.5512	0.4292	0.0000***	0.0153**	0.0035***
<i>Without Constant & Trend</i>	-2.6330	0.0609	-1.2137	-8.9233	-3.4070	-4.7293
	0.0099***	0.6960	0.2020	0.0000***	0.0012***	0.0000***

Level of significance: *** (1%), ** (5%), *(10%)

Source: EViews' author's own computation using yearly data (1980-2017).

Table 7.3 (below) provides the unit root test results for India.

Table 7.3 Unit root test: India

<i>INDIA</i>	<i>ADF at Levels</i>			<i>ADF DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>
<i>With Constant</i>	-5.0288	-1.9336	-3.5616	-5.7930	-4.8084	-6.6254
	0.0002***	0.3134	0.0116**	0.0000***	0.0005***	0.0000***
<i>With Constant & Trend</i>	-5.8434	-3.5147	-3.7943	-5.6985	-4.7391	-6.5193
	0.0001***	0.0552**	0.0282**	0.0002***	0.0033***	0.0000***
<i>Without Constant & Trend</i>	-0.1983	-0.4336	-1.5217	-5.8840	-4.8826	-6.6721
	0.6074	0.5184	0.1184	0.0000***	0.0000***	0.0000***

<i>INDIA</i>	<i>Phillips Perron at Levels</i>			<i>Phillips Perron DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>
<i>With Constant</i>	-5.0268	-1.8288	-3.5044	-21.5699	-7.2966	-8.8258
	0.0002***	0.3604	0.0134**	0.0001***	0.0000***	0.0000***
<i>With Constant & Trend</i>	-6.5367	-2.2007	-3.7437	-21.1624	-7.8955	-8.6808
	0.0000***	0.4732	0.0316***	0.0000***	0.0000***	0.0000***
<i>Without Constant & Trend</i>	-1.1188	-0.0734	-1.3870	-21.4156	-6.4464	-8.8251
	0.2343	0.6506	0.1510	0.0000***	0.0000***	0.0000***

Level of significance: *** (1%), ** (5%), *(10%).

Source: EViews' author's own computation using yearly data (1980-2017) from (World Bank, 2018), (International Monetary Fund, 2018), and (Federal Reserve Economic Data, 2018).

Table 7.4 below provides the unit root test results for China.

Table 7.4. Unit root test: China

<i>CHINA</i>	<i>ADF at Levels</i>			<i>ADF DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>
<i>With Constant</i>	-3.6896	-3.1941	-3.3943	-6.3174	-4.6573	-5.3655
	0.0088	0.0294	0.0178	0.0000	0.0006	0.0001
<i>With Constant & Trend</i>	-3.7713	-1.8441	-4.1406	-6.2247	-5.3110	-5.3099
	0.0308	0.6627	0.0126	0.0001	0.0006	0.0007
<i>Without Constant & Trend</i>	-0.4796	-1.3682	-0.9725	-6.4118	-4.6265	-5.4402
	0.5007	0.1560	0.2891	0.0000	0.0000	0.0000
<i>CHINA</i>	<i>Phillips Perron at Levels</i>			<i>Phillips Perron DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange Rate</i>	<i>Inflation</i>
<i>With Constant</i>	-2.8107	-4.1464	-2.3893	-5.9145	-4.1431	-8.3647
	0.0665 *	0.0025**	0.1515	0.0000***	0.0026**	0.0000** *
<i>With Constant & Trend</i>	-2.5251	-5.7848	-2.5753	-6.2571	-5.7209	-8.3790
	0.3150	0.0002***	0.2930	0.0000***	0.0002***	0.0000** *
<i>Without Constant & Trend</i>	-0.5263	-2.8181	-1.7759	-6.0435	-4.0829	-7.9415
	0.4820	0.0061**	0.0721*	0.0000***	0.0002***	0.0000** *

Level of significance: *** (1%), ** (5%), *(10%).

Source: EViews author 'own computation using yearly data (1980-2017).

Table 7.5 below provides the unit root test results for South Africa.

Table 7.5. Unit root test: South Africa

<i>SOUTH AFRICA</i>	<i>ADF at Levels</i>			<i>ADF DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>
		<i>Rate</i>			<i>Rate</i>	
<i>With Constant</i>	-4.4180	-1.6309	-0.7143	-7.1702	-5.3386	-2.8952
	0.0012**	0.4572	0.8294	0.0000***	0.0001***	0.0570**
<i>With Constant & Trend</i>	-4.4822	-3.8954	-2.7636	-7.0817	-5.2875	-5.1439
	0.0052**	0.0226**	0.2190	0.0000***	0.0006***	0.0011***
<i>Without Constant & Trend</i>	-3.0728	-1.2276	-1.4902	-7.2555	-5.2066	-2.5656
	0.0031**	0.1975	0.1253	0.0000***	0.0000***	0.0120**
<i>SOUTH AFRICA</i>	<i>Phillips Perron at Levels</i>			<i>Phillips Perron DIFFERENCED</i>		
	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>	<i>GDP</i>	<i>Exchange</i>	<i>Inflation</i>
		<i>Rates</i>			<i>Rate</i>	
<i>With Constant</i>	-4.4294	-1.7057	-1.4266	-9.2326	-5.5967	-9.0974
	0.0011**	0.4202	0.5588	0.0000***	0.0000***	0.0000***
<i>With Constant & Trend</i>	-4.4822	-2.2695	-2.8030	-8.8839	-7.1801	-9.9948
	0.0052**	0.4393	0.2053	0.0000***	0.0000***	0.0000***
<i>Without Constant & Trend</i>	-2.9977	-2.9712	-1.4609	-9.4405	-5.1109	-5.9906
	0.0038**	0.0040**	0.1324	0.0000***	0.0000***	0.0000***

Level of significance: *** (1%), ** (5%), *(10%).

Source: EViews author's own computation using yearly data (1980-2017).

Given the above, the results of the unit root testing indicate that the variables of all the countries had unit roots at various levels; but, after differencing the series once, all the variables became stationary at various levels of significance. Therefore, there was no unit root. The values were all less than one.

7.4 DIAGNOSTIC TESTS

The diagnostic tests run for this study include the serial correlation LM tests and the stability test. The diagnostic tests permit to test the fitness of the model.

7.4.1 Residual test of serial correlation (LM-Test)

The lag lengths using *Akaike* Information Criteria (AIC) were chosen in order to ensure that the estimations of SVAR are consistent.

Table 7.6 below shows the optimal lag length and serial correlations LM tests for the different VAR models.

Table 7.6. SVAR lag length selection criteria.

COUNTRY	Lag Length	LM- Test and P values (in brackets)
BRAZIL	1	13.94 (0.6062)
RUSSIA	1	11.02 (0.8107)
INDIA	1	20.47 (0.2042)
CHINA	1	11.09 (0.8053)
SOUTH AFRICA	1	20.83 (0.1892)

Source: EViews author's own computation using yearly data (1980-2017).

The results of the serial correlation LM test indicate that all models at the chosen lags are free from serial correlation because the *p values* in parenthesis are greater than 0.05. Hence, the models are robust at their chosen lags. The next important test following serial correlation is the VAR stability test.

7.4.2 Stability test

The values of the results of the stability test for each countries are presented in Table 7.7 below.

