

UNIVERSITY OF GHANA
COLLEGE OF HUMANITIES

REMITTANCES, BANK-BASED FINANCIAL DEVELOPMENT AND ECONOMIC
GROWTH: EMPIRICAL EVIDENCE FROM GHANA

BY

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DECLARATION

I hereby declare that this work is the result of my own research. This work, in part or in whole, has neither been presented by me nor anyone for an academic award in this university or any other university except that which is duly acknowledged in the text.

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CERTIFICATION

I hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

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DATE

DEDICATION

This Thesis is dedicated to:

The blessed memory of my father

Mr. Andrews Fuseini Salifu (Rtd. Educationist)

&

My Mother: Mrs. Sarah Azaratu Mahama

My Siblings: Jonathan, Peter, Mark, Joyce and Moses

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ABSTRACT

The study investigates the potential non-linear and asymmetric impact of remittances and bank-based financial development on economic growth and also the potential mediating role of bank-based financial development in the remittance-growth nexus. The study used the newly developed Non-linear Autoregressive Distributed Lag (NARDL) model by Shin et al. (2014) on annual data for Ghana from 1979 to 2017 for the analysis.

The study finds that remittances have a non-linear and asymmetric impact on growth in both the long and short run when the banking system is generally developed and specifically when it is accessible and efficient. The study also finds bank-based financial development to have a non-linear but symmetric impact on growth in both the long and short run. Again, the study finds evidence for the credit constraint hypothesis which posits that when the financial system is less developed or economic agents are unable to access credit, then recipients of remittances could rely on the amounts received to start or finance their businesses.

It is recommended that policies geared towards sustained cumulative increases in remittance flows to Ghana should be promulgated and implemented. And policies to make remittance recipients come into contact with banks as well as incentives to make the remittances received through banks stay long enough to be channeled into productive investments should be initiated and implemented.

Key Words: Non-linear, Asymmetric, Remittances, Bank-based financial development, Economic growth, Non-linear Autoregressive Distributed Lag (NARDL), Ghana, Credit Constraint hypothesis.

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LIST OF ABBREVIATIONS

2SLS-IV	Two Stage Least Squares Instrumental Variable
ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
DGMM	Difference Generalized Method of Moments
ECM	Error Correction Model
ECOWAS	Economic Community of West African States
EU	European Union
FD	Financial Development
FDI	Foreign Direct Investment
FE-2SLS	Fixed Effects Two Stage Least Squares
FI	Financial Institutions Index
FIA	Financial Institutions Access Index
FID	Financial Institutions Depth Index
FIE	Financial Institutions Efficiency Index
FMOLS	Fully Modified Ordinary Least Squares
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GDPPC	Gross Domestic Product Per Capita
GMM-IV	Generalized Method of Moments Instrumental Variable
INF	Inflation
LAC	Latin America and the Caribbean
MLICs	Middle to Low Income Countries
NARDL	Non-linear Autoregressive Distributed Lag
ODA	Official Development Assistant
OECD	Organization of Economic Co-operation and Development
OLS	Ordinary Least Squares
OLS-IV	Ordinary Least Squares Instrumental Variable
PCA	Principal Components Analysis
PDOLS	Panel Dynamic Ordinary Least Squares
PMG	Pooled Mean Group
PVAR	Panel Vector Autoregressive
REM	Remittances
SA	South Asia
SBIC	Schwarz Bayesian Information Criterion
SGMM	Systems Generalised Method of Moments
SSA	Sub-Saharan Africa
SUR	Seemingly Unrelated Regressions
TFP	Total Factor Productivity
TOPEN	Trade Openness

UK	United Kingdom
UNDESA	United Nations Department of Economics and Social Affairs
USA	United States of America
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WDI	World Development Indicators
ZA	Zivot Andrews

CHAPTER ONE

INTRODCUTION

1.1 Study Background

On average, after adjusting for purchasing power parity, wage levels in high-income countries are five times that for similar occupations in developing countries (World Bank, 2006). This serves as a pull factor for migration into United States, Europe and other developed countries (Todaro & Smith, 2012). For instance, the stock of international migrants (including refugees) in 2017 stood at 258 million (UNDESA, 2017). However, adjusting this migration data with recent figures from the USA, UK, Australia, Germany and migration data from OECD, the records of international migrants in 2017 excluding refugees could be approximately 242 million (World Bank, 2018). The stock of international migrants is expected to increase and remain robust given that the population of developed economies is aging (Chami, Barajas, Cosimano, Fullenkamp, Gapen & Montiel, 2008), hence, the demand for migrant-labour would increase coupled with the fact that there is no end in sight as to when industrial wage levels in developing countries would rise significantly to the wage levels of industrialised economies to discourage skilled-labour from embarking on job seeking migration (Ahortor & Adenutsi, 2009). That is, the demand for migrant labour force is projected to gain momentum going in to the future, hence, more remittance flows to home countries.

Notwithstanding the fact that migration has some negative consequences in the home country manifesting in brain-drain and the distortions of social and cultural norms; it is considered as one of the ways households can reduce their exposure to risks in the sense of diversifying their sources of income (Ratha, 2007). Remittances as an off-shoot of migration are one of

the most important benefits to the home country. For instance, remittances are considered as a crucial source of capital to propel economic growth and development of recipient countries (Ratha, 2003). Chami et al. (2008) defined remittances as “the unrequited, nonmarket personal transfers between households across countries”.

Discussions of remittances as an offshoot of migration and development are not a Greenfield. However, recent upward trends in remittance flows to migrant`s countries of origin has led to the resurgence of great interest in remittance flows and its growth potential among scholars, growth researchers and policymakers. The heightened interest on the subject matter of remittances is mainly driven by the sharp rise of transfers to developing countries in recent years (EU, 2014). For instance, remittances to the developing world was US\$ 342 billion in 2010; US\$ 350 billion in 2011; US\$ 401 in 2012; US\$ 414 billion in 2013 and by 2017 it was US\$ 466 and projected to grow further to US\$ 485 in 2018 and US\$ 503 in 2019 (World Bank, 2018). See Table 1.1 below.

Table 1.1 Flow of remittances to countries by region (in Billions of US\$)

Year	East Asia and Pacific	Europe and Central Asia	Latin America and Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa
2010	96	38	57	39	82	30
2014	121	52	65	54	116	37
2015	126	41	68	51	118	36
2016	123	40	74	49	110	34
2017	130	48	80	53	117	38
2018F	135	51	83	56	120	41
2019F	140	53	87	57	123	43

Source: World Bank, 2018. F stands for forecasted figures

As can be seen from Table 1.1 above and much more vividly from Figure 1.1 below, it is clear that remittance flows to the developing world is on a constant upward trend since 2010 to 2017 and it is forecasted to continue its upward trend into 2018 and 2019. It is also clear that East Asia and Pacific is the highest recipient of remittances among the regions closely followed by SA. SSA is the least remittance destination among the regions after Europe and Central Asia.

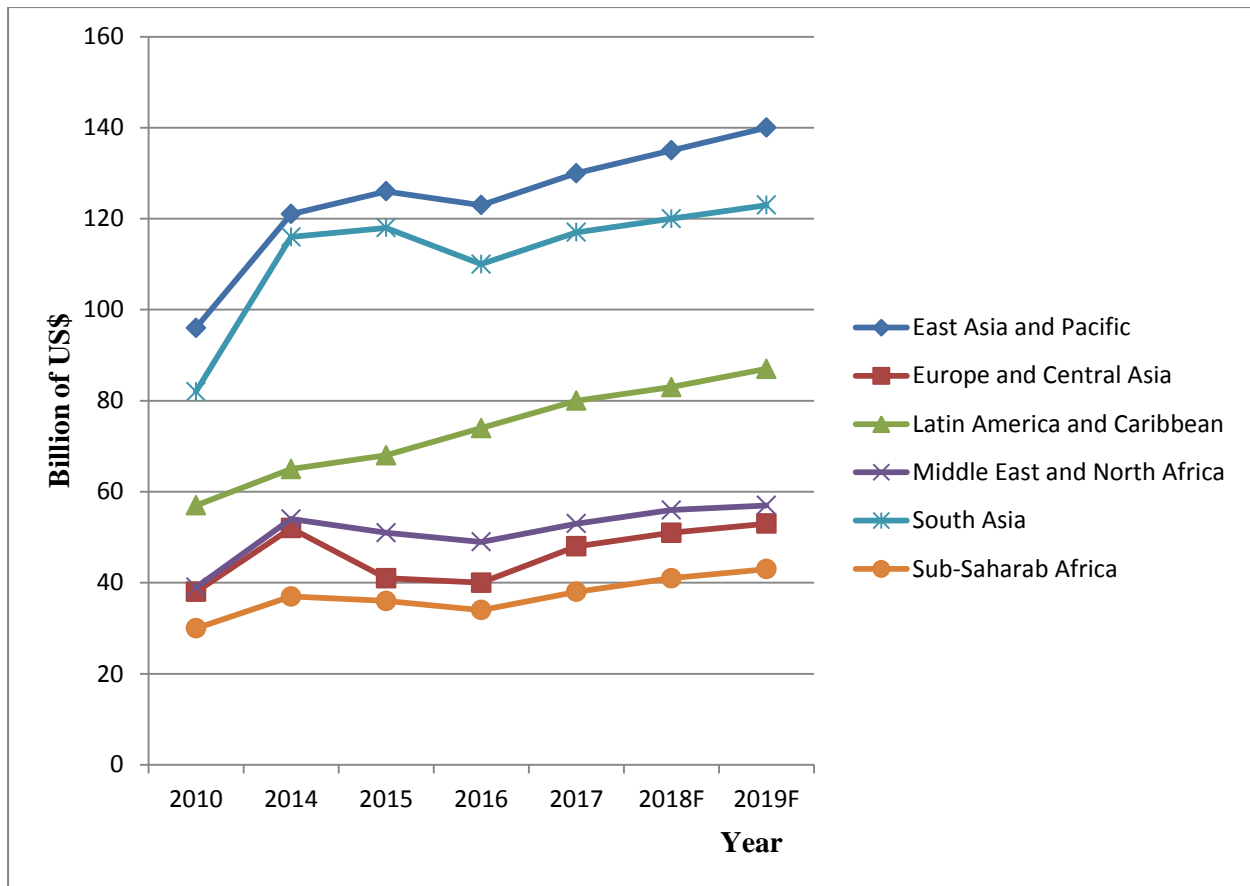


Figure 1.1 Flow of remittances to countries by region, 2010-2019 (In Billions of US\$)

Source: World Bank, 2018 and Authors construction.

Among external private inflows, remittance flows are identified to be the most predictable, less volatile and countercyclical external capital inflow to developing countries and sometimes overshadow ODA in particular and FDI (Chami, Fullenkamp & Jahjah, 2003; Giuliano & Ruiz-Arranz, 2009; Aggarwal, Demirguc-Kunt & Peria, 2011; Ratha, 2013; World Bank, 2018). For instance, Chami et al. (2003) and Ratha (2007) reports that remittances are countercyclical in that they are compensatory transfers which increase when situations in the home country are adverse – economic hardship, natural disasters and conflicts. For remittances being less volatile, Ratha (2013) posit that at the onset of the 2009 global financial crises, remittances to the developing world declined by approximately 5% while FDI fell by an approximate 33%; by 2011 remittances rebounded and rose by 25.29%,

however, FDI struggled to regain its 2008 recorded values. Thus, in 2009 and 2011, recorded remittances were almost three times more than ODA and half or as large as FDI to the developing world (World Bank, 2011, 2018; Salahuddin & Gow, 2015). This is depicted in Figure 1.2 below.

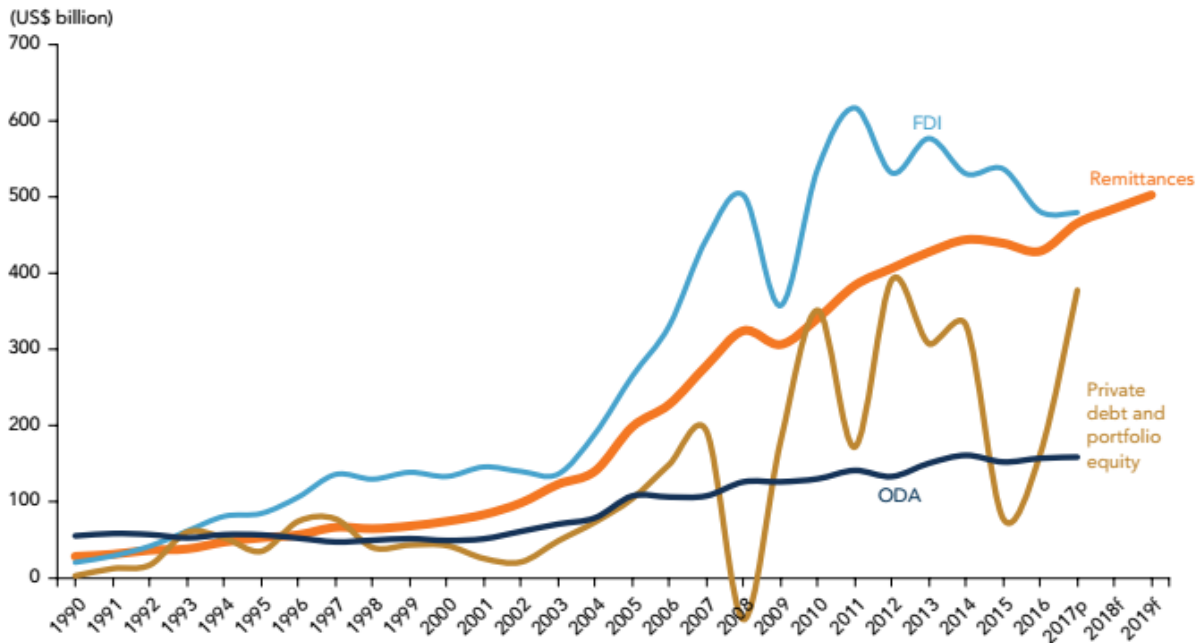


Figure 1.2 Flows of external capital to developing countries, 1990-2019 (Billions of US\$)

Source: Adopted from World Bank staff estimates, in Migration and Development Brief 29, page 3, World Bank (2018).

Although Ghana is not among the top remittance destinations, the phenomenon of remittances (REM) being larger than other external capital inflows, like FDI and ODA, to developing countries in recent years is evident. Over the years, remittances (% of GDP) to Ghana relative to FDI(% of GDP) and ODA(% of GDP) on annual basis was less than 0.5% but as off 2011 remittances (% of GDP) shot up to 5% and further to 10% in 2015. When it was falling it was still above FDI and ODA which were rising. Remittances slightly fell below FDI and rises again to be above both FDI and ODA in 2017. See Figure 1.3 below. The increase in the flow of remittances to low and middle income countries, including Ghana,

is attributed to factors such as; growth in the stock of international migrants, growth in incomes of international migrants, reductions in the costs of remitting and improvements in the measurement of remittance flows (Ratha, 2007).

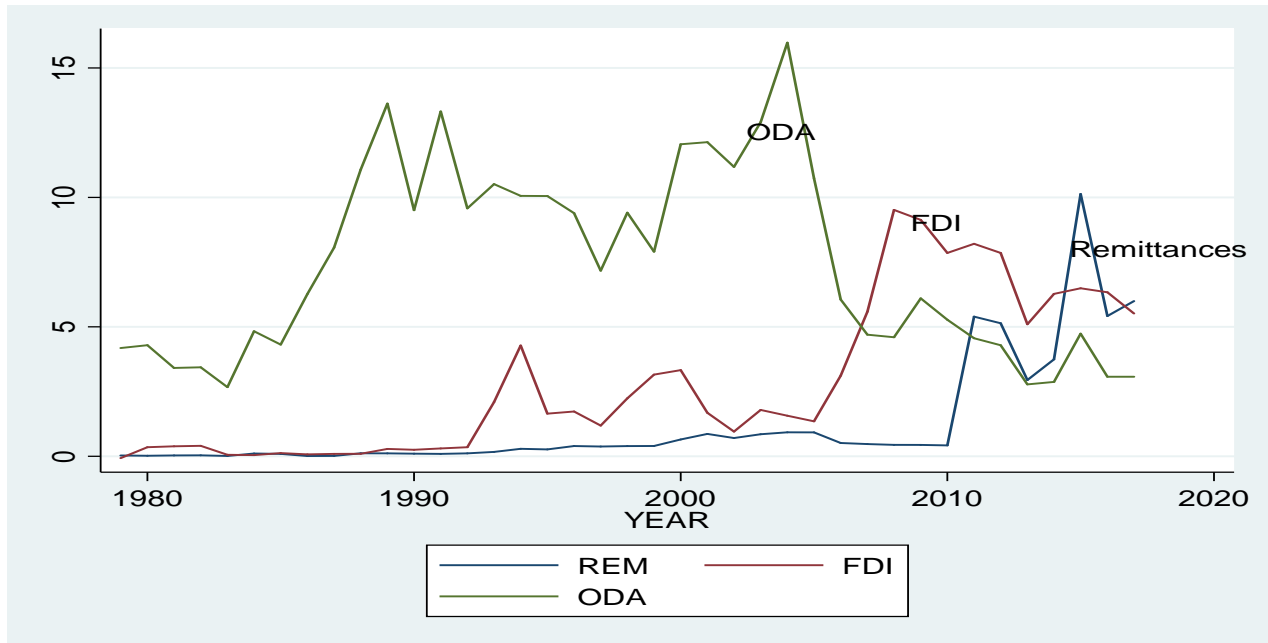


Figure 1.3 External capital flows to Ghana, 1979-2017 (% of GDP)

Source: World Development Indicators and Author`s construction.

Given the share volumes of this non-debt capital flow to developing countries, development economists expect that these flows should impact positively on the growth and development of recipient countries. Hence, researchers and policymakers have interrogated its microeconomic and macroeconomic consequences in recipient households and countries. At the micro-level, remittances have been found to lift households out of poverty and improve household welfare in terms of health and education (e.g. Adams & Page, 2005; Adams, 2006, Quartey, 2006; Adams & Cuecuecha, 2013).

Unlike the consistency of empirical findings at the micro-level, at best, economic thought and empirical results present mixed evidence as to the impact of remittances at the macro-level. For instance, remittances are empirically reported to negatively impact economic growth through two channels. That is, through moral hazard (e.g. Chami et al., 2003; Chami et al., 2008) and Dutch disease (e.g. Acosta, Lartey & Mandelman, 2007). On the contrary, remittances are reported to significantly enhance economic growth, albeit, to the extent that it is used for productive investment (e.g. Giuliano & Ruiz-Arranz, 2005, 2009; Fayissa & Nsiah, 2008; Pradhan, Upadhyay & Upadhyaya, 2008; Adenutsi, 2011; Ramirez, 2013). Yet still others did not find remittances to have a bearing on growth (e.g. IMF, 2005; Barajas, Chami, Fullenkamp, Gapen & Montiel, 2009; Lim & Simmons, 2015; Jouini, 2015).

Quite apart from the varied findings at the macro-level, there is a shift towards investigating how financial systems and sound institutions can impact the growth effects of remittances. Again, there is a shift towards investigating a potential non-linear connection between remittance flows and economic growth. This research seeks to evaluate these new paradigms in the examination of the remittance-growth nexus in a small open economy –Ghana.

1.2 Problem Statement

There is extensive literature with regard to the remittances-growth and the finance-growth relationships. However, the results, as alluded to above, are varied and inconclusive. On the back of these mixed findings is the issue of how remittances and financial development are measured (see Chami et al., 2008; Beck, 2015, Sahey et al., 2015; Svirydzenka, 2016; Ito & Kawai, 2018).

With respect to remittances, Chami et al. (2008) cautions researchers, from a measurement point of view, on the lumping together of workers' remittances (personal transfers), migrants' transfers and employee compensation as is usually found in literature (e.g. Giuliano & Ruiz-Arranz, 2005; Aggarwal, Demirguc-Kunt & Peria, 2006). They argue that it is only workers' remittances (personal transfers) - current transfers by migrants to relatives back home, which conforms to the true meaning of remittances as envisaged by researchers and policymakers. Again they argue that the second component, migrants' transfers, constitutes transfer of accumulated assets of a migrant who decides to return to the home country or relocate to another country and hence does not conceptually fit the bill of what remittances are and what they are meant for. On the third component, employees' compensation, they argue is made up of "wages, salaries and other benefits earned" from working in a country other than the home country and same paid for by residents of the host country. They therefore, posit that the most appropriate measure of remittances to reflect what is normally thought of by researchers and policymaker is the share of workers' remittances (personal transfers) of GDP. Studies post this observation add together worker's remittances and employee compensation as percentage of GDP (e.g. Adenutsi, 2011; Nsiah & Fayissa, 2013; Ustarz & Issahaku, 2017). This study uses the personal transfers measure which is obtainable from the World Development Indicators (WDI) database and computed as a ratio of GDP.