Table 7.7. Stability tests per country

BRAZIL	
Root	Modulus
-0.373780 -0.415686i	0.559023
-0.373780 +0.415686i	0.559023
-0.471471	0.209590
0.209590	0.209590
RUSSIA	
Root	Modulus
-0.239846 -0.276187i	0.365794
-0.239846 +0.276187i	-0.365794
-0.112646	0.112646
0.085980	0.085980
INDIA	
Root	Modulus
-0.357150 -0.189961i	0.404526
-0.357150 -0.189961i	0.404526
-0.400301	0.400301
0.064465	0.064465
CHINA	
Root	Modulus
0.096954 -0.688083i	0.694880

0.096954 -0.688083i	0.694880
0.300021	0.300021
-0.249072	0.249072
SOUTH AFRICA	
Root	Modulus
-0.472220	0.472220
0.073046 -0.441361i	0.447364
0.073046 +0.441361i	0.447364
-0.320847	0.320847

No roots lie outside the unit circle. The VAR satisfies stability condition.

Source: EViews author's own computation using yearly data (1980-2017).

Table 7.7 above clearly shows that all the roots of the VAR have a modulus of less than one. Thus, the estimated VAR models of all the BRICS countries under consideration fulfil the condition for stability.

7.5 STRUCTURAL SHOCKS AMONG THE BRICS COUNTRIES

The following tables present the extracting shocks results from the long-run effects SVAR model. The study used cross-country correlation analysis to examine the structural macroeconomic co-movements of disturbances in the BRICS countries. Macroeconomic structural shocks across countries are considered a crucial condition for integration in a common currency area. Furthermore, traditional OCA theory emphasises the importance of symmetric shocks for countries contemplating forming a monetary union. The decision criterion is that a positive and significant correlation indicates that the shocks are symmetric, while a negative or not statistically significant correlation implies that the shocks are asymmetric. The results of the correlations of both external and domestic supply shocks, demand and monetary shocks among the BRICS countries are analysed in the following subsections.

7.5.1 Correlations of structural shocks

The identification of the structural shocks was based on (Blanchard and Quah's (1988) identification framework. The results of the correlation of the structural shocks of the countries are presented in pairs.

7.5.1.1 Correlation of global supply shock

The result of the correlation of the global supply shock (World GDP) among BRICS countries is presented in Table 7.8 below.

Table 7.8. Correlation of the World supply shock

COUNTRIES	BRAZIL	RUSSIA	INDIA	CHINA	SOUTH AFRICA
BRAZIL	1.0000				
RUSSIA	0.404859 [2.619460]	1.0000			
INDIA	0.357185 [2.262377]	0.243099 [1.482671]	1.0000		
CHINA	0.602722 [4.468635]	0.410515 [2.663410]	0.756929 [6.852442]	1.0000	
SOUTH AFRICA	0.435418 [2.861460]	0.554911 [3.946222]	0.490236 [3.327568]	0.518879 [3.590971]	1.0000

Source: EViews author's own computation using yearly data (1981-2017).

Table 7.8 above presents the correlation of global supply shock across BRICS countries, with respect to the world GDP from 1981-2017. The results indicate that the correlations of external supply shock are positive and statistically significant except for India and Russia whose correlation is statistically insignificant. This means that the global supply shock between India and Russia has a certain degree of asymmetry. Nonetheless, the rest of the BRICS countries respond symmetrically to changes in global supply shocks. The

highest correlation (0.756929) in BRICS is between China and India, followed by China and Brazil (0.602722). The lowest correlation is between India and Russia (0.243099). Thus, higher correlations from external shocks suggest an OCA, which makes adoption of a single currency feasible. The benefit of the adoption of a common currency is reduced by bilateral exchange rate distortions brought about by external disturbances. Based on the results it is notable that BRICS economies respond in a similar fashion to external global shocks. That notwithstanding, more policy coordination between India and Russia is necessary to yield an OCA as far as external global shocks are concerned.

7.5.1.2 Correlation of domestic supply shock

The result of the correlation of the domestic supply shock among BRICS countries is presented in Table 7.9 below.

Table 7.9. Correlation of domestic supply shock

<i>COUNTRIES</i>	<i>BRAZIL</i>	<i>RUSSIA</i>	<i>INDIA</i>	<i>CHINA</i>	<i>SOUTH AFRICA</i>
<i>BRAZIL</i>	1.0000				
<i>RUSSIA</i>	0.368861 [2.347764]	1.0000			
<i>INDIA</i>	-0.334603 [-2.100623]	-0.164325 [-0.985560]	1.0000		
<i>CHINA</i>	0.285742 [1.764023]	-0.040240 [-0.238257]	0.075960 [0.450687]	1.0000	
<i>SOUTH AFRICA</i>	0.354362 [2.241914]	0.438921 [2.889944]	-0.056586 [-0.335304]	0.121032 [0.721337]	1.0000

Source: EViews author's own computation using yearly data (1981-2017).

Table 7.9 above represents the correlation of domestic supply shock across the BRICS countries. Across the pairs of countries, only 6 out of 10 pairs are

positively correlated, with the highest correlation being between Russia and South Africa (0.438921). The correlation between Russia and Brazil; China and Brazil; South Africa and Brazil and South Africa and Russia is positive and statistically significant. This implies that the domestic supply shocks are symmetrical in these countries. However, the correlation between India and Brazil; India and Russia; China and Russia and South Africa and India is negative meaning that the domestic supply shocks in these countries display some level of asymmetry. It will cost these countries to be part of a monetary union without appropriate policy coordination. The bottom line is that BRICS economies display different responses to domestic supply. The degree of difference can be due to the nature of their export commodities. Therefore, different adjustment policies are required.

7.5.1.3 Correlation of demand shock

The result of the correlation of the domestic shock among BRICS countries is presented in Table 7.10 below.

Table 7.10. Correlation of domestic demand shock

COUNTRIES	BRAZIL	RUSSIA	INDIA	CHINA	SOUTH AFRICA
BRAZIL	1.0000				
RUSSIA	0.233389 [1.378793]	1.0000			
INDIA	-0.05884 [-0.335387]	-0.141793 [-0.822854]	1.0000		
CHINA	-0.154425 [-0.897877]	0.083447 [0.481045]	-0.186082 [-1.087964]	1.0000	
SOUTH AFRICA	-0.174202 [-1.016252]	00.31561 (0.181392)	0.041085 [0.236213]	-0.195519 [-1.14527]	1.0000

Source: EViews author's own computation using yearly data (1981-2017).

Table 7.10 above provides the correlation coefficients of domestic demand shock among BRICS economies. The responses to demand shocks across the BRICS countries are completely different. Although there are some positive correlations, none of them is statistically significant. Out of the 10 pairs examined, only four pairs (Brazil-Russia; Russia-China; Russia-South Africa and India-South Africa) have a positive but statistically significant correlation. In other words, the overall results display asymmetric shocks as far as the domestic demand shocks are concerned. This once again calls for policy coordination amongst BRICS countries as a preliminary condition for an OCA.

7.5.1.4 Correlation of monetary shock

The result of the correlation of the monetary shock among BRICS countries is presented in Table 7.11 below.

Table 7.11. Correlation of monetary shock

<i>COUNTRIES</i>	<i>BRAZIL</i>	<i>RUSSIA</i>	<i>INDIA</i>	<i>CHINA</i>	<i>SOUTH AFRICA</i>
<i>BRAZIL</i>	1.0000				
<i>RUSSIA</i>	0.198567 [1.109695]	1.0000			
<i>INDIA</i>	0.039278 [0.215301]	0.102736 [0.565701]	1.0000		
<i>CHINA</i>	0.102511 [0.564449]	0.053530 [0.293616]	-0.33083 [-1.312809]	1.0000	
<i>SOUTH AFRICA</i>	0.113391 [0.625099]	0.021904 [0.120001]	0.214922 [1.205341]	-0.020860 [-0.114277]	1.0000

Source: EViews author's own computation using yearly data (1981-2017).