Moving on to the measurement issues of financial development, Ito and Kawai (2018) notes that existing studies predominantly measure financial development by using credit to the private (% of GDP) and or stock market capitalization (% of GDP). Beck (2015) christened these pointers as crude representations for financial development which does not embody the subtle-complexities of the financial system. These measures (quantity-based) have been critiqued for only capturing the depth/size of the financial system, albeit, incomprehensively

(Sahey et al., 2015; Ito & Kawai, 2018). Researchers have therefore made attempts to more appropriately measure financial development by either employing varied pointers of financial development like liquid liabilities (M2/GDP or M3/GDP), total credit by banks, ratio of private credit to total credit by banks, total assets of banks, commercial banks' assets to total banking sector assets, stocks value traded among others), though still quantity-based measures, for robustness checks (e.g. King & Levine, 1993; Giuliano & Ruiz-Arranz, 2009; Adusei, 2013; Adu et al., 2013; Nyasha & Odhiambo, 2015; Ofori-Abebrese, 2017) or construct an index from the alternative measures (e.g. Adu et al., 2013; Issahaku et al., 2017), hence, resulting in only a quantity-based index.

However, financial systems the world over are constituted by financial institutions and financial markets. Both financial institutions and markets have some functional characteristics – depth, access, efficiency and stability (Cihak et al., 2012; Svirydenka, 2016). Intuitively, a deep financial system does not necessarily guarantee high access to financial services; and an efficient financial system does not equate to a stable financial sector (Cihak et al., 2012). Therefore, to have a more comprehensive understanding of the growth effects financial development, it is imperative that the functional dimensions are considered. Sahey et al. (2015) responded to this call and computed a financial development index made up of financial institutions index and financial markets index. This study adopts the financial institutions index (which is predominantly bank-based measures) component of the overall financial development index. This is because; it is largely acknowledged that the financial structure of developing countries are dominated by banks (Levine, 2002; Oima & Ojwang, 2013; Laeven & Valencia, 2013) which is actually the case for Ghana.

In addition to the measurement issues discussed above, recent studies of the remittances, financial development and economic growth relationships are shifting from investigating the relationships as a linear one to a non-linear framework. For instance, Giuliano and Ruiz-Arranz (2009), Mundaca (2009), Barajas et al. (2009), Hassan and Shakur (2012; 2017) and Bangake and Eggoh (2019) studied the non-linear remittance-growth nexus and the non-linear finance-growth nexus have been studied by (Cecchetti & Kharroubi, 2012; Arcand et al., 2012, 2015; Dabla-Noris & Srivisal, 2013; Law & Singh, 2014; Sahey et al., 2015; Grandler, 2015; Oro & Alagidede, 2018). Though intuitively compelling, these studies inherently assumed the non-linear relationship to be symmetric. That is positive and negative cumulative changes to the threshold value either below or above the threshold would have the same impact. However, there is the likelihood that the observed non-linear relationship could also be asymmetric. Again, these studies examined the potential non-linearity for only the long-run. But since, economic and financial variables do have short and long run effects; it is also possible for there to be a non-linear and possibly asymmetric effect in the short-run too.

Furthermore, Chami et al. (2003) and Acosta et al. (2007) view of the destabilizing outcome of remittances on growth is argued to be so because the researchers did not consider financial development in their analysis (e.g. Ratha, 2007; Giuliano & Ruiz-Arranz, 2009; Mundaca, 2009). For example, Ratha (2007) is of the view that remittances are growth enhancing in an enabling investment climate. An investment climate is described by Ratha to be one “with well-developed financial systems and sound institutions”. To this end, there is a relatively recent shift towards testing the credit constraint hypothesis and or complementarity hypothesis ostensibly to ascertain whether or not financial development plays any role in the remittance-growth nexus. The credit constraint hypothesis argue that in the absence of efficient financial systems- a characteristic of developing countries, remittances serves to

ease liquidity constraints (lack of collateral and high interest rates) faced by households and SMEs by enabling recipients to have seed capital to start their own enterprises. However, the complementarity hypothesis argues that a well-functioning financial sector attracts more remittance flows and channels them into productive investments.

Empirical investigations of these hypotheses present mixed evidence. For example, while the findings of (e.g. Chami et al., 2008; Giuliano & Ruiz-Arranz, 2009; Ramirez, 2013) lend support for the credit constraint hypothesis, that of (e.g. Mundaca, 2009; Aggarwal, Demirguc-Kunt & Peria, 2011; Bettin & Zazarro, 2012; Nyamongo Misati, Kipyegon & Ndirangu, 2012) lend support for the complementarity hypothesis. Yet still, others find no evidence for any of the hypotheses (e.g. Chowdhury, 2011, 2016; Hassan & Shakur, 2017).

This study therefore seeks to examine all of the issues discussed above by investigating the remittance-finance-growth nexus in Ghana. These concerns, to the best of my knowledge, have not been investigated already in the context of Ghana. And to the extent that empirical evidence is mixed and that these hypotheses are yet to be empirically tested in the context of Ghana, they remain hypothetical for Ghana; hence, it is imperative for policy purposes to empirically evaluate these hypotheses.

1.3 Research Objectives.

This study shall interrogate the Remittance-Finance-Growth nexus as it pertains to Ghana. Specifically this study shall:

- (i) Investigate the potential non-linear and asymmetric effects of remittances and bank-based financial development on economic growth in Ghana.
- (ii) Investigate the credit constraint and complementarity hypotheses in Ghana.

- (iii) Investigate the long-run causal direction of the remittance-finance-growth nexus under a non-linear and asymmetric framework in Ghana.

1.4 Research Questions.

To realize the objectives, the study shall answer these questions.

- (i) Are there non-linear and asymmetric effects of remittances and financial development on economic growth in Ghana?
- (ii) Does the financial system act as a transmission mechanism for the remittance-growth nexus in Ghana?
- (iii) Are there non-linear and asymmetric causal direction among remittances, financial development and economic growth?

1.5 Significance of the study.

Remittance flows and financial development are very critical themes in economic growth. The study investigates the relationships of remittances and financial development on economic growth in ways that have not been explored before in Ghana as argued earlier. A fundamental input of the study to literature is the adoption and usage of the newly advanced Non-linear Autoregressive Distributed Lag (NARDL) cointegration approach by Shin et al. (2014) to investigate the remittance-finance-growth nexus. This method makes it possible to jointly estimate both short and long run non-linear asymmetries, hence, dealing with the problem of hidden cointegration as first hinted by Granger and Yoon (2002). Hidden cointegration refers to the tendency of rejecting the potential of long run relationship among variables as a result of not accounting for non-linearity in standard cointegration tests. So far, to the best of my knowledge, only Demir (2015), Uboreime, Elisha and Ude-Abosi (2016)

and Moyo, Khobai, Kolisi and Mbeki (2018) have employed this methodology to study the finance-growth nexus.

Apart from the above, this study is relevant because it is the first, to the best of my knowledge, to explore the potential mediating function of financial development in the remittance-growth link in Ghana. This is important because, knowing the interaction effect between remittances and financial development on growth presents a fine opportunity to policymakers to promulgate appropriate policy statements to leverage the benefits of remittances while counteracting its potential negative effects. The study which mirrors the present study in the context of Ghana is that of Adenutsi (2011). However, Adenutsi stopped short at studying the linear long-run and short-run nexuses under Johansen cointegration approach using the standard ARDL model and the linear causal direction among the three variables of concern. Again, this study extends the time period backwards to 1979 and forward to 2017. Adenutsi used data from 1987 to 2007.

Following from the contribution to the on-going debate as set out above; this study has some relevance to the policy front as well. For instance, knowing the potential non-linear and asymmetric effects of remittance flows and financial development on economic growth can inform policy direction in situations of negative or positive cumulative changes to remittance flows and financial development in either the short or long run.

1.6 Scope of the study

A critical mass of the studies on the themes is cross-country based: cross-sectional and panel regressions. However, cross-country studies have been described as not reflecting the

inherent political, economic, institutional, social and cultural characteristics of countries independently. For instance, (Giuliano & Ruiz-Arranz, 2009, p.150) posit that:

“...it is worth noting that cross-country studies only reflect average behaviour and could conceal important behaviour of remittances...time series analysis based on specific case studies could provide additional important information”.

In a similar fashion, Chami et al. (2008, p.64) also noted that:

“...the country fixed effects results may be indicating that the contribution of remittances to growth is highly dependent on individual country circumstances”.

This research responds to these arguments by evaluating the remittance-growth nexus based on a single country study. Annual data from the WDI and the IMF databases from 1979-2017 is used.

1.7 Organization of the study

The study is organized in five chapters. The remaining chapters are as follows. Chapter two shall present the review of related literature. This would be decomposed into the review of the theoretical underpinnings of the study and the recent empirics on the themes under study. The econometric methodology would be presented in chapter three. Chapter three would present data sources, the description of variables of interest and data sources that would be employed for the study, the empirical model specifications and estimation techniques. In chapter four, the study shall present the results and discussion of same. Finally, chapter five would draw conclusions and recommendations thereon.

1.8 Chapter Summary

The chapter has focused on motivating the study and espousing the gaps in the midst of mixed and inconclusive findings in existing studies on the remittance-finance-growth relationships. The objectives which inform the research question to answer are also clearly stated. The relevance of the study to the on-going debate and its potential policy implications is explained. Also the scope and limitations of the study being a single country study and availability of data respectively are also briefly discussed.

CHAPTER TWO

LITERATURE REVIEW

2.1 Chapter Overview

The chapter reviews related and relevant literature. But first, an overview of the features of Ghana's banking sector is presented in section 2.2 before proceeding to the theoretical underpinnings of the three main themes of this study which are presented in sub-sections 2.3.1, 2.3.2 and 2.3.3 respectively. The study proceeds to review related empirical studies which are presented in section 2.4. Section 2.4 is further categorised into studies of the linear remittance-growth nexus; non-linear remittance-growth nexus; remittance-growth nexus in Ghana; linear finance-growth nexus; non-linear finance-growth nexus; finance-growth nexus in Ghana and indirect remittance-growth nexus with financial development acting as a transmission mechanism. The chapter summary is presented in section 2.5.

2.2 Features of Ghana's Banking sector: An overview

Ghana's banking sector is generally viewed from two standpoints. That is, the pre-reform and the post-reform eras. The pre-reform era spans right from independence to the mid-1980s. Most of the banks in the pre-reform era were government owned (Brownbridge & Gockel, 1996). During this era, the banking system was characterised by repressive government interventions like directed credits to rather unproductive sectors of the economy, interest rate ceilings, capital controls and restrictions on entry of foreign banks (Brownbridge & Gockel, 1996, Aryeetey et al., 2000; Bawumia, 2010). These repressive interventions led to an uncompetitive banking sector arising from inefficient intermediation process (Bawumia, 2010; Ackah & Asiamah, 2014). All of these culminated in a shallow financial system,

decreased savings, discouraged deposit mobilization, decreased private investment, and ultimately low economic growth (Aryeetey et al., 2000).

Against this background, the government of Ghana adopted and implemented the Financial Sector Adjustment Program (FINSAP) by the World Bank and the IMF (Aryeetey et al., 2000). The objectives of FINSAP were: “first, to reduce financial repression through the liberalization of interest rates and elimination of administrative credit allocations; second, to institute the transition from direct to indirect monetary policy; third, to restructure the banking system and improve bank solvency levels; fourth, to develop financial markets in general, mainly primary markets for treasury bills, and other markets for bonds and stock markets and finally to strengthen the regulatory environment including bank supervision, auditing and accounting practices” (Ncube and Senbet 1997; Camen et al. 1997; Bawumia, 2010).

Following the implementation of FINSAP, the Financial Sector Strategic Plan (FINSSP) was also implemented in 2001 as successor programme largely to consolidate the gains made under FINSAP (Bawumia, 2010; Ofori-Abebresse et al., 2017). The liberalisation of the financial sector under Financial Sector Adjustment Programme (FINSAP) and Financial Sector Strategic Plan (FINSSIP) brought about improved savings, enhanced deposit mobilisation, financial deepening and competition in the banking sector (Bawumia, 2010). There have also been some significant enhancements in other important indicators including capital adequacy, deposit mobilisation, sectoral credit allocation, interest rate liberalisation and total banking assets (Bawumia, 2010). Again, the number of banks increased from 10 in 1988 (Bawumia, 2010) to 29 in 2013 (Quartey & Afful-Mensah, 2014) with both Ghanaian

and foreign ownership. And as of August 2017 there were 35 banks operating in Ghana (Ghana Banking Survey, 2017).

Quite recently, the banking system was at the risk of bank runs as a result of the insolvency and liquidity challenges of some banks. The regulator – Bank of Ghana instituted clean-up and recapitalization reforms between 2017 and 2018 to engender confidence in the banking sector (Banking Sector Report, 2019). In the process the operating licenses of nine (9) banks were revoked. Two (2) of the banks (Unique Trust Bank and Capital Bank) were collapsed and taken over by Ghana Commercial Bank. The other seven (7) were reconstituted into a new bank – Consolidated Bank Ghana. As at the end of October 2019 twenty three (23) banks were in operation as banks that had met the clean-up and recapitalization reforms. According to the Bank of Ghana “the positive dividends from the clean-up and recapitalisation reforms have remained broadly sustained reflecting in a sound, solvent, profitable and resilient banking sector. The outlook for the industry is positive and there is potential for further credit growth and financial deepening on the back of the higher capital levels and sustained growth in deposits” (Banking Sector Report, 2019).

2.3 Theoretical Literature Review

2.3.1 Theories of Remittances

Chami et al. (2003) posit that theories of remittances are developed around explaining the ultimate aim of remittances. That is, remittance theories focus on the drivers or causes of remittance flows. Therefore, the theories presented herein focuses on what drives remittance flows. Lucas and Stark (1985) highlighted three main motives for migrants remitting home. These motives are; pure altruism, pure self-interest and tampered (enlightened) self-interest.

The pure altruism theory holds that migrants send money to the home country out of great concern for the wellbeing of the family left behind. Under this theory, the migrant derives utility from the utility of his family members in the home country (Chami et al., 2003). Under this motive the sizes of remittances increase when economic situations of the home country are hostile. By implication, when economic conditions are favourable in the home country the volumes of remittances may reduce. This makes remittances take the form of “compensatory transfers” and hence countercyclical in nature. The economic impact of remittance flows under the altruism theory depends on the use of the flows. Because, the flows are compensatory to smooth consumption in adverse situations, more of the amounts received are more likely allocated to consumption than to investment in capital accumulation and human capital development (Barajas et al., 2009) and if the flows are also considered permanent, then it could reduce the labour participation of recipient households (Chami et al., 2003). High volumes of remittance inflows could possibly result in a rise in exchange rate which could contract the tradable sectors (e.g. manufacturing for export) of the economy (Acosta et al., 2007; Lartey et al., 2008). These would play out to adversely impact output growth in the home country.

Pure self-interest theory as espoused by Lucas and Stark (1985) argues that remittance flows could also be pro-cyclical and not always countercyclical. Under this theory, remittances are sent home for one of three reasons or all of them together. The first is to increase visibility and gain favour when it comes to inheritance. The second is the portfolio view and the third is to have accumulated social assets for esteem (prestige and influence) when the migrant has the intention of returning home. The first motive is premised on the belief that inheritance is a function of behaviour, hence, the more remitted, the more favour garnered. The portfolio view holds that the migrants decide how to spend his earnings between the host country

assets and the home country assets (Elbadawi & Rocha, 1992 cited in Chami et al., 2003). Therefore, the portfolio view takes into consideration the differences in interest rates in the host and home countries hence remittances flows is thus a function of the resolution to expend on home country assets; since it is believed that interest rates back home are higher than that of the host country. On the third motive under pure self-interest theory, the migrant remits home to invest in lands, buildings and livestock. Macroeconomic impact of remittances premised on this motive would depend on the types of investments undertaken. If the investments are assets merely changing hands, then no real economic activity would have taken place. But, to the extent that the flows are used for productive investments it could generate positive impact on output growth.

Lastly, the tempered or enlightened self-interest theory as explained by Lucas and Stark (1985) was subdivided into implicit family contract I also known as loan repayment and implicit family contract II also known as co-insurance by Solimano (2003). In the loan repayment theory, the migrant is remitting home to settle the expenses incurred by the family to sponsor his/her migration and or education abroad. The migrant starts remitting as he/she gradually finds footing in the host country. The co-insurance bit of the theory is built around the principle of diversification. That is, a family sponsors its member(s) abroad which has superior economic conditions than home so that the member(s) would support the family back home in unfavourable times and also the family would help the migrant in times of unfavourable conditions for the migrant.

2.3.2 Theories of Financial Development

Theoretically, economists are sharply divided on the growth effects of the financial system. For instance, Schumpeter (1912) is of the view that a functional financial sector drives

growth via technological innovation through the efficient allocation of funds away from non-productive sectors to the productive sectors of the economy. Robinson (1952) on the other hand holds that rather growth (real sector growth) drives financial development. Yet still, Lucas (1988) does not think there is any relationship between finance and growth. This section presents the theories on linkages between financial development and economic growth as espoused by Patrick (1966), McKinnon (1973) and Shaw (1973).

The stages of development hypothesis by Patrick (1966) posit that at the initial stages, a developed financial system serves as the engine for growth in the real sectors of an economy. This proposition is popularly known as the “finance-led-growth or the supply-leading” hypothesis which reflects the argument of Schumpeter (1912). As the economy grows, Patrick argues there is a role change between economic growth and financial development. That is, growth of the real sectors of an economy would increase the demand for financial services which would lead to further developments of the financial sector. At this point, economic growth takes a lead. This view corroborates the “growth-led-finance” or the “demand-following” hypothesis which mirrors Robinson (1952) view.

McKinnon (1973) and Shaw (1973) on the other hand highlighted the need for liberalized financial systems. The financial liberalization proposition is premised on the fact that a repressed financial sector, through government control, directed credits and interest ceilings among others, reduces the domestic savings and by extension investment through to economic growth. Hence, to increase the real growth rate and also the depth of the financial sector McKinnon and Shaw advocates for liberalized financial systems.

2.3.3 Economic Growth Theory - Endogenous Growth

It is argued that in the mid-1970s, neoclassical growth theory had become obsolete in explaining economic growth. Hence, the endogenous growth theory came on the back of the weaknesses or limitations in the economic thought of the Neoclassicals in explaining growth which included but not limited to its inability to explain changes in economic growth from one period to the other and its inability to explain significant and persistent differences in income per capita across countries and regions (Parker, 2012). The endogenous growth theory is one of the modern day growth theories. Credited to “Increasing Returns and Long-Run Growth” a seminal work by Romer (1986), the endogenous growth theory also known as the new growth theory departs markedly from the economic thought of Neoclassicals who held that economic growth is determined by unexplained or exogenous (external) technical progress. Thus, the proponents of endogenous growth theory intimate that growth is basically a function of endogenous (internal) factors (Lucas, 1988). That is, the implicit characteristics of countries determine their long-run growth trajectory. Another significant difference is the departure from the assumption that there is diminishing return to capital in the neoclassical growth theory as well as the broadening of the scope of capital to comprise of physical capital and human capital and or knowledge capital (Todaro and Smith, 2012). Endogenous growth theorists therefore advocates for investments in Research and Development (innovation), infrastructure and human capital to spur long-run economic growth.

2.4 Empirical Literature Review

There is a plethora of studies on the developmental impact of remittances along the lines of poverty and wellbeing, at the micro-level. And generally, it is found that remittances lifts households out of poverty and improve their wellbeing/welfare in areas like education and health. Such studies include but not limited to Cox-Edward and Ureta (2003), Adams and

Page (2005), Adams (2006), Quartey, (2006), Adams and Cuecuecha (2008) and Adams and Cuecuecha, (2013). The focus for this section, however, is to review empirical studies on the macroeconomic consequences of remittances. The review proceeds as outlined under the chapter overview as follows.

2.4.1 Linear Remittance-Growth Nexus

Chami, Fullenkamp, and Jahjah (2003) investigated the link between remittances and economic growth using 113 countries and data from 1970 to 1998. The researchers' proxied economic growth with per capita GDP growth and remittances with two measures; (1) workers' remittances (% of GDP) and (2) changes in workers' remittance (% of GDP). In a bid to control for endogeneity of the remittance variable, the researchers employed two sets of instrumental variables; (1) external instruments and (2) internal instruments. The home country's income to the income of US and also the home country's real interest rate to that of the US were used as the external instruments for workers' remittances received and the lagged independent variables were used as internal instruments. Using Fixed Effect and 2SLS-IV estimations, the results proved that changes in remittances drags growth negatively indicative of a moral hazard problem. Hence, the researchers concluded that remittance were mostly driven by altruistic motive and hence are compensatory transfers rather than for investment purposes.

IMF (2005) also studied the remittance-growth relationship for 110 countries using data from 1970 to 2003. The researchers controlled for endogeneity of the remittance variable by employing external instruments for the measure of remittance. Two external time-invariant instruments such as the distance between the home and host country (Geographic instrument) as well as a dummy for whether or not the home and host country speak a common language

(Cultural instrument) were employed in the study. The use of time-invariant instruments was possible because the authors used cross-sectional instead of a panel data. The cross-sectional regression for the full sample of countries and for fifty (50) remittance-dependent countries (Remittances/GDP ratio is greater than 1%) did not show evidence of remittances having a significant bearing on growth.

Giuliano and Ruiz-Arranz (2005) studied the remittance-growth relationship using non-overlapping 5-year averages data starting from 1975 to 2002 for 73 developing countries. Three estimation techniques such as Pooled OLS, Fixed Effects and the SGMM were used for the cross-country regressions. The SGMM was specifically used to address a likely endogeneity issue by employing lagged independent variables as instruments. All three estimation techniques did not evidence any significant bearing of remittances on growth. The results however, changed to remittances having a mild impact on growth when investment is dropped from the control variables in the estimations. The researchers therefore concluded that evidence pointing to remittances enhancing growth is fragile. Using the same dataset, years, and variables as above, Giuliano and Ruiz-Arranz (2009) extended the number of countries to 100. The researchers reported the same findings with OLS and SGMM estimations of the specified models.