Table 7.11 presents the results of the monetary shocks. The results show positive but statistically insignificant correlations except for China-Russia and

South Africa-China correlations, which are negative. Clearly, BRICS economies display asymmetric monetary shocks. This implies that an OCA with respect to asymmetric monetary shocks is not feasible.

Overall, although the BRICS economies respond in a similar way to the external supply shocks, only Russia, Brazil, China and South Africa have a similar response to demand shock. These countries have symmetric responses to supply shocks with the exception of India. However, the significance of the degree of shock is low. The same goes for monetary shocks. China, Russia and South Africa do not respond symmetrically to monetary shock.

Having analysed the various shocks in the foregoing paragraphs; the next section presents the analysis of variance (*ANOVA*) and Levene test results.

7.6 One-Way ANOVA ANALYSIS

After the analysis of correlations results, it is important to examine the probability of equality and the degree of variance of the means of the series. A one-way ANOVA analysis was used to categorise the nature of the shocks (symmetric/asymmetric) across the BRICS countries. It is informative to know whether these shocks are heterogeneous (implying that forming a monetary union is costly) or homogeneous (implying that forming a monetary union is not costly). The basic idea is that if the identified shocks among BRICS countries have the same mean, the shocks are homogeneous, failing which they are heterogeneous. The size of the shock is measured by using a coefficient of variation (CV). A coefficient of variation value of less than one implies homogeneity among the sub-groups, whereas a CV value of more than 1 signifies heterogeneity among the sub-groups suggesting that the degree of variability among them is large.

The following Table 7.12 shows a summary of the results of both the one-way ANOVA test and the coefficient of variance test.

Table 7.12. The One-way ANOVA test and coefficient of variance

<i>Source of disturbance</i>	<i>One-way ANOVA</i>		<i>Coefficient of variance</i>	
	<i>(F-test)</i>		<i>(Levene-test)</i>	
<i>Shocks</i>	<i>Value</i>	<i>P-value</i>	<i>Value</i>	<i>P-value</i>
<i>Global supply shock</i>	86.98408	0.0000	3.861133	0.0049
<i>Domestic supply shock</i>	43.49514	0.0000	10.46250	0.0000
<i>Domestic Demand shock</i>	7.440534	0.0000	24.34353	0.0000
<i>Monetary shock</i>	22.61545	0.0000	7.970862	0.0000

Source: EViews author's own computation using yearly data (1981-2017).

As can be seen from the table above, shows, the supply, demand and monetary shocks differ across BRICS countries. Hence, the identified shocks are heterogeneous. Furthermore, CV values are greater than one with the domestic demand shock having a higher degree of variation from other shocks. This implies that policy responses are different across BRICS countries; hence, holding all other factors constant, the formation a monetary union in the BRICS economies will be costly under the current political and economic landscape.

After examining the heterogeneity versus the homogeneity of the shocks together with the degree of variations amongst them, it is equally important to examine the size of the shocks. This is done by the use of the impulse response function (IRF). The results of the IRF are reported in Table 7.13 below.

7.7 SIZE OF THE SHOCKS

Table 7.13 below reports the average magnitude of both external and domestic shocks across the BRICS economies. The different relative sizes of the shocks indicate whether the different stabilisation policies will be synchronous or whether a common stabilisation policy will address different macroeconomic

disturbances across BRICS countries. This implies that, if the identified shocks are larger, a common stabilisation policy will be ineffective.

Table 7.13. Size of external and internal shocks

<i>COUNTRIES</i>	<i>Global Supply shock</i>	<i>Domestic supply shock</i>	<i>Average supply shock</i>	<i>Demand shock</i>	<i>Monetary shock</i>
<i>BRAZIL</i>	1.950213	2.822592	2.3864025	-0.584312	0.532524
<i>RUSSIA</i>	4.172853	4.917046	4.5449495	-1.153266	0.168894
<i>INDIA</i>	0.779550	2.844163	1.8118565	0.008786	0.506345
<i>CHINA</i>	0.044453	0.207670	0,1260615	0.004888	-0.053167
<i>SOUTH AFRICA</i>	1.762548	2.296312	2.0294300	-0.632784	0.288618

Source: EViews author's own computation using yearly data (1981-2017).

Notably, Table 7.13 above shows that the largest shock is mainly the supply shock (average supply shock). Furthermore, a country with the largest supply shock (4.5449495) is Russia followed by China, which has the smallest supply shock (0.1260615).

The evidence from the variance decomposition of the variables in the SVAR suggests that BRICS countries differ significantly in how they respond to shocks. In addition, the impulses response functions and the analysis of the structural shocks suggest that BRICS countries do not respond symmetrically to all external shocks.

7.8 CONCLUDING REMARKS

The aim of this chapter was to model SVAR in the evaluation of the feasibility of the adoption of a single currency in BRICS economies. This was done by analysing the degree of symmetry and sizes of the identified shocks across member countries. The analysis was placed within a context of OCA theory. The chapter presented the results of the unit root test for all the variables for each BRICS country. The tests of serial correlation and stability were also conducted. Then, the model tested for the correlation of shocks to determine

the degree of symmetry or asymmetry and the impulse responses function to identify the size of shocks.

The findings show that the external supply shocks across BRICS countries are positive and symmetric. Thus, this implies that adoption of a single currency will greatly reduce bilateral exchange rate distortions caused by external disturbances. Nonetheless, there are some asymmetries in domestic supply, monetary and domestic demand shocks implying that BRICS countries respond differently towards these shocks. This means that with regard to these shocks, the BRICS integration fails to be an OCA, implying that a single currency will cost these countries. Such costs will include the loss of the ability to control monetary policy and interest rates in response to national economic conditions in member countries. It also means that each country's exchange rate would no longer respond to the cumulative effects of differences in productivity and global demand trends. In addition, the single currency would weaken the market signals that would otherwise warn a country that its fiscal deficits were becoming excessive.

CHAPTER EIGHT. ASSESSMENT OF FINDINGS, CONCLUSION, RECOMMENDATIONS, AND AREAS OF FURTHER RESEARCH

8.1 INTRODUCTION

The aim of this study was to present an analysis of financial integration in BRICS countries. This economic group has expressed its concern about the lack of representation in the IMF system. Therefore, there is a need to reform the international monetary system so that it could be more representative by reflecting the current changes taking place in the world economy. In an attempt to tackle the dollar dependency in the market and reduce the exchange rate's volatility, BRICS countries have engaged not only in using their national currencies in settling intra-BRICS transactions, but they have also stated their interest in forming a common currency area.

This study evaluated the feasibility of the adoption of a single currency in BRICS economies. This was done by analysing the degree of symmetry and sizes of the identified shocks across member countries. The analysis was placed within the context of OCA theory. The SVAR was employed on secondary data from 1980 to 2017 based on the AD-AS theoretical framework. The findings provide important policy implications for research policies and strategies for BRICS countries. This was the first empirical investigation of the feasibility of a monetary union for BRICS. Thus, this study paves ways for further empirical literature and opens up routes for investigation to be conducted on a BRICS currency union.