In a study by World Bank (2006), the growth influence of remittances was examined in LAC. Data for 67 countries over the 1991 to 2005 period was used. The time-invariant instrument used in the IMF (2005) study, specifically the distance instrument, was transformed to a time-changing instrument by finding the product between the reciprocal of the distance between the home and host countries and measures of the host country's macroeconomic performance (per capita GDP, growth rate of GDP or rate of unemployment).

Another external instrument included was the shares of migrants in the top five host countries for the home country as of the year 2000. The cross-country regressions proved the existence of robust positive bearing of remittances to growth in estimations with or without the investment measure. However, in estimations where the investment variable was omitted the significance of the remittance coefficients was lost.

Faini (2006) examined the macroeconomic impact of remittance inflows for 68 countries and data from 1980 to 2004. The researcher also used the time-invariant instrumental variable to control for endogeneity in the regression model. Following IMF (2005), Faini used the distance between the home country and the host country as instrument for remittances to GDP ratio. The cross-sectional regression estimates based on OLS showed that remittances-to-GDP ratio promotes economic growth. Turning to instrumental variables regression, remittances lost its significance though it remained positive.

Pradhan, Upadhyay and Upadhyaya (2008) examined the link between remittances and economic growth in 39 developing countries with data from 1980 to 2004. The estimated results from Fixed Effects (FE) being the preferred estimates from the Hausman test indicates that per capita remittances do have a significantly positive bearing on growth.

Ramirez and Sharma (2008) studied the economic outcomes of remittances for 23 LACs. The study used data for the sampled countries from 1990 to 2005. Unlike other studies, the researchers corrected the potential endogeneity problem by using an econometric estimation technique instead of instrumental variable(s). Using Pedroni Cointegration and Panel FMOLS, they find remittance to GDP ratio to have a significantly positive effect on long-run growth. Further works showed that the impact of remittances is even greater in countries with

credit constraints. In a later and similar study, Ramirez (2013) used the same data and econometric techniques and the year extended to 2007 from 2005. The estimated results pointed to the same findings.

Fayissa and Nsiah (2008) studied the macroeconomic bearing of remittances using 37 African countries on data from 1980 to 2004. Employing panel regression techniques such as FE and DGMM on the 5 year averaged data, the researchers found per capita worker` remittances to positively impact per capita GDP. The study further finds the impact of remittances on growth to be more prominent in countries with shallow financial sectors. Similar results were reported in Fayissa and Nsiah (2010) employing the same data and panel regression techniques over the same period for 36 African countries.

Barajas et al. (2009) studied the remittances and growth relationship of a panel of 84 countries using 5 year averages data from 1970 to 2004. To control for a possible endogeneity issue, the researchers used remittances (% of GDP) to the rest of the world as an instrument for remittances (% of GDP). The researchers also introduced for the first time, the mean growth level of first 20 trading partners of the sampled countries to mitigate variables that could affect both growth and remittances arising from the instrument used. Applying OLS and FE both based on instrumental variable regression and the SGMM on the full and emerging economies samples, the results showed on the whole that remittances do not enhance economic growth and that the significance and size coefficients were conditioned on the control variables used.

Ahortor and Adenutsi (2009) examined the macroeconomic bearing of remittances on growth of 31 developing economies. The study used 15 countries in SSA and 16 in the LAC region.

Annual panel data from 1996 to 2006 was used. The study used the SGMM to estimate results for all countries and the sub samples of SSA and LAC. The results provide evidence that remittances per capita increases growth and that the effect is more manifest in the LAC region than in the SSA countries.

Rao and Hassan (2011) examined the remittance-growth relationship in forty (40) countries that had remittance-to-GDP ratio of one per cent or more from 1960 to 2007. Using three panel regression techniques such as FE, RE and SGMM, the researchers found evidence for a direct and significant growth effects of remittances in all estimations. However, the researchers find marginal indirect growth effects of remittances through financial development and investment.

Siddique, Selvanathan and Selvanathan (2012) studied the bivariate causal direction between remittance flows and growth in 3 Asian countries from 1976 to 2006 using annual data. Employing VAR and Granger Causality under the VAR framework; a unidirectional causal relationship between remittances and economic growth from remittances to growth in was found for Bangladesh, no causal relationship in India and a bidirectional causal relationship between remittances and economic growth for Sri Lanka.

Nsiah and Fayissa (2013) studied the link between remittances and growth for 64 countries. These comprised of 29 countries from Africa, 14 from Asia and 21 from Latin America and the Caribbean. Using the Panel FMOLS to estimate the results, they found that remittances promote growth.

Kumar (2013) studied the nexus between remittance flows and growth as well as the causal direction between remittances and growth in Guyana from 1982 to 2010. Using ARDL Bounds Cointegration, ECM and Granger Causality under a VAR framework, the researcher found that remittances enhance growth in the long-run and short-run. However, no causal link was found between remittances and economic growth.

Ahamada and Coulibaly (2013) employed Granger causality test under the Seemingly Unrelated Regressions (SUR) framework as proposed by Kónya (2006) using annual data for 20 SSA from 1980 to 2007. This approach controls for heterogeneity and cross-section dependence and allows for estimating the causal link for each country separately using Wald tests based on bootstrap critical values which are unique to each country. Their results did not show evidence of a causal link between remittances and economic growth in each of the countries.

Feeny, Iamsiraroj and McGillivray (2014) studied the macroeconomic outcome of remittances for 136 developing countries. Among the 136 sampled developing countries are 25 Small Island Developing States (SIDS). Data for the study spanned the period from 1971 to 2010. Using SGMM to estimate the specified model, they found that remittances do not affect economic growth in developing countries. However, they find positive relationship between remittances and growth in SIDS from SSA and the Pacific region but not in SIDS from LAC region.

Imai et al. (2014) examined the effects of remittances and volatility of remittances on economic growth of 24 Asian and Pacific countries. Panel data from 1980 to 2009 was used in the analysis. Using FE and FE-2SLS, they found remittances to have a positive bearing on

growth. Again using Panel Vector Autoregression (PVAR) they found the volatility of remittances adversely impact economic growth.

Nyeadi, Yidana and Imoro (2014) examined the causal link between remittance flows and growth in three African countries namely Nigeria, Senegal and Togo. Data spanning from 1980 to 2012 was used for the analysis. Applying Johansen Cointegration and Granger Causality under a bivariate VAR framework, the results evidenced a unidirectional causal relationship between remittance flows and growth running from remittance flows to growth in Nigeria and Senegal. No causal direction between remittances and growth was found for Togo.

Lim and Simon (2015) studied the growth outcomes of remittances in thirteen (13) CARICOM countries. The study used panel data spanning from 1975 to 2010. Applying Pedroni and Westerlund Cointegration tests and DOLS to estimate the results, they found no evidence for any influence of remittances on growth.

Jouini (2015) used data from 1970 to 2010 to study the remittance-growth relationship in Tunisia. Applying ARDL Bounds Cointegration and Granger Causality, the study found remittances do not impact growth in the long and short runs. However, the study reports a bidirectional causal link between remittance flows and growth running from remittance flows to growth and from growth to remittances only in the short-run.

Salahuddin and Gow (2015) also examined the potential long and short run impact of remittances on growth from 1977 to 2012 in four SA countries. The researchers conducted Cross-sectional Dependence test and applied PMG to estimate the results. It was found that

remittances enhance growth in the long-run. However, no evidence was found for any outcome of remittances on growth in the short run.

Majumder and Donghui (2016) also investigated the potential long-run and short-run nexus between remittances and growth in Bangladesh. Using data from 1975 to 2013 and applying ARDL Bounds Cointegration and ECM, they found that remittances have a positively significant impact on growth in the long run but have no statistically significant impact in the short run.

Pradhan (2016) studied the growth outcome of remittance flows on growth in five (5) countries namely Brazil, India, China, Russia and South Africa. Using a balanced panel data from 1994 to 2013 and panel FMOLS, the researcher find remittances to have a negative long-run bearing on growth. Going further to ascertain the causal direction using Panel VECM, the results showed a one-way causality from remittances to growth.

Oladapo, Alao and Koyode (2016) investigated the impact of volatility of remittance flows on growth in Nigeria. Starting off their study with OLS estimation of results using annual data from 1986 to 2014, they found remittances have a positive effect on economic growth in Nigeria. To their main study, they applied the Autoregressive Conditional Heteroscedasticity (ARCH) model and found that the volatility of remittance inflows to Nigeria have no effect on growth.

Arif, Khan, Raza and Maqbool (2017) investigated the long and short run nexus between external funds including remittance flows and economic growth in 8 Emerging and Growth Leading Economies (EAGLE). Applying Westerlund panel cointegration test, PMG and

Demitrescu and Hurlin non-causality test to annual data from 1986 to 2014, they found remittance flows have no effect on growth in the long and short runs. With respect to the non-causality test, they found a bidirectional causal relationship between remittances and growth.

Meyer and Shera (2017) applied panel estimation techniques such as Pooled OLS and FE to data for 7 countries from 1999 to 2013. The results showed that positive outcome of remittances on growth is more pronounced as the remittance flows increases.

2.4.2 Non-Linear Remittance-Growth Nexus

Hassan and Shakur (2017) extended the dataset used by Hassan, Shakur and Bhuyan (2012) to examine the potential non-linearity in the remittance-growth relationship in Bangladesh. Hassan et al. (2012) employed data from 1974 to 2006 to explore the potential non-linear nexus between remittances and economic growth in Bangladesh. Hassan and Shakur (2017) extended the years up to 2012 and applying the same econometric procedures as in the former, the 2SLS-IV and GMM-IV results showed U-shaped association between remittances and growth. Which was interpreted to mean that remittances start off by being a drag on economic growth but at later stages begins to positively impact economic growth. This corroborated the finding of Hassan et al. (2012). In a related study in Bangladesh, Hassan, Chowdhury and Bhuyan (2016) examined the potential non-linear relationship between remittances and TFP and applying the same econometric estimation techniques above, they also reported U-shaped relationship between remittance flows and TFP in Bangladesh.

Chami et al (2008) and Barajas et al (2009) also examined the potential non-linear nexus between remittance flows and economic growth. Employing a squared term of remittances OLS-IV and FE-IV estimation techniques on 5 year averaged data from 1970 to 2004 for 108

countries and 84 countries respectively, they did not find evidence for a non-linear nexus between remittances and growth.

2.4.3 Remittance-Growth Nexus in Ghana

Nyeadi and Atiga (2014) assessed the long-run relationship and the causal direction between remittances and growth in Ghana using annual data from 1980 to 2012. VAR-Granger causality test and OLS, the results showed unidirectional causal link running from remittances to growth. The OLS results indicated that remittances promote economic growth.

Ustarz and Issahaku (2017) used OLS and Quantile regressions to study the influence of remittances on TFP in Ghana from 1975 to 2013. Using stepwise OLS regression and the 25th, 50th and 75th quantiles of remittances for the Quantile regression, the results from all the estimation methods showed that remittances significantly retard economic growth in Ghana.

2.4.4. Linear Finance-Growth Nexus

The seminal work of King and Levine (1993) investigated whether or not higher levels of development positively impact improvements in economic growth, physical capital accumulation and the efficiency with which countries deploy capital. Using 5 years averaged data from 1960 to 1989 for 80 countries and pure cross-sectional estimator; they found that financial development has significant and positive impact on economic growth, capital accumulation and improvement in economic efficiencies. They also found that initial levels of financial development indicators impact the future growth rates of the three growth measures positively and significantly.

Beck, Levine and Loayza (2000) investigated the nexus between financial development and four measures of growth – economic growth, TFP, physical capital accumulation and private savings. Data for 32 countries from 1980 to 1995 were used for the analysis. Financial development was primarily proxied by loans to private sector by deposit money banks as a share of GDP. For robustness checks they included liquid liabilities to GDP ratio and commercial bank assets to the sum of commercial banks and central bank assets as additional proxies for financial development. The study also introduced the stock market development measures– stock market turnover, stock market value traded and market capitalization. The results from both the cross-country instrumental variables estimator and the GMM revealed financial development have significant positive impacts on growth through TFP.

Levine, Loayza and Beck (2000) employed an assortment of estimation approaches ranging from pure cross-sectional regressions, Instrumental Variables (IV) regressions and panel estimation methods – DGMM and SGMM to analyse the impact of financial development on the growth of 74 countries. The estimated results from the 5 year averaged data from 1960 to 1995 showed that financial development, measured by liquid liabilities (% of GDP), commercial banks assets to the sum of commercial banks and central bank assets and private sector credit (% of GDP), has positive and significant impact on economic growth. The results were robust to the different estimation methods. They also examined whether the cross-sectional differences accounts for variations in levels of financial development and the results were in the affirmative.

Beck and Levine (2004) studied the effects of banks and stock markets on growth of a panel 40 countries using 5 year averaged data from 1976 to 1998. Bank development was proxied by credit to the private sector by deposit money banks (% of GDP) and stock market

development was proxied by stock market turnover ratio. Employing a dynamic panel estimator – SGMM, the overall results point to banks and stock markets having a positive bearing on growth.

The causal link between financial development and economic growth was studied by Odhiambo (2008). Econometric analysis using Johansen-Joselius cointegration test and VECM-Granger causality test were conducted on annual data from 1969 to 2005 for Kenya. The trivariate regression results showed unidirectional causality running from growth to finance, proxied by M2 to GDP ratio.

Examining the causal link between financial development, economic and inflation in India, Pradhan (2011) used annual data from 1994 to 2010 and proxied financial development by M3 as a percentage (% of GDP). Econometric methods employed were Johansen cointegration and VECM-VAR Granger causality. The results indicated the existence of bidirectional causal link between financial development and growth in India running from finance to growth with a feedback.

Bittencourt (2012) assessed the connection between financial development and economic growth in 4 Latin American countries - Brazil, Bolivia, Peru and Argentina using annual data from 1980 to 2007. Two measures of financial development was used, that is, M2 to GDP ratio and an index constructed from M2 to GDP ratio, private credit to domestic deposit ratio, credit from deposit money banks to sum of deposit money banks and central bank credit and stock market capitalization/GDP using PCA. The FE-IV estimator showed that financial development exerts strong positive impact on growth in the Latin American countries over the study period.

Kouki (2013) studied the relationship between economic growth and financial development in 4 North African countries (Egypt, Algeria, Tunisia and Morocco). Financial development was decomposed into two – banks and stock markets. Using annual data from 1964 to 2009 when bank proxies are used and from 1988 to 2009 when stock market proxies are used, the study reports from the use of Pedroni cointegration and FMOLS that bank deposit (% of GDP) and credit to private (% of GDP) positively and significantly impact the economic growth of Egypt; while they negatively and significantly impact growth in Algeria. For Tunisia and Morocco only the credit to private sector impacts growth positively and significantly. All two measures for stock market development – market capitalization to GDP and value traded to GDP impact growth positively and significantly in all countries.

Examining the financial development and economic growth relationship in 10 Asian countries, Hsueh, Hu and Tu (2013) applied Bootstrap Panel Granger Causality to annual data from 1980 to 2007. Using Domestic credit to GDP, M1 to GDP, M2 to GDP and M3 to GDP ratios as alternative measures for financial development, the estimated results showed a unidirectional causal link between finance and economic growth from finance to growth.

Beck, Degryse and Kneer (2014) investigated whether the intermediation role and size of the financial system have differential effects on economic growth and economic growth volatility. A panel of 77 countries with data from 1980 to 2007 averaged over non-overlapping 5 year intervals were employed for the analysis. OLS results showed that intermediation proxied by credit to GDP ratio promotes economic growth and also reduces growth volatility. However, the size of the financial system proxied by the share of value

added of the financial sector in GDP only promoted growth but was not having a significant impact in reducing growth volatility.

Investigating the long-run and short-run growth effects of financial development in Kenya, Kiprop, Kaleo, Kibet and Kiprop (2015), used annual data from 1970 to 2013 and applied ARDL Bounds cointegration approach and ECM. The empirical results indicated that financial development, proxied by credit to the private sector (% of GDP), promotes Kenya's economic growth in the long and in the short run.

Rana and Barua (2015) studied the nexus between finance and growth in 5 South Asian countries using annual data from 1974 to 2012. Five alternative proxies were used for financial development – domestic credit, broad money, gross domestic savings, total debt services and trade balance. The FE estimated results indicated that only domestic savings and total debt service had significant impacts on economic growth.

Iheanacho (2016) studied the impact of financial development on economic growth in Nigeria from 1981 to 2011. Four indicators of financial development – Private sector credit to GDP ratio, commercial banks assets to GDP ratio, liquid liabilities to GDP ratio and bank deposits to GDP ratio were used to proxy financial development. Using PCA to construct three indices for financial development from the four measures, the study found, after using ARDL Bounds approach, that the indices and the individual indicators have no impact on economic growth in the long-run. However, financial development was found to be drag on growth in the short-run.

Barajas, Chami and Yousefi (2016) investigated whether or not financial development has uniform macroeconomic impact across countries. They proxied financial development by two alternative measures – private sector credit to GDP ratio and the ratio of stock market turnover. Annual data from 1975 to 2005 for 150 countries was used for the analysis. The SGMM estimation method was employed with interaction terms with regional dummy variables, oil exporters dummy and oil dependent economies dummy. The estimated results showed differential impacts across different regional blocks, oil exporting economies and oil dependent economies. The researchers therefore concluded that the beneficial impact of financial development is not equal across board.

Banerjee, Ahmed and Hossain (2017) used annual data from 1974 to 2012 and quarterly data from 1988 to 2012 to examine the impact of financial development on the growth of Bangladesh measured by credit to the private sector and stock market capitalization respectively. Using ARDL Bounds cointegration and VECM, they found that credit to the private sector promotes economic growth in both the long-run and short-run. But, they did not find evidence for stock market capitalization having a significant impact on Bangladesh's economic growth either in the long-run or short-run.

Durusu-Ciftci, Ispir and Yetkiner (2017) studied the role of the financial system in the economic growth of 40 countries from 1989 to 2011. To allow for Cross-Sectional Dependencies, the researchers used Westerlund and Edgerton cointegration test, Augmented Mean Group and Common Correlated Effects estimation methods. The study found that debts from credit markets and equity from stock markets contribute significantly to long-run economic growth. However, it was found that debt from credit markets had greater impact than equity from stock markets.

2.4.5 Non-Linear Finance-Growth Nexus

With respect to the potential non-linear finance-growth relationship, De Gregorio and Guidotti (1995) are credited as being the first to hint of a non-monotone relationship between financial development and economic growth. Following this observation, there has been a recent surge in testing the “too much” finance hypothesis or the “vanishing effects” of finance across countries and time. This section presents relatively recent investigations into the potential non-linear nexus between financial development and economic growth.

A critical review of literature points to Rioja and Valev (2004) as being the first researchers to examine the non-linear finance-growth nexus in relatively recent times. The researchers studied a panel of 74 countries from 1960 to 1995 by the GMM estimator. The sample was split into three regions using financial development as the sample splitting variable. The threshold was put at alternative percentile values of financial development from the 10th percentile through to the 90th percentile with uniform increments of 5. The low region ranged from the 10th to the 45th percentiles and the high region from the 55th to 90th percentiles with the 50th percentile being the middle region. The findings were that in the low region there is an indeterminate impact of financial development and economic growth. But, the level of financial development impacts positively on economic growth in the middle region while the impact of financial development diminishes in the high region. Financial development was proxied by private credit to GDP, commercial banks assets to the sum of commercial banks and central bank assets and liquid liabilities of the financial system to GDP.

Rousseau and Wachtel (2011) re-examined the finance-growth relationship across a cross-section of 84 countries using annual data from 1960 to 2004. Measuring financial

development with three alternative proxies – M3 (% of GDP), M3 less M1 (% of GDP) and private sector credit (% of GDP) and applying OLS, Instrumental Variables (IV) regression and SGMM estimation methods for three models– 1960 to 2004 (full sample), 1960 to 1989 (first sub-sample) and 1990 to 2004 (second sub-sample); the results showed that for the full sample and first sub-sample periods the measures of financial development had significant positive impacts on economic growth except the private sector credit (% of GDP) which was insignificant in the 1960 to 1989 sub-sample. On the contrary, none of the financial development indicators used in the study had a significant impact on growth in the 1990 to 2004 sub-sample. The results were consistent across the different estimation methods.

In exploring the “too much” finance hypothesis, Arcand, Berkes and Panizza (2012) used annual data from 1960 to 2010. private credit was used to measure financial depth (development) and employed an assortment of estimators over different time period, 1970 to 2000; 1970 to 2005; 1970 to 2010; 1980 to 2010 and from 1990 to 2010 for the cross-sectional regression to compare with Beck and Levine (2004) estimates and 1960 to 1995; 1960 to 2000; 1960 to 2005 and 1960 to 2010 for panel regression to compare with Rousseau and Wachtel (2011) estimates the study found that the impact of financial development on growth diminishes over the periods. Turning to the use of a squared term of private credit, the study found evidence for an inverted U-shape relationship and that when private credit exceeds 80% to 100% of GDP, then financial development begins to impact economic growth negatively. Similarly, Arcand, Berkes and Panizza (2015) found that when credit to the private sector gets to 100% of GDP then evidence of the vanishing effect of financial development on growth manifests.

Cecchetti and Kharroubi (2012) used Pooled OLS on a panel of 50 countries to examine the potential non-linear relationship between finance and economic growth using a non-overlapping 5 year averages data from 1980 to 2009. Using credit to private sector as a proxy for financial development and including a squared term of private sector credit in the regression, the researchers found evidence for an inverted U-shape relationship between financial development and economic growth and that finance starts to retard economic growth when credit to private sector hits 90% of GDP.

Dabla-Norris and Srivisal (2013) investigated the potential role of financial development in dampening macroeconomic volatility. A panel of 110 countries with annual data from 1974–2008 was employed in the analysis. The dynamic panel estimator –SGMM was used and the estimated results showed that financial development proxied by private sector credit to GDP ratio has a U-shape relationship with growth volatility. That is, the linear term to private credit was negative and significant but the squared term of private credit was positive and significant. The results were robust to other proxies used for financial development - total liquid liabilities as a share of GDP, depository banks' assets as a share of GDP, and total deposits in financial institutions as a share of GDP.

Law and Singh (2014) examined the potential non-linear finance-growth nexus using a panel of 87 countries and 5 year averaged data from 1980 to 2010 and employed a GMM dynamic panel estimation procedure and panel threshold estimation techniques. The study finds that when credit to public sector is used as a threshold variable for financial development, the point is at 4.842 translating into 88% of GDP; 4.514 translating into 91% when liquid liabilities are used to proxy financial development and 4.595 translating into 99% of GDP when domestic credit is used to proxy financial development. The results indicated that below

the reported thresholds finance development significantly promote economic growth but serves as a drag on economic growth above the reported threshold values of financial development.

Beck, Georgiadis and Straub (2014) also examined the potential non-linear finance-growth nexus using 132 countries and data from 1980 to 2005 averaged over 5 year intervals. Financial development was measured by private credit as a percentage of GDP. The quadratic term of private credit was included in the estimable model to test for the non-linearity. Estimating the results with a dynamic panel estimator – SGMM, they found evidence for an inverted U-shape link between financial development and economic growth.

Doumbia (2015) investigated the finance growth nexus by employing SGMM and Panel Smooth Transition Regression (PSTR). Data for 43 developed and developing countries covering the period from 1975 to 2009 were used and financial development proxied by three alternative measures of financial development – liquid liabilities, domestic credit to the private sector and bank credit. Using economic growth as the threshold variable, the researcher found that below the median value of economic growth, financial development augments growth for developing countries and turns to insignificance after the median value of economic growth.

Using NARDL to investigate a potential non-linear and asymmetric relationship between financial development and economic growth in USA, Germany, France and Turkey, Demir (2015) proxied financial development by stock market capitalization (% of GDP) and private sector credit (% of GDP). Data for study was from 1989 to 2012. Generally, the estimated

results showed evidence for asymmetric cointegrating relationship and long-run and short-run non-linear asymmetries in the finance-growth relationship.

Similarly, Eboreime et al. (2016) studied the potential non-linear and asymmetric relationship between finance and growth in Nigeria. Using NARDL estimation method and annual data from 1990 to 2015, the study found that there is an asymmetric cointegrating relationship between financial development and economic growth and that positive cumulative changes to bank assets (% of GDP) and money supply (% of GDP) is growth enhancing while negative cumulative changes to the two proxies for financial development is a drag on growth in Nigeria.

Moyo et al. (2018) also used the NARDL approach to investigate the potential non-linear and asymmetric relationship between financial development and economic growth in Brazil. Using annual data from 1985 to 2015 and using eight (8) alternative measures for financial development – Bank credit to deposit ratio, Bank deposits (% of GDP), M2 (% of GDP), private credit (% of GDP), Bank assets (% of GDP), liquid liabilities (% of GDP), stock market capitalization (% of GDP) and stock market value traded (% of GDP) the results showed evidence for long-run and short-run asymmetries in the finance-growth relationship. It was also found that on the whole positive cumulative changes to banks measures had negative impact on growth and negative cumulative changes have positive impact on growth. For the stock market measures, positive cumulative changes and negative cumulative changes were found to impact growth positively and negatively respectively.

Oro and Alagidede (2018) examined the potential nonlinear relationship between financial development, economic growth and the volatility of growth in Nigeria using annual time

series data from 1970 to 2015. Using instrumental variables estimator with a squared term of private sector credit and dynamic threshold estimators, the researchers found evidence of a U-shape relationship between finance development (credit to private sector as a percentage of GDP) and economic growth.

Using sample splitting and panel threshold estimation approach, Ibrahim and Alagidede (2018) examined the potential non-linear finance-growth relationship using a panel of 29 Sub-Saharan African countries from 1980 to 2014. Using private credit as a share of GDP and domestic credit as a share of GDP, the results indicates that below the threshold values of private credit and domestic credit, financial development has an insignificant impact on growth but above the threshold values financial development has a positive and significant impact on economic growth.

2.4.6 Finance-Growth Nexus in Ghana

Quartey and Prah (2008) tested the supply-leading, demand-following and the Patrick's Stages of Development hypotheses in Ghana. Their bivariate VAR model was estimated for four different measures of financial development - broad money to GDP ratio; domestic credit to GDP ratio; private credit to GDP ratio and private credit to domestic credit ratio. The Granger causality tests, Impulse Response Functions and Variance Decomposition performed for all four VAR estimates showed evidence for the demand-following hypothesis using the broad money to GDP ratio proxy financial development. For the rest of the proxies, no evidence for either the demand-following or supply-leading hypotheses was found. No evidence was also found for the stages of development hypothesis.

Esso (2010) examined the long-run finance-growth nexus in ECOWAS countries from 1960 to 2005 in which Ghana was one of the units of analysis. Using ARDL and Toda and Yamamoto Non-causality test for each of the countries in the study, the results showed that M2 as a share of GDP has a positive and significant long-run relationship with economic growth. The non-causality test showed evidence of a way causality running from financial development to economic growth.

Adusei (2013) investigated the long-run and short-run impact of financial development on the economic growth in Ghana with annual data from 1971 to 2010. The Fully Modified Ordinary Least Squares (FMOLS) was used to examine the long-run effect of financial development on economic growth and the Error Correction Method (ECM) was used to examine the short-run impact of finance on growth. For robustness checks the Generalized Method of Moments (GMM) was also used. The results points to a negative and significant impact of financial development, proxied by domestic credit as a percentage of GDP and broad money supply as a percentage of GDP, on economic growth in both the long-run and short-run. The results for when credit to the private sector as a percentage of GDP proxied financial development were positive but insignificant. The results were robust to the different estimation methods.

Adu, Marbuah and Mensah (2013) examined the finance-growth relationship in Ghana. Four alternative indicators of financial development - credit to the private sector to GDP ratio, private sector credit to total credit ratio, total domestic credit and broad money stock to GDP ratio were used. Using ARDL approach they found that the growth effect of financial development is sensitive to how financial development is measured. The results showed that while credit to the private sector to GDP ratio, private sector credit to total credit and total

domestic credit ratio have positive impacts on growth, broad money stock to GDP ratio have a negative impact on growth.

Using ARDL cointegration and ARDL-ECM to the study the finance-growth nexus in Ghana, Nyasha and Odhiambo (2015), employed four alternative measures of financial development the ratio of quasi liquid liabilities to GDP, the ratio private sector credit to GDP, the ratio private sector credit to broad money and the ratio of commercial banks' assets to GDP and a composite index of bank-based financial development. The analysis using annual data from 1970 to 2014 showed on the balance financial development have positive and significant impact on economic growth.

2.4.7 Indirect Remittances-Growth Nexus Using Financial Development.

There are several studies that investigate the indirect effects of remittances on economic growth through channels like quality institutions (e.g. Catrinescu et al., 2009; Abdih et al., 2012; Lartey & Mengova, 2015; Adams et al., 2016; El-Hamma, 2017), exchange rate appreciation or the Dutch Disease effect (e.g. Amuedo-Dorantes & Pozo, 2004; Rajan & Subramanian, 2005; Acosta et al., 2007; Lartey et al., 2008; Lopez et al., 2008; Bouoiyour & Selmi, 2016) and inflation (e.g. Narayan et al., 2011; Khan & Islam, 2013; Ball et al., 2013; Tung et al., 2015) among others. This section specifically reviews studies that used the financial system as the transmission channel for the growth effects of remittances. The review proceeds as follows.

Giuliano and Ruiz-Arranz (2005) examined the indirect growth effects of remittances through financial development on a panel of 73 countries using 5 year averaged data from 1975 to 2002. As an initial step, they estimated their specified model using OLS, FE and SGMM

without the financial development variable and found that across the estimation techniques, remittances did not have a significant impact on growth. Going further to estimate their model with a financial development term and an interaction term between remittances and financial development, they found that remittances boost growth and the interaction term between remittances and financial development was negative and significant and this was interpreted to mean that remittances are used a tool to overcome credit constraints in less financially developed countries to finance investment. The estimated results for the model with interaction term using SGMM was robust to all the alternative measures of financial development used – Deposits to GDP, credit to private sector to GDP, Banking credit to GDP and M2 to GDP. In a similar fashion Giuliano and Ruiz-Arranz (2009) extended the number of countries from 73 to 100 using non-overlapping 5 year averages data for the same period of 1975 to 2002 and reports the same findings.

World Bank (2006) investigated the development impact of remittances to Latin America. Annual Cross-country data set for 67 from 1991 to 2005 was employed for the empirical analyses. Quite apart from examining the direct growth impact of remittances, the study explored the potential indirect growth effects of remittances by including interaction terms for remittances and financial development and other macroeconomic variables such as educational attainment, institutional quality and investment in separate equations. The estimated results showed that remittances negatively and significantly impact growth but its interaction with the financial development variable yielded a positive and significant impact on growth. The study thus, concluded that remittances are only growth enhancing only when the financial system of countries are well developed.

Chami et al. (2008) empirically examined the credit constraint hypothesis, as part of their work on the macroeconomic effects of remittances. The study used a panel of 108 countries with 5-year averages data from 1970 to 2004. Applying OLS, FE, OLS-IV and FE-IV estimation methods for the full sample and for only emerging economies, they found remittances to positively impact growth and the interaction term between remittances and financial deepening proxied by M2 to GDP was negative and significant for only emerging economies in both the OLS and FE estimation methods. Turning to the use of Instrumental Variables, results estimated by OLS-IV and FE-IV showed that the coefficient remittances have a positive and significant impact on growth while the interaction term was negative and significant for both the full sample and the emerging economies sub-sample only when OLS-IV was the estimation method used. They therefore, concluded that there is a mild evidence of financial development complementing the growth effects of remittances by easing credit constraints in less financially developed economies.

Barajas et al. (2009) followed the econometric procedure used by Chami et al (2008) to investigate the credit constraint hypothesis in a panel of 84 countries from 1970 to 2004. Applying OLS-IV and FE-IV to 5-year averages data for the full sample as well for a sub-sample of emerging countries; the researchers report the same findings as did Chami et al. (2008). That is, they found remittances to have positive impact on growth and the interaction term to negatively and significantly impact growth for both the full sample and emerging economies sub-sample in only the OLS-IV estimated results. Thus evidence for the credit constraint hypothesis was found only under the OLS-IV method, which means that in less developed financial systems, remittances help to reduce credit constraints for investment.

Mundaca (2009) assessed the nexus between remittances and economic growth in the presence of a developed financial system. Using annual data from 1970 to 2002 for 25 Latin America and Caribbean (LAC) countries and applying DGMM estimation method, the result yielded evidence to the effect that the macroeconomic impact of remittances is enhanced in the presence of well-developed financial system that funnels the remittances to productive investments.

Ahamada and Coulibaly (2011) studied the role of the financial system in the growth stabilizing impact of remittances in a panel of 87 developing and economies. The study employed annual data from 1980 to 2008 and applied Panel Smooth Transition Regression (PSTR) to estimate the results. They found that the mitigating role of remittances in growth volatility is more pronounced in an environment of well-developed financial systems which aid in redirecting remittances to investments.

Nyamongo et al. (2012) investigated the tripartite nexus between remittances, financial development and economic growth in Africa. Applying FE and 2SLS to annual data from 1980 to 2009 for a panel of 36 African countries, the study found remittances be growth enhancing and the volatility of remittances was also found to be drag on growth. With respect to the role of financial system in the remittance-growth nexus, they found that the financial development proxied by domestic credit to the private sector complements the growth enhancing impact of remittances.

Bettin and Zazzaro (2012) queried whether remittances and financial development are substitutes or complements for growth. To empirically analyse this, they used annual data for 66 developing averaged 5years from 1991 to 2005. Departing from previous studies, the

researchers used a quality-based measure - efficiency of the banking sector proxied by cost to income ratio; instead of the traditional quantity-based measures to proxy for financial development. Estimating their model with an interaction term between remittances and financial development using OLS and SGMM, they found remittances have a positive and significant bearing on growth and the coefficient of the interaction term was positive and significant. They interpreted the result to mean that when the banking system is efficient it complements remittances to enhance economic growth.

Abida and Sghaer (2014) examined the role of the financial system in the remittance-growth relationship using a panel of four (4) North African economies. Applying SGMM to annual data for Egypt, Morocco, Tunisia and Algeria for the period starting from 1980 to 2011, they found remittances have positive and significant growth effect. They also found that the growth enhancing impact of remittances becomes more pronounced with a developed financial system as evidenced by the positive and significant coefficient of the interaction term between remittances and financial development measured by Liquid Liabilities to GDP ratio and Credit to GDP ratio respectively.

Sobiech (2015) investigated whether financial development drives remittances and its impact on economic growth in a panel of 54 countries 1970-2010. Econometric analysis methods such as QML-FE and SGMM were applied to non-overlapping 5 year averages of data. The results showed which proved robust to both the measures of financial development used and estimation methods showed that remittances is only growth enhancing in countries with less developed financial systems and serves as a drag on growth in countries with developed financial systems.

Chowdhury (2016) investigated the role of the financial development in promoting the macroeconomic impact of remittances using a panel of 33 developing countries. Using annual data from 1979 to 2011 and applying dynamic panel regression method –GMM, the results showed that remittances positively and significantly impact economic growth. However, the study did not find evidence for either the complementarity hypothesis or the credit constraint hypothesis as the coefficients for the interaction term between remittances and the various measures used to proxy financial development (credit to private sector to GDP ratio, total credit to GDP ratio, M2 to GDP ratio and M3 to GDP ratio) were not significant.

El Hamma (2016) examined the whether or not the macroeconomic impact of remittances is contingent on the level of financial development. Using annual data for 12 MENA countries from 1984 to 2012 and applying SGMM to estimate the regression results both on annual basis and on 4 year averages, it was found that financial development, proxied by domestic credit to private sector as share of GDP, liquid liabilities as a share of GDP and cost to assets ratio, complements remittances in promoting economic growth as evidenced by the positive and significant coefficients of the interaction terms between remittances and the alternative measures of financial development used in the study.

2.5 Chapter Summary

In this chapter the theoretical and empirical literature relevant to the present study is presented. The studies reviewed ranges from cross-sectional studies to panel studies and to county specific studies. Varied methodologies – OLS, FE, RE, ARDL, NARDL, FMOLS, PDOLS, 2SLS, IV, PMG and GMM among others have been used to investigate the relationships between remittances and growth, finance and growth and the remittance-finance-growth relationship. Also, different measures have been used to proxy the key

variables of interest across the studies. All of these together (varied sample sizes, different methodologies and different proxies) accounts for the varied, contradictory and hence inconclusive outcomes – positive, negative and even neutral relationship in some cases.

CHAPTER THREE

METHODOLOGY

3.1 Chapter Overview

The detailed econometric procedures employed to achieve the study objectives are discussed here. The research design is set out under section 3.2 and the empirical model specifications are presented and explained in section 3.3. Estimation strategies comprising of some pre-estimation diagnostics, the method used for estimating the model parameters and post-estimation diagnostic tests are presented under section 3.4. Variables description and their sources are shown in sections 3.5. The chapter is then summarised under section 3.6.

3.2 Research Design and Paradigm

The data analysis approach used in this study is the quantitative analysis approach. The very nature of the study makes it rest on the positivist paradigm which is the de facto research paradigm for all quantitative studies. According to Boateng (2014) a research paradigm describes the set of values and beliefs that is commonly held by members of an academic discipline and it shapes how reality is perceived and studied in that field of knowledge. The thrust of the positivist paradigm is that there exists a single objective reality which does not allow for personal biases or opinions. Deductive reasoning is the bedrock of the positivist paradigm; hence, the conclusions for the study are drawn from the estimated parameters of the specified models for the study.

The objectives of the study are ascertaining whether there exists non-linear and asymmetric effects of remittance flows and bank-based financial development on economic growth and whether there is evidence of either the complementarity hypothesis or credit constraint

hypothesis. To this end, secondary annual time series data for Ghana, collated from the World Bank's World Development Indicators database and IMF's Financial Development Index database, is used.

3.3 Empirical Model Specification

Following the empirics the general econometric model for the analysis of the remittance-finance-growth nexus while accounting for some other drivers of economic growth is specified below:

$$\Delta GDPPC_t = \alpha_0 + \alpha_1 REM_t + \alpha_2 FD_t + \sum_{j=3}^N \alpha_j X_t + \varepsilon_t \quad (1)$$

$\Delta GDPPC$ is changes in Gross Domestic Product per capita to proxy for economic growth following (Giuliano & Ruiz-Arranz, 2009; Adusei, 2013; Nsiah & Fayissa, 2013; Nyeadi & Atiga, 2014; Feeny et al., 2014); REM is personal transfers (% of GDP) to proxy remittances (Chami et al., 2008; Barajas et al., 2009; Chowdhury, 2016; Issahaku et al., 2017); FD is a vector of financial development variables proxied by the financial institutions index (FI) and its three sub-indices of Financial Institutions Depth (FID) composed of credit to private sector (% of GDP), assets of mutual and pension funds (% of GDP) and insurance premium (life and non-life) as a % of GDP; Financial Institutions Access (FIA) composed of bank branches per 100,000 adults and bank accounts per 1000 adults and Financial Institutions Efficiency (FIE) composed of non-interest income, lending-deposit spread, net interest income to total income ratio, overhead cost to total assets ratio, return on assets and return on equity. The overall index and its sub-indices are introduced separately into the model; as it is possible that the sub-indices would have different impact which may be lost in the composite index. The Financial Development Index was originally constructed by Sahey et al. (2015)

from 1980 to 2013 and later updated by the IMF for 183 countries from 1980 to 2016 as a step to resolving the critique of using only quantity-based measures to proxy bank-based financial development; \mathbf{X} is a vector of control variables consisting of investment proxied by gross capital formation as a percentage of GDP (GCF) per the empirics of (Catrinescu et al., 2009; Barajas et al., 2009; Chowdhury, 2016; Ofori-Abebrese et al., 2017), inflation proxied by annual percentage change in the consumer price index (INF) as per (Giuliano & Ruiz-Arranz, 2009; Feeny et al., 2014), Trade Openness proxied by the sum of exports and imports (% of GDP) - (TOPEN) (Nyasha & Odhiambo, 2015; Feeny et al., 2014; Issahaku et al., 2017; Ustarz & Issahaku, 2017) and Foreign Direct Investment proxied by net FDI inflows (% of GDP) as per (Fayissa & Nsiah, 2008; Adenutsi, 2011; Ustarz & Issahaku, 2017); t refers to time; α_0 to α_j are the model coefficients to be estimated and ε_t is the error term.

3.4 Estimation Strategies

This study markedly departs from previous studies in analysing the tripartite nexus of remittance flows, financial development and economic growth. Previous works that examined the likely non-linear link between remittance flows and economic growth employed either a squared term of remittances (e.g. Chami et al., 2003; Barajas et al., 2009; Hassan et al., 2012; Hassan & Shakur, 2017) or the structural break estimation approach that allows for different parameter estimates in the lower and upper regions (e.g. Giuliano & Ruiz-Arranz, 2006, 2009; Bangake & Eggoh, 2019). Similarly, studies that investigated the potential non-linear link between finance and growth largely employed the squared term approach (e.g. Cecchetti & Kharroubi, 2012; Arcand et al., 2012, 2015; Dabla-Noris & Srivisal, 2013; Law & Singh, 2014; Sahey et al., 2015; Grandler, 2015) or the structural break estimation approach (e.g. Giuliano & Ruiz-Arranz, 2009, Oro & Alagidede, 2018).

These studies implicitly assume that the potential non-linear effect is symmetric in the long-run.

However, it is possible that even above or below the identified threshold value(s), economic growth could respond differently to positive and negative changes in remittances and financial development in the different regions. Quite apart from the observation above, the studies cited did not account for the potential non-linear and or asymmetric short-run effects in the relationships. That is, the estimated parameters only point to the long-run non-linear effects. But, quite clearly all the regressors would have long and short run effects on the response variable (Saha, 2017). Hence, to capture the potential non-linear short-run and long-run effects, non-linear cointegration models/Error Correction Models (ECM) comes in handy. However, existing threshold cointegration models such as the threshold ECM attributed to Balke and Fomby (1997), the Markov-Switching ECM associated with Psaradakis et al. (2004) and the Smooth Transition Regression ECM by Kapetanios et al. (2006) have the restrictive assumption that the cointegration dynamics is linear and that the variables must have the same order of integration (Shin et al., 2014; Demir, 2015). On the contrary, it is possible for there to be hidden cointegration. The concept of hidden cointegration as first argued by Granger and Yoon (2002) posits that when variables do not have a cointegrating relationship in the conventional sense, it is possible that the positive and negative partial sums of the variables would be a cointegrated. This is captured by modelling asymmetries into the cointegration dynamics (Shin et al., 2014). To address these short-comings of the methodologies adopted by previous studies, the present study jointly investigate the potential non-linear and asymmetric remittance-growth and the potential non-linear and asymmetric financial-growth relationships and how financial development mediates the remittance-growth relationship under the bounds cointegration framework.