This chapter is structured as follows: Section 8.2 provides a summary of the main findings; Section 8.3 presents conclusions drawn from the study; Section 8.4 covers policy implications and recommendations; and lastly, Section 8.5 suggests some areas for further study.

8.2 ASSESSMENT OF THE MAIN FINDINGS

The purpose of the study was to investigate the feasibility of BRICS forming an OCA. In order to achieve this aim, the thesis began by providing a theoretical literature review, and then conducted an empirical analysis.

The thesis first presented the conceptual framework of the study by looking at the background of BRICS economies. This was followed by a literature review on the international monetary system. The foundation of the discussions was that there is a need for reform and more representation in the international monetary system to reflect the evolution of the world economy. The thesis then provided a literature review on economic integration as well, as it is the basic of any integration. This was followed by an extensive review of the theoretical framework of monetary integration: the OCA theory, followed by a presentation of past empirical studies of currency unions. As the research methodology, the study employed an SVAR model to analyse the underlying structural shocks of BRICS economies.

The main insights that can be drawn from the theoretical literature review discussed in Chapter Two was that, despite their different historical background and their heterogeneity in term of interest, policies can commonly represent the socio-economic and political issues affecting emerging and developing countries. Formed over a decade ago, the “BRICS” economic bloc has already marked its position in the global economy and the world of finance. As it is said, “actions speak louder than words”. The creation and implementation of the BRICS New Development Bank (NDB) and the settlement of transactions among BRICS countries using national currencies reflect the attempts of the “BRICS” economic bloc to further its objectives. However, the BRICS bloc countries aim to improve members’ status internationally, and create new opportunities among themselves. As developing and emerging economies, BRICS countries suffer from a lack of investment. Therefore, in order to enhance the flow of foreign direct investment into these countries and accelerate as well as improve the process of financing and development, there is a need to reduce the currency risk caused by unpredicted exchange rate

volatility and to promote long-term investment that can be consistent. While, the degree of financial integration depends on many factors, currency issues are also a fundamental cornerstone. Thus, forming a common currency area could enhance the process of trade, financial integrations and economic convergence among the countries partners.

Chapter Three outlined the importance for the international monetary system to be more representative of the current changes in the world economy and recognise the growing importance of emerging and developing economies. The international financial and monetary institutions, notably the World Bank and the International Monetary Fund (IMF) can draw lessons from past weakness and failures of international monetary arrangements in order to improve the global economic and financing system. Nevertheless not to undermine the importance and necessity of these institutions, the IMF and the World Bank are called to be refurbished to meet the demand of the current age. Despite the fact that these institutions provide a source of confidence and solution for stability for the international monetary system, reliability on and overconfidence in the dollar once drove the world economy into a financial crisis. Countries, especially developing economies, can look for ways to reduce the influence of the dollar in their economies. Since the successful adoption of the euro, countries are thinking of the possibility of a single currency area. Since the creation of the EMS, not only has it survived according to popular belief but it has also grown. Hence, it is worth considering what this experience reveals about the preconditions for maintaining pegged exchange rates.

Chapter Four undertook to describe the theoretical aspects of economic integration. The chapter outlined how globalisation has paved ways to liberalism (free trade policy), characterised by free trade agreements and market integration, such as eliminating price control, deregulating the capital market, notably the abolition of any trade obstructions and foreign exchange market integration lowering of trade barriers. The liberalisation of economic policy helps reduce trade and investment barriers, which has helped increase the flow of goods and services as well as factors of production and paves the way for economic integration. Nations are looking for ways to increase their

economic performance, tackle their unemployment issue and alleviate their poverty level; these are still main economic issues of developed as well as developing countries. The level of poverty and unemployment is usually reduced in countries engaged in economic integration. These objectives and ways of thinking have solidified to form the ideological cornerstone of the key bodies of the international financial and monetary institutions, which have highlighted the spread of the open market economy. Thus, economic integration is considered a key process for future world economic development. Yet most studies on economic integration were found to be mainly trade-related. However, there is a need for countries to go beyond trade transactions when engaging in economic integration. The essence of economic integration is for integrated countries to look after one another and not only regard one another as business trans-actors.

The theoretical framework for analysing the monetary integration aspect is the OCA theory. The aim of Chapter Five was to provide insights regarding the literature discussion on OCA theory within the framework developed by Robert Mundell as a theoretical background. Chapter Five showed that financial integration takes various aspects. It can be via monetary integration; the liberalisation of the capital account; regulatory convergence; and harmonisation. Monetary integration encompasses the integration of financial and banking systems along with policy coordination for the ultimate adoption of a common currency. The term “optimum” currency area implies the requirements for an efficiency-enhancing common currency. The concept of the OCA showed that under certain circumstances, it would be beneficial for countries to consolidate their currencies and form an OCA. The role of the exchange rate adjustments is to absorb the asymmetric shocks that arise under flexible exchange rate regime. This is why before forming a currency union or adopting a single currency, countries set to form an OCA have to assess the economic shocks (whether asymmetric or symmetric) of the region. One of the aspects in the analysis of OCAs is the assessment of (economic) shocks faced by the areas that might want to form or join a monetary union. Given the criteria specified in OCA theory, the symmetry of shocks among countries takes into

account how countries respond to the economic shocks they face. Thus, OCA theory focuses on features of the constituent member countries and facilitates adjustments to asymmetric shocks in the absence of exchange rate adjustments. Moreover, the degree of symmetry of shocks appears as a determinant criterion when establishing an OCA or currency union. The research adopted Mundell's OCA approach, as it was the appropriate theoretical framework to use in exploring whether there was a possibility of macroeconomic convergences among the BRICS economies. Asymmetric aggregate supply and demand disturbances across a region prevent the smooth functioning of a currency union. It was found that the importance of symmetric shocks within the region would constitute proof in favour of a currency peg. If on the other hand, country-specific shocks were prevalent and uncorrelated across countries, a currency area would be difficult to sustain.

Chapter Six presented the methodology of the research that investigated the feasibility of a monetary union in the BRICS countries. This chapter provided insight with regard to the SVAR model (SVAR). The model is widely used to determine whether future members of a monetary union can form an OCA. Most studies used a bivariate (two variables) structural vector autoregression model. However, this was the first empirical analysis of the feasibility of an OCA in the BRICS countries. One of the aspects that made this empirical investigation different was the use of a four-variable SVAR model. Research found that this was useful in obtaining shocks among bloc economies because of its ability to capture the evolution of and the interdependence between multiple time-series. The SVAR model allowed the measurement of the symmetry of shocks using correlation analysis, impulse response and variance decomposition. After testing the correlation of shocks, the research extended the study by applying the ANOVA in order to determine the statistical significance of the differences between the means of two values. Chapter Six also presented the variables used in the model and provided their sources.

Chapter Seven provided the results of the empirical analysis. The results indicated that the correlations of external supply shock were positive and statistically significant among most BRICS countries. This meant that the

BRICS countries responded symmetrically to changes in global supply shocks. Out of the 10 pairs of countries, only 6 pairs were positively correlated, with the highest correlation being between Russia and South Africa. The results showed that Russia, Brazil and South Africa responded positively to supply shocks. This implied that the domestic supply shocks were symmetrical in these countries. Results showed that, although there was a positive correlation among the BRICS countries in response to demand shock, their coefficients were all statistically insignificant. The BRICS economies displayed asymmetric monetary shocks, as the results showed a positive but statistically insignificant correlation to monetary shock. This implies that an OCA with respect to asymmetric monetary shocks is not feasible. To extend the empirical study, the research used a one-way ANOVA test, which helped to identify if the shocks among BRICS countries had the same mean, which would mean that the shocks were homogeneous, failing which they were heterogeneous. The results of both the one-way ANOVA test and the coefficient of variance test showed that the probability values were significant at 1% level, implying that the means of the supply, demand and monetary shocks differed across BRICS countries. Hence, the identified shocks were heterogeneous. Furthermore, the coefficient of variance values was greater than one, with the domestic demand shock having a higher degree of variation from other shocks. The result of size of the shocks showed that the largest shock was mainly the supply shock (average supply shock).