In furtherance of the above, the Non-linear ARDL (NARDL) recently developed by Shin et al. (2014) would be adopted to analyse the objectives of the study.

3.4.1 Method of Estimation

The NARDL cointegration approach is an extension of the Autoregressive Distributed Lag (ARDL) Bounds cointegration approach made popular by Pesaran and Shin (1998) and Pesaran, Shin and Smith (2001). Thus, it has all the advantages of the ARDL Bounds Cointegration approach. The ARDL Bounds approach to cointegration testing has a clear flexibility and advantage in relaxing some preconditions of the popular Engle and Granger (1987) and Johansen (1988) cointegration tests. For instance, the use of the two approaches to testing cointegration requires that all series should be integrated of the same order. That is stationary at level [I(0)] series, or stationary after first difference [I(1)] series. However, the NARDL Bounds cointegration relaxes this preconditions and is thus applicable even when the series are I(0) or I(1) or both I(0) and I(1) but not of a higher order – I(2). That is, the series should not have unit roots at first difference. Quite apart from the flexibilities stated above, the NARDL just like the ARDL is known to produce consistent short-run parameters with respect to their long-run parameters in small sample sizes (Pesaran et al., 2001) as is the case of this study. Again, the use of the AIC or the SBIC to select the optimal lag length, an integral part of the ARDL Bounds cointegration process, reduces Multicollinearity and endogeneity problems (Pesaran et al, 2001) which also hold for the NARDL cointegration approach. An added advantage of the NARDL approach is that it estimates both the short and long runs asymmetric relationship simultaneously (Shin et al., 2014).

Following Shin et al. (2014) the asymmetric long-run links with only remittances and bank-based financial development entering the equation asymmetrically (introducing their partial sum of positive and negative changes) can be written as:

$$\Delta GDPPC_t = \beta_0 + \beta_1^+ REM_t^+ + \beta_2^- REM_t^- + \beta_3^+ FD_t^+ + \beta_4^- FD_t^- + \phi X_t + \varepsilon_t \quad (2)$$

Where REM and FD in equation (1) are decomposed into their partial sum components with the focus being on the positive and negative partial sums as follows;

$$REM_t = REM_0 + REM_t^+ + REM_t^- \quad (2a)$$

REM_0 refers to no change in the REM series, REM_t^+ is the partial sum of positive changes in the REM series given by:

$$REM_t^+ = \sum_{i=1}^t \Delta REM_t^+ = \sum_{i=1}^t \max(\Delta REM_t, 0) \quad (2b)$$

REM_t^- is the partial sum of negative changes in the REM series given by:

$$REM_t^- = \sum_{i=1}^t \Delta REM_t^- = \sum_{i=1}^t \min(\Delta REM_t, 0) \quad (2c)$$

$$FD_t = FD_0 + FD_t^+ + FD_t^- \quad (2d)$$

FD_0 indicates no change in the FD series, FD_t^+ is the partial sum of positive changes in the FD series given by:

$$FD_t^+ = \sum_{i=1}^t \Delta FD_t^+ = \sum_{i=1}^t \max(\Delta FD_t, 0) \quad (2e)$$

FD_t^- is the partial sum of negative changes in the FD series given by:

$$FD_t^- = \sum_{i=1}^t \Delta FD_t^- = \sum_{i=1}^t \min(\Delta FD_t, 0) \quad (2f)$$

REM_0 and FD_0 subsumed into the constant term are the threshold values (Threshold of zero) for the partial sum of changes in the REM and FD series (Eberhardt & Presbitero, 2013; Shin et al., 2014). \mathbf{X}_t is a vector of regressors entering equation (2) symmetrically.

Again, following Shin et al. (2014) the UECM from equation (2) is specified as follows;

$$\begin{aligned} \Delta GDPPC_t = & \alpha_0 + \rho GDPPC_{t-1} + \gamma_1^+ REM_{t-1}^+ + \gamma_2^- REM_{t-1}^- + \gamma_3^+ FD_{t-1}^+ + \gamma_4^- FD_{t-1}^- + \gamma \mathbf{X}_{t-1} \\ & + \sum_{i=1}^{p-1} \delta_i \Delta GDPPC_{t-i} + \sum_{i=0}^{q-1} (\theta_i^+ \Delta REM_{t-i}^+ + \theta_i^- \Delta REM_{t-i}^-) \\ & + \sum_{i=0}^{m-1} (\eta_i^+ \Delta FD_{t-i}^+ + \eta_i^- \Delta FD_{t-i}^-) + \sum_{i=0}^{n-1} \varphi_i \Delta \mathbf{X}_{t-1} + \varepsilon_t \end{aligned} \quad (3)$$

All variables retain their descriptions as given above. ρ is the autoregressive parameter and the asymmetric long-run parameters of the positive and negative partial sum coefficients of the lagged levels of REM is given by $\beta_1^+ = -\hat{\gamma}_1^+ / \hat{\rho}$ and $\beta_2^- = -\hat{\gamma}_2^- / \hat{\rho}$ and that of FD is given by $\beta_3^+ = -\hat{\gamma}_3^+ / \hat{\rho}$ and $\beta_4^- = -\hat{\gamma}_4^- / \hat{\rho}$. γ is a vector of symmetric long-run parameters of the control variables. $\sum_{i=1}^{p-1} \delta_i$ is the symmetric short-run parameters of the

lagged difference of the dependent variable and $\sum_{i=0}^{n-1} \varphi_i$ is the symmetric short-run parameters of the control variables. $\sum_{i=1}^{q-1} \theta_i^+$, $\sum_{i=1}^{q-1} \theta_i^-$; $\sum_{i=1}^{m-1} \eta_i^+$, $\sum_{i=1}^{m-1} \eta_i^-$ represent the asymmetric short run coefficients of the lagged difference of remittances and financial development. Δ is the difference operator whiles “p”, “q”, “m” and “n” are the maximum (optimal) lag lengths of the dependent and independent variables respectively. One (1) is subtracted from the lag lengths of the variables because, the NARDL model is estimated with one lag less of the optimal lag length selected by either AIC or SBIC.

In modelling the second objective which is to ascertain whether or not financial development plays a mediating function in the remittance-growth nexus, an interaction of remittances (REM) and financial development (FD), following the empirics of Giuliano and Ruiz-Arranz (2009), Mundaca (2009), Ahamada and Coulibaly (2011), Nyamongo et al. (2012) and Ramirez (2013), is introduced in equation (3) as follows;

$$\begin{aligned} \Delta GDPPC_t = & \tau_0 + \psi GDPPC_{t-1} + \phi_1^+ REM_{t-1}^+ + \phi_2^- REM_{t-1}^- + \phi_3^+ FD_{t-1}^+ + \phi_4^- FD_{t-1}^- \\ & + \phi_5^+ (REM * FD)_{t-1}^+ + \phi_6^- (REM * FD)_{t-1}^- + \phi X_{t-1} + \sum_{i=1}^{p-1} \vartheta_i \Delta GDPPC_{t-i} \\ & + \sum_{i=0}^{q-1} (\lambda_i^+ \Delta REM_{t-i}^+ + \lambda_i^- \Delta REM_{t-i}^-) + \sum_{i=0}^{m-1} (\pi_i^+ \Delta FD_{t-i}^+ + \pi_i^- \Delta FD_{t-i}^-) \\ & + \sum_{i=0}^{n-1} (\delta_i^+ (\Delta REM * FD)_{t-i}^+ + \delta_i^- (\Delta REM * FD)_{t-i}^-) + \sum_{i=0}^{r-1} \mu_i \Delta X_{t-1} + \varepsilon_t \quad (4) \end{aligned}$$

As explained before, all variables retain their descriptions as given above. ψ is the autoregressive parameter and the asymmetric long-run parameters of the positive and negative partial sum coefficients of the lagged levels of REM is given by $\beta_1^+ = -\widehat{\phi}_1^+ / \widehat{\psi}$ and

$\beta_2^- = -\widehat{\phi}_2^- / \widehat{\psi}$ and that of FD is given by $\beta_3^+ = -\widehat{\phi}_3^+ / \widehat{\psi}$ and $\beta_4^- = -\widehat{\phi}_4^- / \widehat{\psi}$ and for REM*FD it is given by $\beta_5^+ = -\widehat{\phi}_5^+ / \widehat{\psi}$ and $\beta_6^- = -\widehat{\phi}_6^- / \widehat{\psi}$. ϕ is a vector of symmetric long-run parameters of the control variables. $\sum_{i=1}^{p-1} \vartheta_i$ is the symmetric short-run parameters of the lagged difference of the dependent variable and $\sum_{i=0}^{r-1} \mu_i$ is the symmetric short-run parameters of the control variables. $\sum_{i=1}^{q-1} \lambda_i^+$, $\sum_{i=1}^{q-1} \lambda_i^-$; $\sum_{i=1}^{m-1} \pi_i^+$, $\sum_{i=1}^{m-1} \pi_i^-$ and $\sum_{i=1}^{n-1} \delta_i^+$, $\sum_{i=1}^{n-1} \delta_i^-$ represent the asymmetric short run coefficients of the lagged difference of positive and negative changes to remittances and financial development and the interaction term. Δ is the difference operator whiles “p”, “q”, “m” “n” and “r” are the maximum (optimal) lag lengths of the dependent and independent variables respectively. One (1) is subtracted from the lag lengths of the variables because, the NARDL model is estimated with one lag less of the optimal lag length selected by either AIC or SBIC.

Finally, to ascertain the marginal impact of remittances on growth, partial derivatives of equation (4) would be taken with respect to the positive and negative partial sums of REM as follows - for the long-run;

$$\frac{\partial \Delta GDPPC_t}{\partial REM_{t-1}^+} = \phi_1^+ + \phi_5^+ FD_{t-1}^+ \quad \text{and} \quad \frac{\partial \Delta GDPPC_t}{\partial REM_{t-1}^-} = \phi_2^- + \phi_6^- FD_{t-1}^-.$$

And for the short-run;

$$\frac{\partial \Delta GDPPC_t}{\partial REM_{t-i}^+} = \sum_{i=1}^{q-1} \lambda_i^+ + \sum_{i=1}^{n-1} \delta_i^+ \Delta FD_{t-1}^+ \quad \text{and} \quad \frac{\partial \Delta GDPPC_t}{\partial REM_{t-i}^-} = \sum_{i=1}^{q-1} \lambda_i^- + \sum_{i=1}^{n-1} \delta_i^- \Delta FD_{t-1}^-.$$

After the partial differentiation, the 1st, 2nd and 3rd quartiles of FD shall be used to determine the marginal impact of REM at different stages of financial development.

For the third objective, which is to ascertain the potential non-linear and asymmetric long-run causal direction among the three key variables of the study – economic growth, remittances and financial development, equation (3) would be adapted as an UECM under the NARDL framework. That is, each of the three key variables – GDPPC, REM and FD (with focus on

the overall index for financial development) would be used as dependent variables and estimated to infer long-run causality among the main themes of the study under a non-linear framework.

3.4.2 Tests and Diagnostics

3.4.2.1 Stationarity/Unit Root Test

A very important exercise in time series studies is to explore the stationarity properties of the series used in the study. This is to ensure that the regression result(s) is not spurious. Usually, the NARDL Cointegration approach does not require testing for unit roots in the series. However, when the variables are integrated of order one (I(1)) even at first difference, that is I(2) at level, the NARDL model is rendered inapplicable. Therefore, to be certain that no variable is an I(2) process, stationarity properties of the variables are tested. In this regard the study adopts the popularly used methods for testing for the stationarity or unit root properties of variables in time series studies. Thus, the ADF test by Dickey and Fuller (1979) and the Zivot-Andrews (ZA) test by Zivot and Andrews (1992) were used.

The ADF test was introduced by Dickey and Fuller (1979) as an improved version of the Dickey-Fuller test. In the ADF, the lagged difference of a given variable is added to the regressors. The generalized model for ADF test is as specified below:

$$\Delta y_t = \delta + \mu_t + \vartheta y_{t-1} + \sum_{t=1}^k \tau \Delta y_{t-1} + \xi_t \quad (5)$$

Where y_t is a given series at time t , δ is a constant term, μ_t is the trend term, ϑ is the autoregressive parameter and τ is a vector of parameters for the lagged difference of a given series, k is the optimal lag length, Δ is the first difference operator and ξ_t is the error term.

The null hypothesis of a non-stationarity/unit root ($H_0: \vartheta = 0$) is tested vis-a-vis an alternative of stationarity ($H_1: \vartheta < 0$). The MacKinnon approximate p-values for the $z(t)$ statistic would be used to make a decision as to whether or not a series has unit roots. If the MacKinnon approximate p-values are significant at any of the conventional significance levels the null of non-stationarity would be rejected. However, if the MacKinnon approximate p-values are greater than any of the conventional significance levels, the null of non-stationarity would not be rejected.

The ADF test is criticised for not accounting for structural breaks in testing the stationarity/unit root properties of variables. For example Perron (1989) argues that the failure to reject the null of non-stationarity is due to the failure to allow for structural breaks in a given series. That is, not allowing for structural breaks give rise to a bias that reduces the power to reject the null hypothesis of the presence of unit root. Perron therefore extended the ADF model by introducing dummies in the model to allow structural breaks. However, the structural break in Perron's approach was assumed to be known *a priori*. The dating of the break point based on "*ex post* knowledge or examination of the data" is argued to result in an "over rejection" of the null hypothesis (Banerjee et al., 1992; Zivot & Andrews, 1992). They argue that the conventional critical values, for test of parameter change, when the break point is gleaned from examining the data are not valid. Piehl et al. (1999) added that the dummy variable may not enter the model at the appropriate time arising from the uncertainty surrounding the precise timing of the structural break which could render the model invalid.

To resolve these concerns Zivot and Andrews (1992) developed a model to endogenize (assumption that the break date is unknown) the break year(s). Thus, the break date is estimated rather than assumed or inferred from data. Equation 6 below is the Zivot-Andrews

model (an extension of the ADF model) for stationarity test with allowance for structural break in the intercept and trend.

$$\Delta y_t = \delta + \mu_t + \beta DU_t + \gamma DT_t + \vartheta y_{t-1} + \sum_{t=1}^k \tau \Delta y_{t-1} + \xi_t \quad (6)$$

All variables retain their meanings. DU_t is the intercept dummy variable for a change in intercept occurring at each possible break date (TB) and DT_t is a corresponding slope (trend) dummy. Where $DU_t = 1$ if $t > TB$, and 0 otherwise and $DT_t = t - TB$ if $t > TB$, and 0 otherwise. The null hypothesis is that $H_0: \vartheta = 0$ which means that a series has a unit root with drift excluding any break. While the alternate hypothesis is that $H_1: \vartheta < 0$ which means that a series trend-stationary with one time unknown break point. The test selects from among all the possible break dates (BD) the break date which minimizes the t-statistic. The null hypothesis is rejected if the test statistic is statistically significant at any of the conventional levels.

3.4.2.2 Cointegration Test

To ascertain the potential asymmetric cointegrating relationship using the bounds approach under an ARDL framework by Pesaran et al. (2001) extended by Shin et al. (2014) under an NARDL framework, equation (3) would be estimated using the “nardl” command in Stata. Then the asymmetric long run parameter estimates would be tested for cointegration using the F-statistic by Pesaran et al. (2001) with the notation F_PSS on the null of no asymmetric cointegrating relationship among positive and negative changes to remittances, bank-based financial development and economic growth against the alternative of an asymmetric cointegrating relationship.

$$H_0: \rho = \gamma_1^+ = \gamma_2^- = \gamma_3^+ = \gamma_4^- = 0$$

$$H_1: \rho \neq \gamma_1^+ \neq \gamma_2^- \neq \gamma_3^+ \neq \gamma_4^- \neq 0$$

According to Pesaran et al. (2001) If F_{PSS} is greater than the Upper Bound Critical (UBC) values of constructed by Pesaran et al. (2001), then the null is rejected for the alternative. But, if F_{PSS} is lesser than the Lower Bound Critical (LBC) values of Pesaran et al. (2001), then the null is not rejected. And if the F_{PSS} falls between the UBC and LBC, then it becomes inconclusive (Pesaran et al., 2001).

For equation (4) the F-statistic for a null of no asymmetric cointegrating relationship would be tested against the alternative of an asymmetric cointegrating relationship. The null and alternative hypotheses are set out below:

$$H_0: \psi = \phi_1^+ = \phi_2^- = \phi_3^+ = \phi_4^- = \phi_5^+ = \phi_6^- = 0$$

$$H_1: \psi \neq \phi_1^+ \neq \phi_2^- \neq \phi_3^+ \neq \phi_4^- \neq \phi_5^+ \neq \phi_6^- \neq 0$$

3.4.2.3 Symmetry Test

When a cointegrating relationship is established from the cointegration test for equations (3) and (4) the next is to use the Wald test for asymmetries to test for asymmetries in the long-run parameter estimates and short-run parameter estimates.

For the long-run, the null hypothesis of symmetric parameter estimates is tested against the alternative of long-run asymmetric parameter estimates from equation (3) as follows:

$$H_0: \gamma_1^+ = \gamma_2^- \text{ and } \gamma_3^+ = \gamma_4^-$$

$$H_1: \gamma_1^+ \neq \gamma_2^- \text{ and } \gamma_3^+ \neq \gamma_4^-$$

Also, the null hypothesis of symmetric parameter estimates is tested against the alternative of long-run asymmetric parameter estimates from equation (4) as follows:

$$H_0: \phi_1^+ = \phi_2^-; \phi_3^+ = \phi_4^- \text{ and } \phi_5^+ = \phi_6^-$$

$$H_1: \phi_1^+ \neq \phi_2^-; \phi_3^+ \neq \phi_4^- \text{ and } \phi_5^+ \neq \phi_6^-$$

For the short-run, the null hypothesis of symmetric parameter estimates is tested against the alternative of short-run asymmetric parameter estimates from equation (3) as follows:

$$H_0: \sum_{i=1}^{q-1} \theta_i^+ = \sum_{i=1}^{q-1} \theta_i^- \text{ and } \sum_{i=1}^{m-1} \eta_i^+ = \sum_{i=1}^{m-1} \eta_i^-$$

$$H_1: \sum_{i=1}^{q-1} \theta_i^+ \neq \sum_{i=1}^{q-1} \theta_i^- \text{ and } \sum_{i=1}^{m-1} \eta_i^+ \neq \sum_{i=1}^{m-1} \eta_i^-$$

Again, the null hypothesis of symmetric parameter estimates is tested relative to the alternative of short-run asymmetric parameter estimates from equation (4) as follows:

$$H_0: \sum_{i=1}^{q-1} \lambda_i^+ = \sum_{i=1}^{q-1} \lambda_i^-; \sum_{i=1}^{m-1} \pi_i^+ = \sum_{i=1}^{m-1} \pi_i^- \text{ and } \sum_{i=1}^{n-1} \delta_i^+ = \sum_{i=1}^{n-1} \delta_i^-$$

$$H_1: \sum_{i=1}^{q-1} \lambda_i^+ \neq \sum_{i=1}^{q-1} \lambda_i^-; \sum_{i=1}^{m-1} \pi_i^+ \neq \sum_{i=1}^{m-1} \pi_i^- \text{ and } \sum_{i=1}^{n-1} \delta_i^+ \neq \sum_{i=1}^{n-1} \delta_i^-$$

The rejection of the nulls for the long and short run would confirm the existence of asymmetric long run and short run impacts of either remittances or bank-based financial development or both on economic growth. On the other hand, a failure to reject the nulls would prove that either remittances or financial development or both do not affect economic growth asymmetrically. The decision to reject or not would be determined using the p-value of the Wald statistic. It is important to note that the rejection or failure to reject the null of symmetric effects could apply to either remittances or financial development or both as the

parameter restriction tests would be done separately for remittances and financial development. That is, the decision to reject the null or otherwise for remittances and bank-based financial development are independent of each.

3.5 Variables and Data Sources

Data for the study is sourced from the databases of the World Bank and IMF from 1979 to 2017. Apart from the financial development index which is sourced from the IMF financial development index database all others are from the WDI database (2018). Table 3.1 below summarizes the variables, notation, measurement/description and the data sources.

Table 3.1 Variables, Notation, Measurements and Sources

Variables	Notation	Measurement	Sources
Economic Growth	GDPPC	Changes in Gross Domestic Product (in current \$) divided by mid-year population.	WDI
Remittances	REM	Current transfers of migrants (personal transfers) as % of GDP	WDI
Financial Development	FD	Financial development Index	IMF
Investment	INVEST	Gross Capital Formation (% of GDP)	WDI
Economic Stability	INF	Annual % change in CPI	WDI
Trade	TOPEN	Sum of export and import of good and services (% of GDP)	WDI
Foreign Direct Investment	FDI	Foreign Direct Investment, Net Inflows (% of GDP)	WDI

3.6 Study limitations

A key limitation of the study is with respect to availability of data for the focus variables – workers` remittances (personal transfers) and financial development index. The measures of remittance flows and financial development used makes it not possible to go beyond 1979

though data for economic growth and some of the control variables goes back to 1960. Data for personal transfers (% of GDP) starts from 1979 while data for the financial development indices for the study became available in 1980. Therefore the study covers a time period of thirty-nine (39) years from 1979 to 2017. However, this limitation is not expected to contaminate the results as there is data for a sufficiently long period for this annual time series study.

3.7 Chapter Summary

This chapter deals with the model specification, the estimation technique and justification of same. Pre-estimation tests like the test for stationarity of the variables as well as post-estimation tests such as bounds cointegration test and the Wald test for long-run and short-run asymmetries are discussed. The study covers a period of thirty-nine (39) years from 1979 to 2017. Data is sourced from the World Bank's World Development Indicators (WDI) database and the International Monetary Fund (IMF) website.

CHAPTER FOUR

DISCUSSION OF RESULTS

4.1 Chapter Overview

This chapter presents and discusses the results for estimating the specified models in Chapter 3. To begin with the discussion of the results, as is common for time series studies, the descriptive statistics and the correlation matrix for the variables used in the study are computed and presented in clearly labelled tables below. The study proceeds to present the main regression results together with the diagnostic tests as explained in Chapter 3. The results are analysed and its intuitive implications are presented in the discussion of the results.

4.2 Descriptive Statistics

Table 4.1 presents summary statistics of the variables used in the study from 1979 to 2017. Information on the number of observations, the mean, standard deviation, minimum and maximum values for each variable are provided. A few of the summary statistics are briefly discussed below.

Table 4.1 Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
GDPPC	39	750.388	617.070	263.112	2401.754
REM	39	1.261	2.237	0.010	10.131
FI	38	0.205	0.026	0.166	0.266
GCF	39	17.539	7.886	3.378	29.814
INF	39	28.171	25.321	7.126	122.875
TOPEN	39	64.121	30.644	6.320	116.048
FDI	39	2.840	2.979	-0.070	9.517

Notes: GDPPC is Gross Domestic Product per capita in current US\$; REM is personal transfers received as a percentage of GDP; FI is Financial Institutions Index with a range of 0 to 1 (where 1 represents a developed financial system); GCF is Gross Capital Formation as a percentage of GDP; INF is the annual percentage

change in consumer price index; TOPEN is trade openness measured as the sum of imports and exports as a percentage of GDP and FDI is net Foreign Direct Investment Flows as a percentage of GDP.

Over the period under study, GDPPC averaged US\$750. The minimum GDPPC of US\$263 was recorded in the year 2000. This reflects the significant deviations in macroeconomic targets and actual outcomes in 1999 which persisted into the year 2000 and affected GDP per capita growth (Aryeetey, Fosu & Bawumia, 2001). For instance, they submit that the targets for real GDP growth, inflation and BOP surplus for 1999 were 5.5%, 9.5% and US\$60m respectively which turned out to be 4.4%, 13.8% and BOP deficit of US\$93.5m respectively and inflation stood at 40.8% from a target of 10% as at year end in 2000 (Aryeetey et al., 2001, p. 2 and 3). The maximum GDPPC of US\$2402 was recorded in the year 2013. Personal transfers received averaged 1.3% of GDP an indication that Ghana still has the capacity to attract more remittances. With respect to external capital flows, personal transfers received proved to be more stable than net FDI flows to Ghana with standard deviations of 2.24 and 2.98 respectively. Remittances recorded a low of 0.1% of GDP for the sample period in 1984 and high of 10% in 2015. The Financial institutions index averaged 0.205 which indicates that Ghana's financial system is less developed as it far from the perfect score of 1. The minimum index of 0.17 was recorded in 2005 and the maximum index of 0.27 was in 1985. The maximum index for financial development in 1985 could be associated with Sowa (1991) and Aryeetey et al. (2001) assertion that the 1983 Economic Recovery Program (ERP) showed significant improvements in indicators for financial development such as increases in bank branches, credit to private sector and money supply among others in 1985. Inflation rate over the period of study averaged 28% indicative of a state grappling with price stability. The lowest inflation rate for the sample period is 7% which occurred in 2012 and the highest inflation is 123% rate which happened in the year 1983. 1983 was the year Ghana experienced its worst drought and bush fires which affected food production coupled with the

deportation of over one million Ghanaians from Nigeria heightened inflationary pressures on the economy (Aryeetey et al., 2001).

4.3 Pairwise Correlation Matrix

A correlation table is presented below which gives information on the strength and direction of the relationship among the variables used in the study and to ascertain whether or not there are Multicollinearity problems. Multicollinearity is when independent variables (predictors) are highly correlated making it difficult to unbundle the individual effects of the predictors on the dependent variable. Multicollinearity leads to increased standard errors, hence, coefficient estimates turn to be statistically insignificant because of smaller t-ratios (Gujarati, 2004). Table 4.2 presents the correlation matrix. In Table 4.2 there is only one set of highly correlated independent variables (TOPEN & GCF) with correlation coefficient of 0.861. However, the estimation technique used –NARDL is able to correct potential multicollinearity problems (Pesaran et al., 2001; Shin et al., 2014).

Table 4.2 Pairwise Correlation Matrix for the NARDL Model

Variables	GDPPC	REM	FI	GCF	INF	TOPEN	FDI
GDPPC	1						
REM	0.780***	1					
FI	0.203	0.240	1				
GCF	0.351**	0.426***	-0.420***	1			
INF	-0.364**	-0.286*	0.169	-0.468***	1		
TOPEN	0.392**	0.482***	-0.472***	0.861***	-0.531***	1	
FDI	0.777***	0.574***	-0.135	0.349**	-0.416***	0.519***	1

*, ** and *** shows significance at the 10%, 5% and 1% levels respectively.

Although testing for the stationarity or unit root properties is not required when using the NARDL estimation technique, it is imperative to be certain that none of variables is non-stationary or has unit root even at first difference. To ascertain the stationarity properties of the variables, the ADF and ZA unit root tests are used to estimate equation 5 and 6 respectively for both the level and first difference of each variable. The results are presented below.

4.4 Stationarity/Unit Root Tests Results

Table 4.3 Augmented Dickey-Fuller and Zivot-Andrews Unit Root tests (intercept and trend option)

Panel A: Augmented Dickey-Fuller (ADF)					
Variables	Levels		First Difference		Order of Integration
	z(t)		z(t)		
GDPPC	-1.630		-3.952***		I(1)
REM	-4.318***		-8.116***		I(0)
FI	-1.392		-5.708***		I(1)
GCF	-2.213		-5.239***		I(1)
INF	-4.273***		-6.602***		I(0)
TOPEN	-2.419		-5.701***		I(1)
FDI	-3.042		-4.845***		I(1)

Panel B: Zivot-Andrews (ZA)					
Variables	Levels		First Difference		Order of Integration
	T	Break Year	t	Break Year	
GDPPC	-4.796	2006	-5.258**	2003	I(1)
REM	-5.853***	2006	-9.654***	2011	I(0)
FI	-3.955	2005	-6.811***	1987	I(1)
GCF	-6.369***	1993	-7.593***	1986	I(0)
INF	-5.019*	1984	-7.022***	1997	I(0)
TOPEN	-5.227**	1996	-7.112***	1987	I(0)
FDI	-4.473	1993	-7.328***	1995	I(1)

Notes: All variables are log transformed. ***, ** and * indicates stationarity at significance levels of 1%, 5% and 10% respectively. Zivot-Andrews critical values at 1%, 5% and 10% levels are -5.57, -5.08 and -4.82 respectively.

Table 4.3 above shows that only remittances and inflation are stationary (I(0)) at level when the ADF is used. However, accounting for structural breaks using the ZA test show that

remittances, investment (GCF), inflation (INF) and trade openness (TOPEN) are stationary (I(0)) at level. The table also shows that all variables become stationary at first difference in both the ADF and ZA tests. Since, no variable is still non-stationary at first difference the NARDL model can be used to estimate the specified models.

4.5 Cointegration Tests Results

Table 4.4 NARDL Bounds Cointegration Test under an Asymmetric Framework

Model	K			F_PSS
FI	2			7.427
FID	2			5.439
FIA	2			4.720
FIE	2			6.345
Critical values at K= 2 for unrestricted intercept and no trend-Case III (see Pesaran et al., 2001, p. 300)				
	10%	5%	1%	
LBC	3.17	3.79	5.15	
UBC	4.14	4.85	6.36	

Notes: K is the number of non-deterministic regressors in long-run relationship; F_PSS is the calculated Bounds F-statistic.

Table 4.4 above presents results for cointegrating relationship using the ARDL Bounds approach. To arrive at a decision for long-run relationship (cointegrating relationship) or not, the F-statistic (F_PSS) is compared with the lower bound (LBC) - (I(0)) and upper bound (UBC) - (I(1)) critical values by Pesaran et al. (2001). If the F-statistic is greater than the upper bound critical value at K=2, then the null of no cointegration is rejected. Significance levels at 1%, 5% and 10% are used for the decisions. For the FI model, there is a cointegrating relationship at 1% as the F-statistic of 7.427 is greater than the upper bound critical value 6.36 at the 1% significance level. For the FID model, cointegrating relationship exists at the 5% significance level as its F-statistic of 5.439 is greater than the upper bound critical value of 4.85 at the 5% significance level. For the FIA model, evidence for

cointegrating relationship is found at the 10% significance level as the F-statistic of 4.72 is greater than the upper bound critical value of 4.14 at the 10% significance level. Finally for the FIE model, evidence for cointegrating relationship is found at the 5% significance level as the F-statistic of 6.345 is greater than the upper bound critical value of 4.85 at the 5% significance level.

Having found that there exist an asymmetric long-run relationship among economic growth, remittances and financial development, the analysis goes on further to test for whether or not the long-run relationship and the short-run dynamics are asymmetric. That is, ascertain whether or not the positive and negative cumulative changes to remittances and financial development, in fact, do have significantly different effects. This is done by employing the parameter restriction test - the Wald test.

4.6 Symmetry Tests Results

Table 4.5 Wald Test of Long-Run and Short-Run Symmetry

Model	Variable	Long-Run Symmetry	Short-Run Symmetry
FI	REM	4.088(0.059)	11.500(0.003)
	FI	2.090(0.166)	1.373(0.258)
FID	REM	1.818(0.195)	8.002(0.012)
	FID	2.918(0.106)	0.319(0.579)
FIA	REM	3.423(0.082)	10.700(0.005)
	FIA	1.903(0.186)	0.524(0.479)
FIE	REM	10.490(0.005)	10.470(0.005)
	FIE	0.064(0.803)	0.246(0.627)

Notes: The table reports the Wald F-statistic with p-values in the parenthesis.

Table 4.5 above presents results for the long-run and short-run tests for symmetry. Under the FI model, where financial development is proxied by financial institutions index (FI), the p-value for the F-statistic for remittances in the long-run and short-run are significant at 10% and 1% respectively. Hence, the null hypothesis of long-run and short-run symmetric effects of remittances on economic growth are all rejected in favour of the alternative hypothesis that remittances have asymmetric impact on economic growth in the long-run and short-run. However, the null of symmetric effect of financial development on economic growth cannot be rejected for both the long-run and short-run as the p-values are greater than all of the conventional significance levels (1%, 5% and 10%).

In addition, under the FID model, where financial development is proxied by financial institutions depth index (FID), remittances have asymmetric effects on economic growth in the short-run at the 5% significance level but not in the long-run as evidenced by the p-values. Again, the null of symmetric effects of financial development on growth in the both long and short runs cannot be rejected as evidenced by the p-values.

Also, under the FIA model, where financial development is proxied by financial institutions access index (FIA), evidence for long-run and short-run asymmetries is found for remittances at the 10% and 1% significance levels respectively. For financial development, the null of symmetric effect cannot be rejected in the long and short run.

Finally under the FIE model, where financial development is proxied by financial institutions efficiency index (FIE), the null hypothesis of symmetric effects of remittances on economic growth is rejected in favour of the alternative hypothesis of asymmetric effects in both the

long-run and short-run at 1% significance level. But, in the case of financial development, the null hypothesis cannot be rejected.

The results for the symmetry tests points to the need to studying the remittance-growth relationship under non-linear and asymmetric framework. To the best of my knowledge, this is a novel finding in the study of the remittances-growth relationship. On the contrary, the preponderance of evidence does not point to non-linear asymmetries in the finance-growth relationship in Ghana. This contradicts the findings of Demir (2015) for USA, Germany, France and Turkey, Uboreime et al. (2016) for Nigeria and Moyo et al. (2018) for Brazil who reports non-linear asymmetries in the finance-growth nexus.

4.7 Regression Results

Table 4.6 NARDL Estimates for the effects of Remittances and Financial Development on Economic Growth

Dep Var: ΔGDP_{PC_t}	(1) FI	(2) FID	(3) FIA	(4) FIE
Panel A: Short-Run				
ΔREM^+	0.0680 (0.0534)	0.122** (0.0529)	0.119** (0.0525)	0.0925 (0.0597)
ΔREM_{t-1}^+	0.0319 (0.0526)	0.0642 (0.0656)	0.0537 (0.0729)	0.0330 (0.0505)
ΔREM^-	-0.377*** (0.0800)	-0.269** (0.0948)	-0.397*** (0.0942)	-0.339*** (0.0836)
ΔREM_{t-1}^-	-0.174* (0.0947)	-0.120 (0.0871)	-0.143 (0.0962)	-0.174* (0.0980)
ΔFD^+	-0.0444 (0.983)	0.218 (0.282)	0.451 (0.439)	-0.952 (0.858)
ΔFD_{t-1}^+	1.426* (0.685)	0.0834 (0.332)	0.152 (0.456)	1.237* (0.675)
ΔFD^-	-0.692 (0.649)	0.162 (0.858)	0.162 (0.794)	-0.550 (0.503)
ΔFD_{t-1}^-	-0.0310 (0.603)	0.863 (0.841)	1.590** (0.738)	0.0934 (0.484)
Panel B: Long-Run				
REM_{t-1}^+	0.162 (0.258)	0.031 (0.054)	0.019 (0.935)	0.259 (0.416)
REM_{t-1}^-	-0.843* (3.795)	-0.216 (1.940)	-0.669* (4.207)	-0.395 (1.319)
FD_{t-1}^+	-5.710 (0.927)	1.291* (13.636)	0.130 (0.021)	-6.293 (2.129)
FD_{t-1}^-	-8.739 (1.723)	-1.314 (0.710)	3.793 (1.568)	-5.834* (3.341)

Notes: Investment, inflation, FDI and trade openness have been controlled for. **See appendix A for full results table and diagnostic tests.** All variables are log transformed. Standard Errors are in the parentheses for the short-run results and Wald test F-statistic in parentheses for the long-run results. *, **, and *** indicates significance at 10%, 5% and 1% levels respectively.

Table 4.6 above presents the Non-linear Autoregressive Distributed Lag (NARDL) estimated results for the asymmetric long-run and short-run effects of remittances and financial development on economic growth in Ghana. FI presents results for when the overall financial institutions index (FI) is the proxy for financial development. The overall index is decomposed into its component parts to ascertain the effects of the sub-components as the individual components may have different effects and could be lost in the overall index. Therefore, models 2 to 4 are estimated to account for the potential different effects of the sub-components on economic growth. FID is the results for when financial institutions depth index (FID) is the proxy for financial development, FIA is for when financial institutions access index (FIA) as a proxy for financial development and FIE is for when financial institutions efficiency index (FIE) is the proxy for financial development.

The diagnostic tests (see appendix A) show that all four models are free from serial correlation/autocorrelation as shown by the p-value of the Breusch-Godfrey serial correlation test, Heteroscedasticity as shown by the Breusch-Pagan Heteroscedasticity test (except FI which fails the test for Homoscedasticity), the residuals in all models are normally distributed as depicted by the p-value of the Jacque-Bera test for normally distributed residuals and all models are correctly specified as per the Ramsey RESET test. In all four models at least 70% of the variability in economic growth is explained by the model.

It is imperative to emphasis here that the interpretations of the coefficients for the negative partial sums (cumulative decreases/decline) are not conventional. That is, the signs of the coefficients for negative cumulative changes to remittances and financial development under the NARDL framework are interpreted in the opposite. Negative coefficients are interpreted to mean that negative cumulative changes to remittances and or financial development have a

positive impact on growth (i.e. economic growth responds negatively to negative cumulative changes to remittances and financial development). In the same manner, positive coefficients are interpreted to mean that negative cumulative changes to remittances and financial development have negative impact on growth (i.e. economic growth responds positively to negative cumulative changes to remittances and financial development). Thus, the interpretations are derived from the NARDL estimator (See Table 5 on page 41 interpreted on pages 24 (last paragraph) and 25 (first paragraph) in Shin et al., 2014).

4.7.1 Short-Run Results Analysis

Positive cumulative changes to remittances have a positive and significant impact on economic growth only when financial development is proxied by the indices for financial institutions depth (FID) and financial institutions access (FIA). Specifically, on the average a 1% point increase in remittance flows in the short run would increase economic growth by approximately 0.12% under both scenarios all things being equal. This could be interpreted to mean that when remittances are funneled through the financial system, the recipient(s) would be more inclined to opening an account which affords the recipients an opportunity to access more financial services like credit, insurance and other financial instruments (facilitating access to the financial system) and also increases mobilized savings for investments. This corroborates UNCTAD (2011) finding that remittances and financial inclusion are strongly related which helps in reducing poverty and improving living conditions. Again, when remittances are funneled through the financial system and stays long enough in the banks, it could serve as available credit for productive investments to boosts growth. However, when financial development is proxied by the overall index (FI) and the financial institutions efficiency (FIE) index, remittances does not have any significant impact on economic growth. On the other hand, a positive cumulative change to remittances in the short-run (with a lag) is

found not to have significant impact on economic growth across all four (4) estimated results.

Economic growth is found to respond negatively and significantly to negative cumulative changes to remittance flows in the short-run. What it implies is that when remittance flows are cumulatively reducing, economic growth moves in the opposite direction (respond negatively). That is, economic growth is enhanced when remittance flows are reducing. Specifically, on the average, a 1% negative cumulative change to remittances in the short run leads to an approximate 0.4%, 0.3%, 0.4% and 0.3% increase in economic growth respectively all things being equal. Negative cumulative changes to remittances (with a lag) has positive effects on growth only in the FI and FIE models. That is, on the average, a 1% negative cumulative changes to remittances in the short run leads to an approximate 0.17% increase in economic growth in both cases. There is evidence that at least 70% of remittances are used for household consumption (Ratha, 2003; UNCTAD, 2013) and this is found to increase inflation significantly (Tung et al., 2015). Therefore, intuitively a negative cumulative change to remittances flows in the short-run would have a dampening effect on inflation in the short-run, hence, improving economic growth in the short-run. It could also be interpreted to mean that in periods of stable or increasing flows of remittances, recipient's access to the financial system, through counseling or financial advice, could induce them to save a portion of the remittances received which could be used to cushion themselves in periods of unstable or declining flows and also afford them the ability to source credit from the financial system. It also corroborates Bettin and Zazzaro (2012) finding that remittances impact economic growth positively only when the financial system is efficient in intermediating the flows to profitable sectors of the economy.

Turning to the positive and negative cumulative changes to financial development, the results

show that a positive cumulative change to financial development in the short-run does not have a significant impact on economic growth across all the four (4) models. That is, a positive cumulative change to overall financial institutions development, depth, access and efficiency does not immediately impact economic growth. However, positive cumulative changes to financial development (at one lag) has a positive and significant impact on economic growth in the FI and FIE models. Specifically, on the average, a 1% point improvement in financial development leads to a 1.43% and 1.23% increase in economic growth respectively all things being equal. That is, an overall enhancement of financial institutions has a higher impact, in terms of magnitude, on growth than an improvement only in efficiency of financial institutions. Therefore, positive cumulative changes to financial development enhances economic growth in the short-run with a lag and not immediately.

Again in the short-run, economic growth only responds positively and significantly to negative cumulative changes to financial development (with a lag) in the FIA model. This could mean that when access to financial institutions is falling, economic growth dwindles in the short-run. The results show that on average a 1% point reduction in access to financial institutions in the previous period would decrease economic growth by an approximate 1.6% all things being equal. That is, when access to financial services such as credit, insurance and other financial instruments is impacted negatively, firms and households are deprived of credit (for example) to invest to spur growth. Hence, growth is impacted negatively in the subsequent period. It is also found that negative cumulative changes to financial development do not have a contemporaneous effect on economic growth in the short-run.

4.7.2 Long-Run Results Analysis

The long-run asymmetric effects of remittances and financial development, as discussed

under section 3.4.1 of Chapter 3, are derived by taking the negative ratio of the coefficients of the positive and negative cumulative changes to the coefficient of the lagged dependent variable and by applying the Wald test to determine the significance of the coefficients. From equation (3) the long-run positive and negative asymmetric coefficients for REM are given by $\beta_1^+ = -\hat{\gamma}_1^+/\hat{\rho}$ and $\beta_2^- = -\hat{\gamma}_2^+/\hat{\rho}$ and that of FD are given by $\beta_3^+ = -\hat{\gamma}_3^+/\hat{\rho}$ and $\beta_4^- = -\hat{\gamma}_4^+/\hat{\rho}$. Where β_1^+ and β_2^- are the long run coefficients for positive and negative cumulative changes to remittances respectively and β_3^+ and β_4^- are the long-run coefficients for positive and negative cumulative changes to financial development respectively.