8.3 CONCLUSION

Two of the channels that countries can use to control their economy are monetary policy and fiscal policy. However, a monetary policy usually gives quicker results than a fiscal policy. A currency union deprives a country of the ability to utilise monetary policy to control its economy. Thus, a common currency deprives a country of one of the two methods of controlling its economy. That is why the OCA theory, the framework of monetary integration, outlines the preconditions for countries to assess before embarking on such crucial event. The benefits of a currency union are numerous; however, the

assessment of these pre-requisites is necessary in order to set the right path for a monetary union.

The overall results displayed a symmetric response to external and domestic supply shocks. However, BRICS countries responded asymmetrically as far as the demand and monetary shocks were concerned. Overall, BRICS would have difficulty agreeing on a common currency's exchange value. Furthermore, Russia would for instance like to see its currency stronger, as there is little demand elasticity in its exports (oil and other natural resources). China on the other hand follows a different policy option, as the country wants to keep its currency weak in order to promote a high level of exports. There is considerable demand elasticity and substitutability in the types of products China exports.

Moreover, BRICS countries display heterogeneous characteristics. A monetary union is not ideal if members are heterogeneous. A monetary union can be a state of affairs or a process that needs long and careful assessment and some pre-requisites have to be put in place first.

Institutions such as the IMF may need reform and more representation to reflect the evolution of the current world economy. Nevertheless, the IMF remains the only stable and reliable global institutional system. It is important to note as well that the benchmark of monetary union, the European monetary union, was first driven by political objectives. Therefore, this emphasises the importance of political integration as the basic of economic integration. Despite the pessimistic views on the creation of the euro, the European financial crisis following the 2008 and 2009 global financial crisis, and the recent quest of the British to exit the European Union (Brexit), the euro has proved to be strong and still maintaining its position in the IMF currency reserves. Yet, despite the countries in the eurozone not meeting the OCA criteria for the most part, the currency union has been working well in this region. Because of the diversity, heterogeneity among countries will always exist.

The creation of a single currency constitutes one of the highest levels of financial and economic integration. There is a great deal of literature and empirical evidence on the benefits of such integration, such as forming a big

common market, less transaction costs, stimulating mutual trade and investments, strengthening financial and fiscal discipline. Creating a single BRICS currency is desirable and a useful step on the way to better economic integration between the group members. However, preparatory work needs to be done. It is necessary to mention that a higher political level of integration is also required. A creation of a formal organisation with a permanent executive body is desirable. However, given the results from the selected variables used to identify the shocks, the study concluded that BRICS integration is currently not an OCA; and that a common currency for BRICS would be disastrous if created under the prevailing circumstances in BRICS economies.

In the global context, the global financial institutions (IMF) may need reform and more representation to reflect the evolution of the current world economy. Nevertheless, the IMF remains the only stable and reliable global institutional system. It is important to note as well that the benchmark of the monetary union, the European monetary union, was first driven by political objectives. Therefore, this emphasises the importance of political integration as the basis of economic integration. Yet, despite not meeting the OCA criteria for most part of the countries in the eurozone, the currency union has been working fine for this region. The essence of economic integration is to look after one another: no one must be left behind.

8.4 IMPLICATIONS AND RECOMMENDATIONS

Based on the findings of this research, the following policy implications and recommendations are presented.

More policy coordination is needed between India and Russia in order to form an OCA as far as external global shocks are concerned. BRICS economies displayed different responses to domestic supply. The degree of difference can be due to the nature of their export commodities. Therefore, different adjustment policies are also required. The overall results display asymmetric shocks as far as the domestic demand shocks are concerned. This once again calls for policy co-ordination amongst BRICS countries as a preliminary condition for an OCA. In addition, the BRICS economies display asymmetric

monetary shocks. This implies that an OCA with respect to asymmetric monetary shocks is not feasible, as policy responses would differ across BRICS countries. Hence, the formation of a monetary union in BRICS economies would be costly under the current political and economic landscape.

Furthermore, the way to a BRICS currency union would be long and complicated. To move forward, BRICS countries should first create a free trade zone between the BRICS members.

Secondly, there is a need to establish a customs union that allows the free movement of goods, services and capital in order to move closer to creation of a single market. It is also desirable to create a common labour market. The needed precondition here is abolishing travelling and working visas for citizens of the BRICS countries, which could become a sensitive political issue.

Thirdly, the integration of financial markets will be required, which means the unification of financial and banking rules and some kind of supranational oversight (a single regulatory body). In addition, there will also be a need for full openness of capital account and current account transactions. Some countries, for example, China, are retaining substantial restrictions on their capital movements. Moreover, harmonising basic macroeconomic parameters is also a necessary precondition for a currency union. All BRICS members need to adhere to similar parameters of budgetary deficit and inflation, which is necessary to avoid the negative extremes of opposing business cycles in different countries.

From a short-term perspective, BRICS should focus on increasing intra-BRICS trade and investments and also on facilitating payments and transfers in the national currencies. There is some progress in that direction, as BRICS currencies are becoming more internationalised and more widely used for international trade and investments. The five countries should make efforts to remove remaining infrastructural and regulatory obstacles to using BRICS currencies abroad and move further in the development of BRICS payment mechanism.

Given that currency adoption is a two-sided market problem that has positive network externalities, the only way BRICS nations can challenge the existing international monetary order is through coordination. More work needs to be done to convince politicians and policy makers that it is a useful goal to pursue. Institutions like the NDB and BRICS central banks could be tasked to gauge the feasibility of policy coordination and build consensus towards this goal. It is important to note that transition to the single European currency was very long and complicated. The creation of a currency union needs many preconditions and preparatory work. The main obstacles to a single BRICS currency are the geographical and economical diversity of the member countries, differences in economic models and regulation regimes. BRICS countries should have a fair and sound financial system to ensure the productivity and prosperity across the whole population.

A well-balanced, fair and carefully considered financial and economic policies can make BRICS and other countries the greatest guardian for the international financial system. Therefore creating their own currency for trading and new international trade agreements can be a beneficial yet crucial step for deeper integration among the BRICS partners (“BRICS Bank announces first set of loans,” 2016).

Despite the problems of social inequality and poverty that BRICS economies face, one cannot disregard the importance of the impacts of their actions in the global financial and economic architecture.

This research was carried out in the context of BRICS countries, and thus implications and recommendations may be limited to this context. Therefore, caution should be observed when implementing the abovementioned policy recommendations due to limitations of this study.

The next section explains the limitations of the study and indicates areas for further studies

8.5 AREAS OF FURTHER RESEARCH

This study might pave the way for further research on the feasibility of a common currency in the BRICS bloc. The SVAR model is an interesting and useful model to apply as an econometric approach. However, the OCA theory is the only suitable theoretical framework for analysing a monetary union or currency union.

This thesis limited its scope to the empirical analysis of the feasibility of financial integration (single currency use) among BRICS economies by considering only the symmetry of shocks among the OCA criteria outlined in the theory.

In addition, financial integration is a wide field of study that encompasses not only monetary integration but other social dimensions as well. Although a monetary union is one important aspect of financial integration, the adoption of a single currency involves various processes. Thus, the analysis of the political and financial aspects of the integration process was not the domain of this research study, and it may be recommended for further future study.

Moreover, It is also recommended that further tests be conducted using financial market instruments to establish whether the structural shocks are symmetric or asymmetric in BRICS countries. The use of different models, such as the dynamic stochastic general equilibrium modelling (DSGE) or the general purchasing power parity (GPPP) method can be suggested for further studies in analysing the feasibility of a monetary union among BRICS countries. Moreover, the global VAR model could be an appealing area for further empirical study on the BRICS integration.

Lastly, there are costs in establishing a single currency regime. It requires another extensive investigation both theoretical and empirical to derive the costs-benefits from a single currency. Further study could assess the benefit-cost ratio of implementing a common currency for the BRICS bloc.

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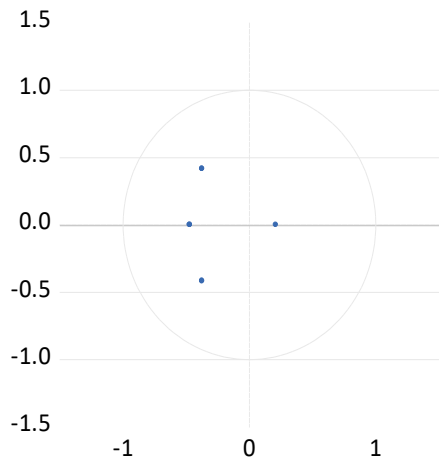
Zehirun, M. F., Breitenbach, M. C., & Kemegue, F. (2014). A Greek Wedding in SADC? Testing for Structural Symmetry Towards SADC Monetary Integration. *African Finance Journal*, 16(2), 16-33.

Zehirun, M. F., Breitenbach, M. C., & Kemegue, F. (2015). Assessment of Monetary Union in SADC: Evidence from Cointegration and Panel Unit Root Tests. *The Economist*, 4(1), 4–10.

APPENDIX A. AR ROOT TEST

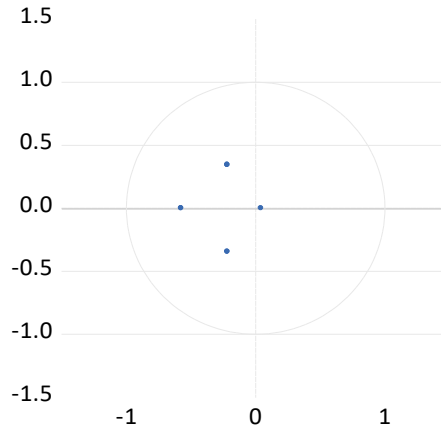
BRAZIL

Inverse Roots of AR Characteristic Polynomial



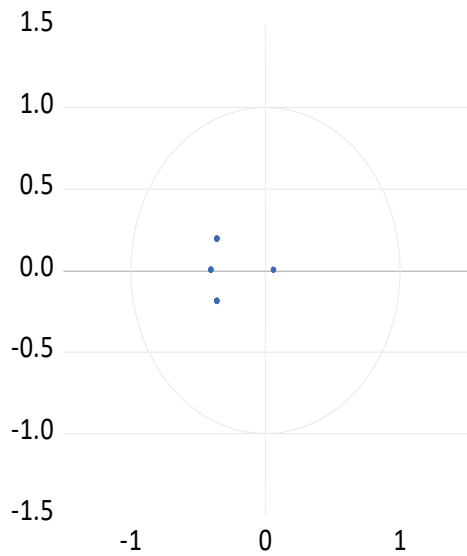
RUSSIA

Inverse Roots of AR Characteristic Polynomial



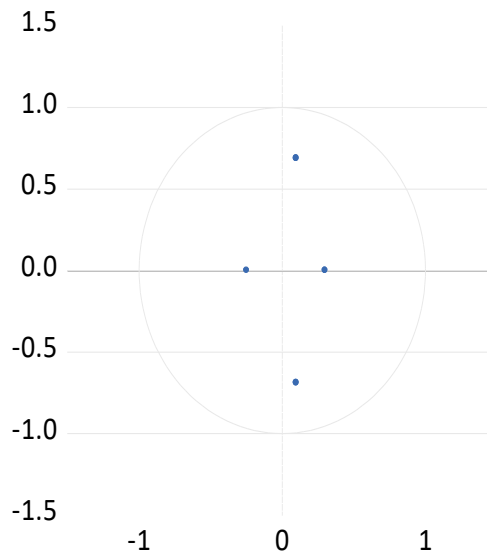
INDIA

Inverse Roots of AR Characteristic Polynomial



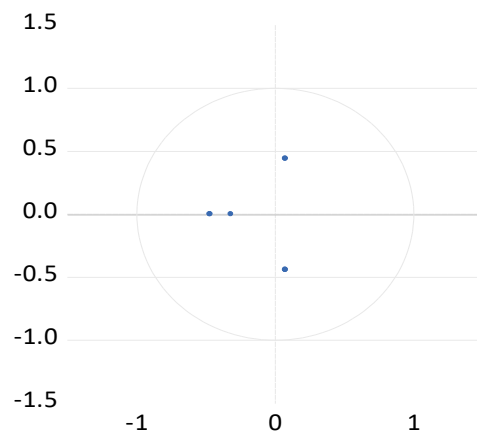
CHINA

Inverse Roots of AR Characteristic Polynomial



SOUTH AFRICA

Inverse Roots of AR Characteristic Polynomial



No Roots lies outside the unit circle. The VAR satisfies stability condition.

APPENDIX B. LIST OF PUBLICATION

The following paper have been submitted from this thesis:

Conference

- Ronney Ncwadi and Marida Nach (May 24-27, 2019). Is BRICS Economic Integration an Optimum Currency Area? Feasibility of Financial Integration in BRICS countries: A Structural Vector Autoregression Approach. *Shanghai Forum, Fudan University*. Shanghai, People's Republic of China.