The results in Table 4.6 above show that positive cumulative changes to remittances in the long-run do not have a statistically significant impact on economic growth. The positive but insignificant coefficients could be interpreted to mean, for example, that even when remittance flows increases cumulatively, the proportion committed to productive investment to spur growth is still very low, hence, its growth effects is not significant. This is consistent with the findings of IMF (2005) and Barajas et al. (2009) that remittances do not have a significant impact on economic growth. This gives credence also to the stylized fact that remittances are predominantly used for purposes of consumption and not for productive investments (Chami et al., 2003). This implies that remittances could be a source of capital to spur growth if significant portions of the non-labour transfers are committed to productive investments. With respect to the negative cumulative changes, economic growth is found to respond negatively and significantly to negative cumulative changes to remittances only in the FI and FIA models. This implies that negative cumulative changes to remittances in the long-run are growth enhancing. This finding is in line with what the short-run results depicts. That is, when remittances are perturbed negatively in the long-run, recipients can rely on their accrued savings as a result of coming into contact with the financial system via remittances

and they can also access other financial services like credit to continue to keep afloat and to continue to finance their growth enhancing activities.

Positive cumulative changes to financial development have a positive and significant impact on economic growth only in the FID model. Specifically a 1% improvement in the depth of financial institutions leads to an approximate 1.3% increase in economic growth. This finding is consistent with the findings by Beck and Levine (2004), Barajas et al. (2016) and Banerjee et al. (2017) that an improvement in financial depth (specifically credit to the private sector) promotes growth. Economic growth responds negatively and significantly to negative cumulative changes in financial development only in the FIA model. This, in fact, means that a negative cumulative change to access to financial services promotes economic growth. That is, on average, a 1% negative cumulative change to financial access in the long-run leads to a 5.8% increase in economic growth all things being equal. This is surprising as it is expected that greater financial inclusion (access) should improve economic growth. However, this could be interpreted to mean that at higher levels of financial access (inclusion), the stability of the financial system is put in jeopardy which has negative growth tendencies. By extrapolation, a reduction in the access to financial services (negative cumulative changes), for example high risk credit, could neutralize the threat of financial instability and therefore ensure stability of the financial system to spur economic growth. This is consistent in part with Sahay (2015) finding that financial inclusion (access) promotes economic growth, only up to a point, after which quality banking supervision is needed to counteract potential banking crisis which would be a drag on growth.

With respect to the control variables, Gross Capital Formation (GCF) and inflation (INF) have the expected signs. But GCF is not significant and INF is significant in two (FI and FIE

models) of the four models. Trade Openness (TOPEN) and Foreign Direct Investment (FDI) however have signs other than what is expected. Their signs are negative in all models except FDI which is not significant in the FIA model. Notwithstanding this, the findings are consistent with studies like Hassan et al. (2012) for Bangladesh and Ofori-Abebrese et al. (2017) for Ghana who found trade openness to negatively impact growth in developing countries as they tend to be import dependent. Also studies like Xu (2000) found FDI to be a drag on economic growth for some provinces of China, Jude and Leveigue (2013) found for a panel of developing countries that FDI on its own does not promote growth and Bermejo-Carbonell and Werner (2018) found FDI not to have significant impact on growth in Spain. The crowding out of domestic firms and lack of absorptive capacity (human capital, sound institutions and developed financial systems) are often cited as being the underlying reasons for the insignificant or negative effects of FDI on growth especially for developing countries.

To test for the complementarity and or credit constraint hypotheses (objective 2) the NARDL model with an interaction term between remittances and financial development was estimated and the Bounds test for cointegrating relationship was conducted. Table 4.7 below contains the results for the cointegration test.

Table 4.7 NARDL Bounds Cointegration Test under an Asymmetric Framework

Model	K			F_PSS
FI	2			5.257
FID	2			5.806
FIA	2			8.593
FIE	2			4.060
Critical values at K= 2 for unrestricted intercept and no trend-Case III (see Pesaran et al., 2001, p. 300)				
	10%	5%	1%	
LBC	3.17	3.79	5.15	
UBC	4.14	4.85	6.36	

Notes: K is the number of non-deterministic regressors in long-run relationship; F_{PSS} is the calculated Bounds F-statistic.

In all the models the F-statistic is greater than the upper bound critical values of Pesaran et al. (2001), as shown in Table 4.6 above at $k=2$, except the FIE model where the F-statistic falls between the upper bound and lower bound critical values at all levels of significance which implies that a firm decision of cointegrating relationship cannot be made (it is inconclusive). However, going on to estimate the NARDL model it is found that there is an asymmetric cointegrating relationship among economic growth, remittances and financial development in all the four models.

Table 4.8 NARDL Estimates for the interaction effect of Remittances and Financial Development on Economic Growth

Dep Var: $\Delta GDPPC_t$	(1) FI	(2) FID	(3) FIA	(4) FIE
Panel A: Short-Run				
ΔREM^+	0.242*** (0.0580)	0.282*** (0.0785)	0.271*** (0.0601)	0.228*** (0.0627)
ΔREM^+_{t-1}	0.067 (0.0540)	0.030 (0.0533)	0.049 (0.0558)	0.059 (0.0532)
ΔREM^-	-0.378*** (0.0770)	-0.379*** (0.0895)	-0.396*** (0.0848)	-0.366*** (0.0775)
ΔREM^-_{t-1}	-0.274*** (0.0813)	-0.290** (0.107)	-0.316*** (0.0940)	-0.253*** (0.0841)
$\Delta(REM * FD)^+$	-0.373** (0.175)	-1.367** (0.598)	-1.219** (0.458)	-0.138 (0.0814)
$\Delta(REM * FD)^+_{t-1}$	-0.208 (0.249)	-0.272 (0.629)	-0.278 (0.677)	-0.088 (0.108)
$\Delta(REM * FD)^-$	-0.055 (0.338)	-0.373 (1.023)	-0.636 (0.817)	0.0035 (0.152)
$\Delta(REM * FD)^-_{t-1}$	0.850 (0.566)	4.332* (2.410)	6.654** (3.058)	0.193 (0.224)
Panel B: Long-Run				
REM^+_{t-1}	1.265* (3.301)	1.447 (1.487)	2.464 (0.525)	0.930** (4.626)
REM^-_{t-1}	-0.049 (0.222)	-0.029 (0.073)	-0.207 (0.803)	0.038 (0.234)
$(REM * FD)^+_{t-1}$	-1.766 (0.786)	-7.074 (0.716)	-12.565 (0.405)	-0.454 (0.544)
$(REM * FD)^-_{t-1}$	3.216 (1.024)	-17.330 (0.807)	48.183 (0.463)	0.354 (0.161)

Notes: Investment, financial development, inflation, FDI and trade openness have been controlled for. **See appendix B for full results table and diagnostic tests.** All variables, except the interaction term, are log transformed. Standard Errors are in the parentheses for the short-run results and Wald test F-statistic in parentheses for the long-run results. *, **, and *** indicates significance at 10%, 5% and 1% levels respectively

The diagnostic tests (see appendix B) show that all four models are free from serial correlation/autocorrelation as shown by the p-value of the Breusch-Godfrey serial correlation test, Heteroscedasticity as shown by the Breusch-Pagan Heteroscedasticity test, the residuals

in all models are also normally distributed as depicted by the p-value of the Jacque-Bera test for normally distributed residuals and all models are correctly specified as per the Ramsey RESET test. In all four models at least 80% of the variability in economic growth is explained by the model.

4.7.3 Intermediation: Short-Run and Long-Run Result Analysis

In the short run the results show evidence for the credit constraint hypothesis for positive cumulative changes to the interaction term between remittances and financial development (without a lag) for the FI, FID and FIA models and also for negative cumulative changes to the interaction term between remittances and financial development (with a lag) for the FID and FIA estimations. What it means for the positive cumulative changes to the interaction term is that when there is a joint improvement in remittance flows and the financial sector in terms of an overall improvement or improvement in depth or in access; recipients of remittances would still rely on the receipts to finance their businesses. This is particularly surprising for the FID and FIA estimations. However, it could be interpreted to mean that even when there is a cumulative improvement in the financial depth and access to the financial system, there could still be significant hindrances in accessing credit especially for start-ups in terms of interest rates and collateral demands among others. This corroborates the assertion that a deep financial system does not necessarily guarantee access and by extrapolation a broad access to the financial system does not necessarily connote a deep financial system (Cihak et al., 2012).

With respect to a cumulative negative change to the interaction term between remittances and financial development also showing evidence for the credit constraint hypothesis, it could be interpreted to mean that in times where remittance flows are declining coupled with

unfavourable developments in the financial sector in terms of depth and access, recipients of remittances could still rely on the remittances received, however small, to start-up or finance their already existing businesses. Unlike the cumulative positive change to the interaction term results, this is unsurprising. These findings can be likened to the linear estimates of Giuliano and Ruiz-Arranz (2009) and Ramirez (2013) who found evidence for the credit constraint hypothesis.

In the long-run no evidence is found for either the complementarity hypothesis or the credit constraint hypothesis. Although some of the coefficients are negative and others positive, none is significant.

Turning to the control variables, inflation has its expected sign of negative in all the estimations and significant. FDI, just as found earlier, has a negative but insignificant impact on growth. Trade openness, just as found earlier, has a negative and significant impact on growth. Surprisingly, financial development does not have a significant impact on growth.

Since equation (4) had interaction terms between remittances and financial development, with remittances being the focus variable, the marginal impact of remittances on growth is ascertained by taking a partial derivative of equation (4) with respect to remittances as discussed under sub-section 3.4.1 of chapter 3. The result is presented below.

Table 4.9 Marginal Effects of Remittances on Economic Growth at Different Stages of Financial Development.

Variable	Model	1 st Quartile	2 nd Quartile	3 rd Quartile
Panel A: Short-Run				
ΔREM^+	FI	0.174 ^{***}	0.319 ^{***}	0.158 ^{***}
	FID	0.250 ^{***}	-0.295 ^{***}	-0.778 ^{***}
	FIA	0.228 ^{***}	0.218 ^{***}	-0.594 ^{***}
	FIE	0.162 ^{***}	0.154 ^{***}	0.138 ^{***}
ΔREM_{t-1}^+	FI	0.105	0.024	0.020
	FID	0.024	-0.084	-0.181
	FIA	0.039	0.037	-0.148
	FIE	0.017	0.012	0.002
ΔREM^-	FI	-0.388 ^{***}	-0.389 ^{***}	-0.390 ^{***}
	FID	-0.388 ^{***}	-0.536 ^{***}	-0.668 ^{***}
	FIA	-0.418 ^{***}	-0.423 ^{***}	-0.847 ^{***}
	FIE	-0.364 ^{***}	-0.364 ^{***}	-0.364 ^{***}
ΔREM_{t-1}^-	FI	-0.118 ^{***}	-0.099 ^{***}	-0.083 ^{***}
	FID	-0.190 ^{**}	1.539 ^{**}	3.069 ^{**}
	FIA	-0.083 ^{***}	-0.030 ^{***}	4.405 ^{***}
	FIE	-0.160 ^{***}	-0.149 ^{***}	-0.128 ^{***}
Panel B: Long-Run				
REM_{t-1}^+	FI	0.941 [*]	0.902 [*]	0.868 [*]
	FID	1.283	-1.539	-4.038
	FIA	2.024	1.922	-6.452
	FIE	1.148 ^{**}	1.174 ^{**}	1.224 ^{**}
REM_{t-1}^-	FI	0.541	0.612	0.675
	FID	-0.430	-7.344	-13.466
	FIA	1.480	1.870	33.977
	FIE	0.208	0.228	0.268

Notes: ^{***}, ^{**} and ^{*} indicates significance at the 1%, 5% and 10% level respectively.

Table 4.9 present results for the marginal effects of remittances on economic growth at different stages of financial development. Thus, the 1st quartile (25th percentile), 2nd quartile (50th percentile) and 3rd quartile (75th percentile) for each of the overall index of financial development and its sub-components are used for the analysis.

4.7.4 Short-Run Marginal Effect Analysis

It can be seen that on the whole the marginal effect of cumulative positive changes to remittances is growth enhancing. It is also observed that, apart from the FI model, the

marginal effect of cumulative positive changes to remittances on growth declines as the financial sector grows. This corroborates the finding of Giuliano and Ruiz-Arranz (2009) that remittances are growth enhancing when the financial sector is less developed. Cumulative positive changes to remittances do not have a marginal effect on growth (with a lag).

Also, on the whole the marginal effect of cumulative negative changes to remittances is growth enhancing (note that the signs for the cumulative decreases are interpreted in the opposite) both contemporaneously and with a lag. Unlike, the cumulative increases, it is observed that the contemporaneous marginal effect of cumulative decreases in remittances on growth is increasing as the financial sector grows; except in the FIE model where the marginal effect is the same at all stages of financial development. The opposite is observed for the lagged marginal effect of cumulative decreases in remittances on growth.

4.7.5 Long-Run Marginal Effect Analysis

In the long run, the marginal effect of cumulative increases in remittances is growth enhancing only when there is general improvement in the financial sector (i.e. the FI model) and specifically when the financial system is efficient enough to attract and funnel the remittance flows into productive investments (i.e. the FIE model). It can be observed that, the marginal effect declines as the financial sector grows in the FI model but increases as the financial sector grows in the FIE model. On the other hand, cumulative decreases in remittance flows do not have any significant marginal effect on growth in the long-run.

To infer the long-run asymmetric (non-linear) causal direction among economic growth, remittances and financial development (Objective 3), equation 3 is estimated as an Unrestricted Vector Error Correction Model (UVECM) with each of the three key variables

of interest as a dependent variable which gives three equations. After estimating the models, Bounds cointegration test was conducted to ascertain whether or not there is a cointegrating relationship among the three variables. The F-statistic (F_{PSS}) of the Bounds test for each of the models with the corresponding Pesaran et al. (2001) lower bound ($I(0)$) and upper bound ($I(1)$) critical values are presented in Table 4.10 below. There is evidence of at least one cointegrating relationship in column 1 of Table 4.10 as the F-statistic of 7.43 is greater than all the upper bound ($I(1)$) critical values at 10%, 5% and 1% significance levels. Causality is then inferred from the significance of the long-run asymmetric coefficients. The R-squared values of 79%, 68% and 66% for each of models 1, 2 and 3 respectively, together with the diagnostics tests for Serial Correlation, Heteroscedasticity, Functional Form and Normality show that the models are fit for the analysis. Except that FI failed the test for Heteroscedasticity and FID failed the test for omitted variable bias.

The results show that there is no long-run asymmetric causality link between economic growth and financial development in Ghana. This is similar to Quartey and Prah (2008) findings and conclusions that there is no evidence for either the supply-leading hypothesis or the demand-following hypothesis in Ghana. However, there is a one-way asymmetric causality between remittances and economic growth running from a negative cumulative change to remittance flows to economic growth. The results also show no evidence for asymmetric causal relationship between remittances and financial development.

Table 4.10 NARDL Long-Run Asymmetric Causal Link

Independent Variables:	Dependent Variables:		
	$\Delta GDPPC_t$ 1	ΔREM_t 2	ΔFD_t 3
$GDPPC_{t-1}^+$	-	0.762(0.495)	0.099(0.425)
$GDPPC_{t-1}^-$	-	3.300(0.286)	-0.254(0.380)
REM_{t-1}^+	0.162(0.618)	-	0.058(0.352)
REM_{t-1}^-	0.843* (0.068)	-	-0.098(0.380)
FD_{t-1}^+	-5.710(0.349)	-3.122(0.677)	-
FD_{t-1}^-	8.739(0.207)	3.487(0.370)	-
R-squared	0.79	0.68	0.66
Observations	36	36	36
B-G LM	14.06(0.594)	5.657(0.991)	14.29(0.5770)
B-P/C-W	4.319(0.038)	2.637(0.104)	1.46(0.227)
Ramsey RESET	2.468(0.105)	3.985(0.030)	1.063(0.396)
Jacque-Bera	0.731(0.694)	3.69(0.158)	0.945(0.624)
F_PSS	7.430	3.563	1.623
Pesaran et al. (2001)			
Critical values for case III:			
	10%	5%	1%
LBC[I(0)]	3.17	3.79	5.15
UBC[I(1)]	4.14	4.85	6.36

Notes: * indicates significance at 10% level. RM_{t-1}^+ and REM_{t-1}^- represents the asymmetric long-run positive and negative cumulative changes to remittances respectively; FD_{t-1}^+ and FD_{t-1}^- are the asymmetric long-run positive and negative cumulative changes to financial development respectively and $GDPPC_{t-1}^+$ and $GDPPC_{t-1}^-$ are the asymmetric long-run positive and negative cumulative changes to economic growth respectively.

4.8 Chapter Summary

In this chapter the results of the study are presented and discussed. The NARDL estimation method is used to examine the objectives of the study. From the regression results for the non-linear asymmetric effects of remittances and financial development on economic growth it is found that in the short-run, positive and negative cumulative changes to remittances have

an immediate positive and significant impact on growth whereas positive and negative cumulative changes to financial development impact growth positively and negatively respectively with a lag. For the long-run it is found that positive cumulative changes to remittances have no impact on growth but negative cumulative changes to remittances promote growth only when the recipients have access to the financial system whereas positive cumulative changes to financial development promotes growth only when the financial system is deep and negative cumulative changes to financial development is also growth enhancing only when the financial system is efficient.

With respect to the second objective which is to test the complementarity and or credit constraint hypotheses it is found that in the short-run, there is evidence of the credit constraint hypothesis in the FI, FID and FIA models for cumulative positive changes to remittances and financial development and also in the FID and FIA model for cumulative negative changes to remittances and financial development (with a lag). In the long-run however, no evidence is found for either the credit constraint hypothesis or the complementarity hypothesis.

Lastly, on the asymmetric long-run causality link among economic growth, remittances and financial development, it is found that only one-way causality exist between negative cumulative changes to remittances and economic growth running from negative cumulative changes to remittances to economic growth. No asymmetric long-run causal link is found between economic growth and financial development and also between remittances and financial development.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Chapter Overview

This chapter presents the conclusion to the present study. In this chapter a summary of the study is presented in section 5.2. Conclusions drawn from the research findings are also presented in section 5.3. Recommendations for policy initiatives and practice as well as direction for future research are presented in sections 5.4 and 5.5 respectively.

5.2 Summary

This study set out to principally investigate the remittance-finance-growth relationship in Ghana. In furtherance of this, an intuitive argument is made for the remittance-growth and finance-growth relationships to be non-linear and asymmetric. These formed the basis for the first objective of the study. The study went on to test two hypotheses in the remittance-finance-growth relationship. These hypotheses are the complementarity hypothesis and the credit constraint hypothesis. The complementarity hypothesis posits that the growth effect of remittances is enhanced when remittance flows are channelled through the banking system which can lead to more savings for onward matching to productive investments. The second hypothesis – the credit constraint hypothesis posits that when accessing credit for investment is difficult due to high interest rates or collateral demands among others, recipients of remittances could fund their investments via the amounts remitted to them. These two hypotheses formed the basis for the second objective of the study. The third objective of the study is to investigate whether or not there are non-linear asymmetric causal relationship among remittances, financial development and economic growth.

To empirically examine the objectives as stated above, the study used annual data from 1979 to 2017 for Ghana. Remittances was proxied by personal transfers received as a percentage of GDP; financial development was proxied by a composite index made up of three sub-indices – financial depth index, financial access index and financial efficiency index as constructed by Sahay et al. (2015); economic growth was proxied by per capita Gross Domestic Product. The objectives of the study were investigated using the newly developed Non-linear Autoregressive Distributed Lag (NARDL) model by Shin et al. (2014).

For the first objective, it is found that in the short run whereas both positive and negative cumulative changes to remittances significantly and positively affect economic growth without delay (this holds for when financial development is proxied by the financial depth and financial access indices for positive cumulative changes to remittances and across all models for negative cumulative changes to remittances), both positive and negative cumulative changes to financial development significantly and negatively affect economic growth with a delay (one lag) when financial development is proxied by the composite index and financial efficiency index for a positive cumulative change and when financial development is proxied by the financial access index for a negative cumulative change. In the long-run, it is found that positive cumulative changes to remittances does not have any significant impact on economic growth but negative cumulative changes to remittances is found to have a positive and significant impact on economic growth when financial development is proxied by the composite index and the financial access index. With respect to financial development, in the long-run, both positive and negative cumulative changes to financial development significantly and positively impact economic growth when financial development is proxied by the financial depth index and financial access index respectively.

Moving on to the second objective, evidence is found for the credit constraint hypothesis in the short-run for cumulative positive changes to the interaction term between remittances and financial development and also for cumulative negative changes to the interaction term but with a lag. In the long-run, however, the study found no evidence for the credit constraint hypothesis or the complementarity hypothesis.

Lastly, for the third objective, the study did not find asymmetric (non-linear) causal relationship between financial development and economic growth and also between remittances and financial development. However, a unidirectional asymmetric (non-linear) causal relationship is found between remittances and economic growth running from remittances (negative cumulative changes) to economic growth.