APPENDIX C. SUMMARY OF EMPIRICAL LITERATURE REVIEW

AUTHOR	TITLE	REGION	METHODS	FINDINGS	RECOMMENDATIONS
Bayoumi and Eichengreen (1993)	Shocking Aspects of European Monetary Integration.	EU	SVAR	Although small, European countries exhibited correlation of shock. However the region had slow response to aggregate shocks in general.	It would be costly for European countries to form a monetary union.
Gosh and Wolf (1994)	How Many Monies? A Genetic Approach to Findings Optimum Currency Areas	US, Europe, the G-7, Former Soviet Union, CFA zones, and world	Genetic Algorithm	The costs outweighed the benefits of adopting a single currency and costs the US states some 2.6 percent of gross state product (GSP) each year	neither Europe nor the United States form an optimum currency area.
Mkenda and Beatrice Kalinda (2001)	Is East Africa an Optimum Currency Area?	EAC	G-PPP	The three countries tend to be affected by similar shocks	Supported the formation of a currency union in the region.
Ismath Bacha, O (2005)	A Common Currency Area for MENA Countries? A VAR Analysis of viability.	MENA	VAR	Despite the symmetry seen in the impulse response functions, variance decomposition showed the absence of any meaningful influence of countries on each other within the bloc	A Common Currency Area is neither a feasible nor a sensible aspiration for now. Their more urgent need aside from enhancing intra-regional trading would be to break away from the vicious cycle of exchange rate deviation, BOP problems and devaluation.
Huang, Ying and Guo, Feng (2006)	Is currency a feasible option in East Asian Monetary Union In West Africa and asymmetric shocks: A dynamic structural factor model approach	ASEAN	SVAR	Identified various types of symmetric shocks in nine East Asian economies	Suggested a common currency zone
Houssa, Romain (2008)	Are East African Countries Ready for a Common Currency? A Structural Vector Autoregression Analysis	WAMZ	Dynamic structural factor	Positive demand shocks correlation in both region but asymmetric supply shocks.	Did not favor a monetary union in the West Africa Do not yet constitute an Optimum Currency Area (OCA)
Falagiarda, M (2009)	Is the East African Community an Optimum Currency Area?	East African Community	SVAR	Asymmetric of shocks: the five economies respond quite differently to shocks	Can be a potential optimum currency area
Kishor and Ssozi (2009)		East African Community	SVAR	Degree of synchronization	OCA Viable but did not suggest a formation of a common currency at least not at that moment
Hsu, Hsiu-Fen (2010)	Is a common currency feasible for East Asia? A multivariate structure vector autoregression	ASEAN	SVAR	Symmetric global and regional shocks	
Buigut, Steven (2011)	A Fast-Track East African Community Monetary Union? Convergence Evidence from a Cointegration Analysis	EAC	VAR	Partial convergence for the variables considered.	Substantial costs for the member countries and this implies the EAC countries (Kenya, Tanzania, Uganda, Rwanda and Burundi) need significant adjustments to align their monetary policies
Numa, Moises (2011)	The Feasibility of a Monetary Union in MERCOSUR	MERCOSUR	OLS, Granger Causality	Based on the results from the OLS Regression model, the paper suggested that Latin America (MERCOSUR) was not economically and politically ready for a currency union	To develop into an optimum currency area, several actions must first occur: Argentina, Brazil, Paraguay and Uruguay must increase their level of integration amongst each other, improve their economic performance, and lastly, all four countries must believe and act in such a way that shows they are unified under a single goal
Sheikh, Yusuf and Aslam (2013)	Feasibility of a monetary union in the East African Community: A structural autoregression model	EAC	SVAR and the synchronised business cycle	EAC region shows some degree of shocks correlation	It will benefit to form an OCA
Zerihun, Breitenbach and Kemegue (2014)	A Greek Wedding in SADC? Testing for Structural Symmetry toward SADC Monetary Integration	SADC	Triples test	Half of the countries in the SADC region have asymmetric business cycle and the other half demonstrated positive correlation of business cycle.	Did not support the region's entry into the monetary union
Zerihun, Breitenbach and Kemegue (2015)	Assessment of Monetary Union in SADC: Evidence from Cointegration and Panel Unit Root Tests	SADC	GPPP	Cointegrating relationships amongst the system of RERS	The region is potentially an OCA that could proceed with monetary integration
Harvey and Cushing (2015)	Is West African Monetary Zone (WAMZ) a common currency area?	WAMZ	SVAR	Region does not have common sources of shock and asymmetrically to common supply, demand and monetary shocks	The authors suggested further integration and convergence before embarking to the common currency formation
Ogunkola, O (2015)	An Evaluation of the Viability of a Single Monetary Zone in ECOWAS	ECOWAS	Real Exchange rate model	Only the lack of fiscal convergence is the obstacle to the formation of a monetary union	Region suitable for an OCA
Basnet and Pradhan (2017)	The role of real and financial sectors Feasibility of Monetary Union in the SADC and EAC: Evidence from Business Cycle Synchronisation	MERCOSUR	VAR	The key macroeconomic variables (real output, investment, and intra-regional trade) share common trends in the long run	Support the formation of an OCA for deeper integration in Mercosur
Redda and Muzindutsi (2017)		SADC & EAC	VAR	There is a lack of business cycle synchronisation in the two economic regions.	It is not feasible to form a monetary union in these two economic regions

APPENDIX D. RAW DATA USED IN THE REGRESSION ANALYSIS

Year	WorldGDP	brGDPRate	brExRate	brInflation	rGDP	rExRate	rInflaRate	indGDP	indExRate	IndflaRate	chGDP	chExRate	chInflaRate	saGDPRate	saExRate	saInflaRate
1980	4.15877623	9.11096016	80.9051088	313.377959	0.72144	79.83	70.25	6.73582153	57.05	11.3652609	7.80669145	265.47603	5.20922	6.62058508	161.335311	13.6602472
1981	1.85947203	-4.3933572	94.0691877	101.725073				6.00620362	60.91	13.1151048	5.17241379	238.264198		5.36073742	169.904173	15.2542377
1982	1.93692935	0.58024555	101.966818	100.543359				3.47573324	55.24	7.88727066	8.93442623	227.308117		-0.38339077	160.998914	14.6390373
1983	0.39033864	-3.40979347	78.2162724	135.027516				7.2888929	59.8	11.868864	10.8352144	223.430438		-1.84654448	177.124302	12.3032072
1984	2.42446008	5.26914315	69.7568649	192.122003				3.82073786	62.42	8.32157969	15.1391718	199.143495		5.09911491	156.315337	11.5264804
1985	4.51877999	7.94586175	67.4694945	225.989959				5.25429922	63.16	5.55555556	13.4433962	169.0403		-1.21148372	118.630537	16.2942261
1986	3.73376258	7.9882951	64.3937519	147.142683				4.77656417	51.75	8.7308114	8.93970894	122.11767		0.01783478	109.499837	18.6549269
1987	3.40687614	3.59962947	66.8380872	228.336258				3.96535563	51.78	8.79868902	11.6889313	105.493564	7.23383553	2.10073522	123.663709	16.160595
1988	3.68860507	-0.10267272	66.1418213	629.113193				9.62778292	29.6	9.38477581	11.2345152	115.094697	18.8118179	4.20013255	116.790707	12.7795442
1989	4.62393581	3.27945886	88.6008099	1430.72507				5.94734333	15.27	3.26256011	4.1858679	133.935235	18.2456384	2.39478416	117.748906	16.3730886
1990	3.67741165	-3.10235595	109.869047	2947.73307	-2.99999564			5.53345456	39.97	8.97123354	3.9071139	98.8172917	3.05229012	-0.31778568	121.448603	14.3209758
1991	2.91539941	1.51193724	92.3682669	432.786664	-5.04693945			1.05683143	49.03	13.8702461	9.29407591	86.7944258	3.55668565	-1.01821987	126.211063	15.334782
1992	1.43106396	-0.46691321	81.2652454	951.962053	-14.5310738			5.48239602	53.8	11.7878193	14.2161636	83.1074829	6.35398134	-2.13705689	130.28595	13.8747029
1993	1.78058023	4.66516899	85.4557185	1927.38079	-8.66854034		874.24572	4.75077622	36.38	6.36203866	13.867576	88.4333863	14.6100786	1.2351991	127.699996	9.71744832
1994	1.53219607	5.3345517	89.0372988	2075.8884	-12.569756	47.9726437	307.722636	6.65892407	46.47	10.2115003	13.0521587	69.3321353	24.2569844	3.2000105	122.307243	8.93854357
1995	3.00959101	4.41673135	97.4211505	66.0070336	-4.14352841	59.0938413	197.414268	7.57449184	47.69	10.2248876	10.9492274	77.2768397	16.791227	3.09999542	118.994666	6.68042627
1996	3.03345369	2.20753553	102.787558	15.7576656	-3.6	72.6010955	47.7520122	7.54952225	47.61	8.97714908	9.92837246	84.9096968	8.31315334	4.29999896	109.508132	7.35412886
1997	3.38647197	3.39502864	105.445268	6.92671252	1.4	77.5321176	14.7613293	4.04982085	49.23	7.16425362	9.23076923	91.4635265	2.7864685	2.60000212	115.818739	8.59777074
1998	3.70453603	0.33835618	102.508344	3.19507629	-5.3	68.3995896	27.6856798	6.18441582	86.49	13.2308409	7.83761392	96.3774717	-0.77318235	0.50000091	106.526118	6.88055254
1999	2.53811235	0.46906659	68.161407	4.8584475	6.4	46.7508147	85.7464941	8.84575556	100	4.66982102	7.66748617	91.1542751	-1.40147381	2.39999624	100.804138	5.1814878
2000	3.25215452	4.11248424	73.5114431	7.04414106	10	52.7170168	20.7987607	3.84099116	77.75	4.00943396	8.49150849	91.2487777	0.34780626	4.20000348	97.782764	5.33895158
2001	4.38416422	1.38283203	61.3889915	6.84035902	5.09198423	61.9572478	21.4770072	4.82396626	36.61	3.68480726	8.33991055	95.1989844	0.71913244	2.69999457	86.3720819	5.70190483
2002	1.92005159	3.05401649	58.5201685	8.45016438	4.7436699	64.8476565	15.7887308	3.80397532	31.66	4.39219974	9.13064594	93.0433442	-0.7319755	3.70038235	74.0740353	9.49470667
2003	2.2009916	1.13988687	55.3040471	14.7149197	7.29585433	67.1151947	13.663293	7.86038148	28.39	3.80586592	10.035603	86.9597148	1.12760196	2.94907914	96.1647502	5.67941806
2004	2.89668866	5.76441161	58.0713753	6.5971851	7.17594919	72.4003195	10.8886157	7.92294342	100	3.76723848	10.1112235	84.6096013	3.82463762	4.55455274	102.115558	-0.69203014
2005	4.36664815	3.19646411	70.9148977	6.86953721	6.37618703	79.3519506	12.685304	9.28482462	103.1	4.24635332	11.3957759	84.1299642	1.77641617	5.27705631	102.235713	2.06285223
2006	3.84151399	3.95729683	79.1277502	4.18356813	8.15343197	87.2271986	9.66865455	9.26396476	101.3	6.14552239	12.719479	85.6223534	1.6494331	5.60379766	96.8962077	3.24390167
2007	4.29209275	6.06035358	85.0470047	3.64127299	8.53508021	92.0282175	9.00729869	9.80136034	108.5	6.36999675	14.231388	89.0747518	4.81676531	5.36047589	90.4608411	6.17781207
2008	4.21938608	5.09085791	88.8530905	5.6785939	5.24795353	98.3775913	14.1107678	3.89095706	97.8	8.35181644	9.65428937	97.0067949	5.9252529	3.19104674	79.4663399	10.055282
2009	1.8164128	-0.12577515	88.0855624	4.8880348	-7.82088503	91.6426028	11.6473296	8.4797839	94.7	10.8773911	9.39981317	100.532823	-0.72817133	-1.53808933	86.5347834	7.26456215
2010	-1.73328657	7.54179864	100	5.0387269	4.50372563	100	6.8493923	10.2599631	102.3	11.9922969	10.6361405	100	3.17532798	3.03973081	100	4.06353897
2011	4.31652076	3.98527761	103.520248	6.63636935	5.28488542	104.946416	8.44046486	6.63836259	99.2	8.8578453	9.53644301	102.946715	5.55389706	3.28416814	97.9751451	5.01715773
2012	3.1846309	1.93310789	93.1847734	5.40355339	3.65590157	106.570839	5.07474301	5.45638875	89.9	9.3124456	7.85626211	108.651737	2.61952616	2.1335481	92.8002299	5.72394366
2013	2.51342794	3.01030558	87.9401115	6.20433595	1.7853545	108.495199	6.75466834	6.3861064		10.9076433	7.75763515	115.476922	2.62104903	2.4852005	83.0717454	5.77640414
2014	2.61742145	0.50821025	87.1169605	6.32915223	0.73860077	99.3466218	7.8201697	7.41022761		6.65757782	7.29766596	119.048621	1.92164342	1.8469916	77.9403082	6.13602015
2015	2.85900437	-3.54976725	73.4258449	9.02980719	-2.82824081	82.0829682	15.534396	8.15442503		4.90697344	6.90020482	131.112438	1.43702451	1.27954928	77.5116464	4.50920828
2016	2.85551131	-3.46816286	78.302247	8.7391283	-0.22491098	81.0644575	7.04243725	7.1126861		4.94821634	6.7	123.786792	2	0.56534494	72.0144418	6.59460441
2017	2.51346906	0.97608568	85.858051	3.44636783	1.54563023	93.435298	3.68333072	6.68118228	64.69	3.32817337	6.9	120.624882	1.59313725	1.31674486	81.1974959	5.18108223

APPENDIX E. ETHIC CLEARANCE APPROVAL LETTER

Chairperson: Faculty R&E Committee
Faculty of Business and Economic Sciences
Tel. +27 (0)41 504 2906



Date: 25 October 2018
Ref: **H-18-BES-DTS-038 [Approved]**
Contact person: Dr Marle van Eyk
To: Prof R Ncwadi
Nelson Mandela University
Economics Department
South Campus

Dear Prof Ncwadi,

PROJECT PROPOSAL: FINACIAL INTEGRATION IN THE BRICS COUNTRIES (DOCTORAL)

PRP: Prof R Ncwadi
PI: Ms MN Nach

Your above-entitled application for ethics approval served at Fac R&E Committee.

We take pleasure in informing you that the application was approved by the Committee. However, please note that the approval is on condition that permission to conduct the study is also obtained from the other relevant individuals, parties, organisations and/or role players to which the study pertains.

The ethics clearance reference number is **H-18-BES-DTS-038**, and is valid for three years. Please inform the Faculty R&E Committee, via the faculty representative, if any changes (particularly in the methodology) occur during this time.

Please inform your co-investigators of the outcome.

Yours sincerely

A handwritten signature in black ink, appearing to read "MEyk".

Dr M van Eyk
Faculty of Business and Economic Sciences

APPENDIX F. PROOF OF LANGUAGE EDITING



One Stop Solution
24 Firenze Gardens
Warbler Road
Cotswold Ext
Port Elizabeth 6045
www.onestopsolution.co.za

TO WHOM IT MAY CONCERN

I, Maureen Klos, declare that I have done the language editing for the thesis of:

MARIDA NEPHERITI NACH

entitled:

FINANCIAL INTEGRATION IN THE BRICS COUNTRIES

Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in Development Finance in the Faculty of Business and Economic Sciences at the Nelson Mandela University

I cannot guarantee that the changes that I have suggested have been implemented nor do I take responsibility for any other changes or additions that may have been made subsequently.

Any other queries related to the language editing of this thesis may be directed to me at 076 481 8341.

Dated at Port Elizabeth on 27 February 2020

Dr. M.L. Klos