5.3 Conclusions

Based on the Bounds cointegrating relationship test and the Wald test for long-run and short-run asymmetries together with the objectives examined, the study concludes as follows:

There is a non-linear and asymmetric cointegrating relationship among remittances, financial development and economic growth in Ghana. And there are long-run and short-run asymmetries in the remittance-growth relationship but not in the finance-growth relationship.

That while positive and negative cumulative changes to remittances have a contemporaneous effect on economic growth in the short-run, positive and negative cumulative changes to financial development do not have a contemporaneous effect on economic growth in the short-run.

Positive cumulative changes to remittances in the long run do not have significant growth effects but negative cumulative changes to remittances, in the long-run, are growth enhancing only when remittance recipients have access to financial services.

The effects of positive and negative cumulative changes to financial development on economic growth are sensitive to the proxy used for financial development.

There is evidence for the credit constraint hypothesis in the short-run. And there is no evidence for the supply-leading or demand following hypothesis in Ghana under a non-linear and asymmetric framework.

5.4 Recommendations

From the findings of the study, the following are recommended. To begin with, policies geared towards sustained cumulative increases in remittance flows to Ghana should be promulgated and implemented.

Following from the first recommendation, policies to make remittance recipients come into contact with banks as well as incentives to make the remittances received through banks stay long enough to be channeled into productive investments should be initiated and implemented.

5.5 Future Studies

Given that evidence is found for long-run and short-run asymmetries, at least, in the remittance-growth relationship, it gives a hint that the remittance-growth relationship is non-linear and asymmetric. Therefore, subsequent studies on the remittance-growth and finance-

growth relationships should adopt the Non-linear Autoregressive Distributed Lag (NARDL) approach, however, the inherent assumption of a threshold around zero under the NARDL should be relaxed to find a threshold value either exogenously or endogenously and find the positive and negative cumulative changes above and below the identified threshold value. This would be ideal in a panel study as a country specific study based on annual data would not yield enough observations for the positive and negative cumulative changes above and below the threshold value for estimation purposes.

REFERENCES

- Abdih, Y., Chami, R., Dagher, J., & Montiel, P. (2012). Remittances and institutions: Are remittances a curse? *World Development*, 40 (4), pp. 657–666.
- Ackah, C., & Asiamah, J. P. (2014). Financial regulation in Ghana: Balancing inclusive growth with financial stability. *Overseas Development Institute Working Paper* 410.
- Acosta, P. A., Lartey, E. K.K., & Mandelman, F. S. (2007). Remittances and the Dutch disease. *Working Paper No. 2007-8*. Atlanta: Federal Reserve Bank of Atlanta.
- Adams, R. (2005). Remittances, household expenditure and investment in Guatemala. *Policy Research Working Paper Series 3532*. Washington DC: The World Bank.
- Adams, R. (2006). Remittances and poverty in Ghana. *Policy Research Paper 3838*. Washington DC: The World Bank.
- Adams, R., & Cuecuecha, A. (2013). The impact of remittances on investment and poverty in Ghana. *World development*, 50, pp. 24-40.
- Adams, R., & Page, J. (2005) Do international migration and remittances reduce poverty in developing countries? *World Dev*, 33, pp. 1645–1669.
- Adenutsi, D. (2011). Financial development, international migrant remittances and endogenous growth in Ghana. *Studies in Economics and Finance*, 28(1), pp. 68-89.
- Adu, G., Marbuah, G., & Mensah, J. T. (2013). Financial development and economic growth in Ghana. Does the measure of financial development matter? *Review of development finance*, 3, pp. 192-203.
- Adusei, M. (2013). Financial development and economic growth: evidence from Ghana, *The International Journal of Business and Finance Research*, 7 (5), pp. 61-76.
- Aggarwal, R., Demirguc-Kunt, A., & Pería, M. S. (2011). Do remittances promote economic growth? *Journal of development economics*, 96, pp. 255-264.
- Ahamada, I., & Coulibaly, D. (2011). How does financial development influence the impact of remittances on growth volatility?. *Economic Modelling*, 6, pp. 2748–2760.
- Ahortor, C. R., & Adenutsi, D. (2009). The impact of remittances on economic growth in small open developing economies. *Journal of applied sciences*, 9(18), pp. 3275-3286.
- Amuedo-Dorantes, C., & Pozo, S. (2004). Workers' remittances and the real exchange rate: a paradox of gifts. *World Development*, 32, pp. 1407–17.
- Aryeetey, E., Fosu, A. k., & Bawumia, M. (2001). *Explaining African economic growth performance: the case of Ghana*. Retrieved: <https://www.researchgate.net/publication/265074393>.

- Aryeetey, E., Nissanke, M., & Steel, W.F. (2000). Intervention and liberalization: changing policies and performance in the financial sector. In: Aryeetey, E., Harrigan, J., Nissanke, M. (Eds.), *Economic Reforms in Ghana: The Miracle and the Mirage*. James Currey and Woeli Publishers, Oxford.
- Balke, N.S., & Fomby, T. B. (1997). Threshold cointegration. *International Economic Review* 38, pp. 627-645.
- Banerjee, P. K., Ahmed, M. N., & Hossain, M. M. (2017). Bank, stock market and economic growth: Bangladesh perspective. *The Journal of Developing Areas*, 51(2), pp. 18-29.
- Banerjee, A., R. Lumsdaine and J. Stock, (1992), Recursive and sequential tests of the unit root and trend break hypothesis: theory and international evidence, *Journal of Business and Economic Statistics*, 10, 271-287.
- Bangake, C., & Eggoh, J. (2019). Financial development thresholds and the remittances-growth nexus. *Journal of Quantitative Economics*, 1-21.
- Banking Sector Report (November, 2019). *Bank of Ghana of banking sector report*. Bank of Ghana.
- Barajas, A., Chami, R., Fullenkamp, C., Gapen, M., & Montiel, P. (2009). Do workers' remittances promote economic growth?. *IMF Working Paper No. WP/09/153*. Washington, DC: International Monetary Fund.
- Barajas, A., Chami, R., & Seyed Reza, Y. (2016). The finance and growth nexus re-examined: Do all countries benefit equally?. *Journal of Banking and Financial Economics*, (1 (5)), 5-38.
- Bawumia, M. (2010). Monetary Policy and Financial Sector Reform in Africa: Ghana's Experience. Combert Impressions Ghana Ltd., Accra.
- Bayar, Y. (2015). Impact of remittances on economic growth in the transitional economies of the European Union. *Economic Insights*, 4(3), pp. 1-10.
- Beck, T., & Levine, R. (2004). Stock markets, banks and growth: panel evidence. *Journal of banking and finance*, 28, pp. 423-442.
- Beck, T., Degryse, H., & Kneer, C. (2014). Is more finance better? disentangling intermediation and size effects of financial systems. *Journal of financial stability*, 10, pp. 50-64.
- Beck, T., Levine, R., & Loayza, N. (2000). Finance and sources of economic growth. *Journal Financial Economics*, 58, pp. 263-300.
- Beck, R., Georgiadis, G., & Straub, R. (2014). The finance and growth nexus revisited. *Economic Letters*, 124, pp. 382-385.

- Bermejo-Carbonell, J., & Werner, R. A. (2018). Do FDI Inflows Generate Economic Growth in Large Developed Economies? A New Empirical Approach. *Applied to Spain, Economic Geography*, (forthcoming).
- Bettin, G., & Zazzaro, A. (2012). Remittances and financial development: substitutes or complements in economic growth? *Bulletin of Economic Research*, 64(4), pp. 509–536.
- Bittencourt, M. (2012). Financial development and economic growth in Latin America: Is schumpeter right? *Journal of Policy Modeling*, 34(3), pp. 341-355.
- Boateng, R. (2014). *Research Made Easy* (1st ed.). Accra: PearlRichards Foundation.
- Brownbridge, M., & Gockel, A.F. (1996). The Impact of Financial Sector Policies on Banking in Ghana. *IDS Working Paper*, No. 38, Institute of Development Studies, Sussex University.
- Camen, U., Ncube, M., & Senbet, L.W. (1997). The Role of Financial Markets in the Operation of Monetary Policy in Africa, Collaborative Project Paper, *African Economic Research Consortium*, Nairobi, Kenya.
- Catrinescu, N., León -Ledesma, M., Piracha, M., & Quillin, B. (2009). Remittances, Institutions, and Economic Growth. *World Dev.* 37, pp. 81–92.
- Cecchetti, S., & Kharroubi, E. (2012). Reassessing the impact of finance on growth. *BIS Working Paper No. 381*.
- Chami, R., Barajas, A., Cosimano, T., Fullenkamp, C., Gapen, M., & Montiel, P. (2008). Macroeconomic consequences of remittances. *Occasional Paper No. 259*. Washington DC: International Monetary Fund.
- Chami, R., Fullenkamp, C., & Jahjah, S. (2003). Are immigrant remittance flows a source of capital for development? *IMF Working Papers 03/189*, Washington, D.C: International Monetary Fund.
- Chowdhury, M. B. (2011). Remittances flow and financial development in Bangladesh, economic modelling, *World Development*, 28, pp. 2600-2608.
- Cihak, M., Demirguc-Kunt, A., Feyen, E., & Levine, R. (2012). Benchmarking financial systems around the world. *Policy research working paper 6175*.
- Cooray, A. (2012). The impact of migrant remittances on economic growth: evidence from south Asia. *Review of International Economics*, 20 (5), pp. 985-998.
- Cox-Edwards, A., & Ureta, M. (2003). International migration, remittances and schooling: evidence from El Salvador. *Journal of Development Economics*, 72(2), pp. 429–461.
- Dabla-Norris, E., & Srivisal, N. (2013). Revisiting the link between finance and macroeconomic volatility. *IMF Working Paper WP/13/29*, International Monetary Fund.

- De-Gregorio, J. D. & Guidotti, P.E. (1995). Financial development and economic growth. *World development*, 23 (3), 433-448.
- Demir, A. U. (2015). Empirical evidence concerning the relationship between financial structure and economic growth. In: *Three Essays on the Non-linear dynamics of the finance-growth nexus* (Unpublished PhD thesis, Department of Economics, University of Leicester).
- Dicky, D.A. and Fuller, W.A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74, pp. 427-31.
- Doumbia, D. (2015). Financial development and economic growth in 43 advanced and developing economies over the period 1975–2009: Evidence of non-linearity. *Appl. Econom. Int. Dev*, 16, pp. 13-22.
- Durusu-Cifti, D., Ispir, M.S., & Yetkiner, H. (2017). Financial development and economic growth: Some theory and more evidence. *Journal of Policy Modeling*, 39, pp. 290–306.
- Eberhardt, M., & Presbitero, A. F. (2013). This time they are different: heterogeneity and nonlinearity in the relationship between debt and growth. *IMF Working Paper WP/13/248*, Washington D.C.: International Monetary Fund.
- Eboreime, M. I., Elisha, J. D., & Ude-Abosi, H. N. (2016). Modelling financial sector effects on Nigeria's real economy: a nonlinear ARDL approach. *West African Journal of Monetary and Economic Integration*, 16(1), pp. 34-62.
- El Hamma, I. (2017). Do political institutions improve the effect of remittances on economic growth? evidence from South-Mediterranean countries. *Economics Bulletin*, 37 (3), pp.2133-2148.
- Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation and testing. *Econometrica*, 55, pp. 251-276.
- Esso, L.J. (2010). Cointegrating and causal relationship between financial development and economic growth in ECOWAS countries. *Journal of Economics and International Finance*, 2, pp. 36-48.
- European Union. (2014). *The impact of remittances on developing countries*. Policy Department DG External Policies.
- Faini, R. (2006). Migration and remittances: the impact on the country of origin. Paper presented at EUDN-AFD Conference on Migration and Development, Paris, November 8.
- Fayissa, B & Nsiah, C. (2010). Can remittances spur economic growth and development? evidence from Latin American countries. *Department of Economics and Finance Working Paper Series*, Middle Tennessee State University.
- Fayissa, B., & Nsiah, C. (2010). The impact of remittances on economic growth and development in Africa. *Am. Econ*, pp. 92-103.

- Feeny, S., Iamsiraroj, S., and McGillivray, M. (2014). Remittances and economic growth: larger impacts in smaller countries?. *Journal of Development Studies*, 50(8), pp. 1055–1066.
- Ghana Banking Survey (August 2017). *Risk-based minimum regulatory capital regime: what it means for banks in Ghana*. PricewaterhouseCoopers (PwC).
- Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, financial development and growth. *Journal of development economics*, 90, pp. 144-152.
- Giuliano, P., & Ruiz-Arranz, M. (2005). Remittances, financial development and growth. *IMF Working Paper WP/05/234, International Monetary Fund*.
- Granger, C.W.J., & Yoon, G. (2002). *Hidden cointegration*. Mimeo: University of California San Diego
- Gründler, K. (2015). The Vanishing Effect of Finance on Growth. Julius Maximilian University of Würzburg Discussion Paper No. 133.
- Hassan, G. M., & Shakur, S. (2017). Non-linear effects of remittances on per capita GDP growth in Bangladesh. *Economies*, 5(25), 1-11.
- Hassan, G. M., Shakur, S., & Bhuyan, M. (2012). Nonlinear growth effect of remittances in recipient countries: an econometric analysis of remittances-growth nexus in Bangladesh. *Annual NZAE Conference* (pp. 1-35). New Zealand Association of Economists.
- Hassan, G., Chowdhury, M., & Bhuyan, M. (2016). Growth effects of remittances in Bangladesh: is there a u-shaped relationship? *International Migration*, doi:10.1111/imig.12242.
- Hsueh, S., Hu, Y., & Tu, C. (2013). Economic growth and financial development in Asian countries: A bootstrap panel Granger causality analysis. *Economic Modelling*, 32, pp. 294-301.
- Ibrahim, M., & Alagidede, P. (2018). Nonlinearities in financial development–economic growth nexus: Evidence from sub-Saharan Africa. *Research in International Business and Finance*, 46, 95-104.
- Iheanacho, E. (2016). The impact of financial development on economic growth in Nigeria: an ARDL analysis. *Economies*, 4(26), pp. 1-12. doi:10.3390/economies4040026
- Imai, K. S., Gaiha, R., Ali, A., & Kaicker, N. (2014), Remittances, growth and poverty: New evidence from Asian countries, *Journal of Policy Modeling*, <http://dx.doi.org/101016/j.jpolmod.2014.01.009>.
- International Monetary Fund (2005). Two current issues facing developing countries. In *World Economic Outlook, April 2005: Globalization and External Imbalances*, World Economic and Financial Surveys (Washington).

- Issahaku, H., Abor, J. Y., & Harvey, S. K. (2017). Remittances, banks and stock markets: panel evidence from developing countries. *Research in international business and finance*, 42, pp. 1413-1427.
- Ito, H., & Kawai, M. (2018). *Quantity and quality measures of financial development: implications for macroeconomic performance* (No. 1803).
- Javid, M., Umaima, A., & Qayyum, A. (2012). Impact of Remittances on Economic Growth. *Academic Research International*, 2(1), pp. 433-447.
- Jawaid, S. T., & Raza, S. A. (2014). Effects of workers' remittances and its volatility on economic growth in South Asia. *International Migration* 54(2), pp. 51-68.
- Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control* 12, pp. 231-254.
- Jouini, J. (2015). Economic growth and remittances in Tunisia: bi-directional causal links. *Journal of Policy Modeling*, 37(2), pp. 355–373.
- Jude, C., & Leveuge, G. (2013). Growth effect of FDI in developing economies: The role of institutional quality. MPRA Paper No. 49321.
- Kapetanios, G., Shin, Y., & Snell, A. (2006). Testing for cointegration in nonlinear smooth transition error correction models. *Econometric Theory* 22, pp. 279-303.
- Kargbo, S.M. & Adamu, P.A. (2009). Financial development and economic growth in Sierra Leone. *Journal of Monetary and Economic Integration*, 9, pp. 30-61.
- Khan, Z.S., & Islam, S. (2013). The Effects of remittances on inflation: evidence from Bangladesh. *J. Econ. Bus. Res.* 19, pp. 198–208.
- King, R., & Levine, R. (1993). Finance, entrepreneurship, and growth. *Journal of Monetary Economics*, 32, pp. 513-542
- Kiprop, M. J., Kalio, A., Kibet, L., & Kiprop, S. (2015). Effect of financial development on economic growth in Kenya: evidence from time series analysis. *European Journal of Business and Social Sciences*, 3(11), pp. 62-78.
- Kouki, I. (2013). Financial development and economic growth in the North African region. *African Development Review*, 25(4), pp. 551–562.
- Kumar, R. V. (2013). Remittances and economic growth: A study of Guyana. *Economic Systems*, 37, 462-472.
- Laeven, L., & Valencia, F. (2013). The real effects of financial sector interventions during crises. *Journal of money, credit and Banking*, 45(1), 147-177.
- Lartey, E.K.K., Mandelman, F.S., & Acosta, P.A., (2008). Remittances, exchange rate

- regimes and the Dutch disease: a panel data analysis. *Working Paper 2008-12*. Atlanta: Federal Reserve Bank of Atlanta.
- Law, S., & Singh, N. (2014). Does too much finance harm economic growth? *Journal of banking and finance*, 41, 36-44.
- Levine, R. (2002). Bank-Based or Market-Based Financial Systems: Which is Better? *Journal of Financial Intermediation*, 11(4), pp. 398–442.
- Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: causality and causes. *Journal of monetary economics*, 46, pp. 31-77.
- Lim, S., & Simmons, W. O. (2015). Do remittances promote economic growth in the caribbean community and common market. *Journal of economics and business*, 77, pp. 42-59.
- Lopez, H., Molina L., & Bussolo M. (2008). Remittances and the Real Exchange Rate. *Policy Research Working Paper 4213*. Washington DC: World Bank.
- Lucas, R., & Stark, O. (1985). Motivations to remit: evidence from Botswana. *Journal of Political Economy* 93, pp. 901–918.
- Lucas, R.E. (1988). On mechanics of economic growth. *Journal of monetary Economics*, 22, pp. 3-42.
- Majumder, S. C., & Donghui, Z. (2016). Relationship between remittances and economic growth in Bangladesh: an Autoregressive Distributed Lag Model (ARDL). *European Researcher. Series A*, 104(3), PP. 156-167.
- Mckinnon, R. (1973). Money and capital in economic development. Washington DC: The Brooking Institute.
- Meyer, D., & Shera, A. (2017). The impact of remittances on economic growth: an econometric model. *Economia*, 18, pp. 147-155.
- Moyo, C., Khobai, H., Kolisi, N., & Mbeki, Z. (2018). Financial development and economic growth in Brazil: A Non-linear ARDL approach. *MPRA Paper No. 85252*, Munich Personal RePEc Archive.
- Mundaca, B.G. (2009). Remittances, financial market development, and economic growth: the case of Latin America and the Caribbean. *Journal of Development Studies*, 2, pp. 288–303.
- Narayan, P.K., Narayan, S., & Mishra, S. (2011). Do remittances induce inflation? Fresh evidence from developing countries. *South. Econ. J.*, 77, pp. 914–933.
- Ncube, M., & Senbet, L.W. (1997). Perspectives on Financial Regulation and Liberalization in Africa under Incentive and Asymmetric Information *Journal of African Economies*, 6, pp. 29–89.

- Nsiah, C., & Fayissa, B. (2013). Remittances and economic growth in Africa, Asia, and Latin American-Caribbean countries: A panel unit root and panel cointegration analysis. *Journal of Economics and Finance*, 37(3), pp. 424–441.
- Nyamongo, E. M., Misati, R. N., Kipyegon, L., & Ndirangu, L. (2012). Remittances, financial development and economic growth in Africa, *Journal of Economics and Business*, 64, pp. 240-260.
- Nyeadi, J. D., & Atiga, O. (2014). Remittances and economic growth: empirical evidence from Ghana. *European journal of business and management*, 6(25), pp. 142-149.
- Nyeadi, J. D., Yidana, N., & Imoro, M. (2014). Remittances and economic growth nexus: empirical evidence from Nigeria, Senegal and Togo. *International Journal of Academic Research in Business and Social Sciences October 2014*, 4(10), pp. 158-172.
- Odhiambo, N. M. (2008). Financial depth, savings and economic growth in Kenya: a dynamic causal linkage. *Economic modeling*, 25, pp. 704-713.
- Ofori-Abebrese, G., Pickson, R. B., & Diabah, B. T. (2017). Financial development and economic growth: additional evidence from Ghana. *Modern economy*, 8, pp. 282-297.
- Oima, D., & Ojwang, C. (2013). Market-Based and Bank-Based Financial Structure on Economic Growth in Some Selected ECOWAS Countries. *International Journal of Education and Research*, 1(2), pp. 1–10.
- Oladapo, O. S., Alao, B. W., & Kayode, A. J. (2016). Effect of volatility of remittance inflow on economic growth in Nigeria. *International journal of management and applied science*, 2(10), pp. 82-83.
- Oro, O. U., & Alagidede, P. (2018, May). *Non-linear relationship between financial development, economic growth and growth volatility: evidence from Nigeria*. Retrieved September 26, 2018, from SSRN: <https://ssrn.com/abstract=3186576>
- Parker, J. (2012). Theories of endogenous growth. Retrieved from: https://www.reed.edu/economics/parker/s13/314/Coursebook/Ch_05.pdf.
- Patrick, H. T. (1966). Economic development and cultural change. *Chicago journal*, 14(2), pp. 174-189.
- Pesaran, M. H., & Shin, Y. (1998). An autoregressive distributed lag modelling approach to cointegration analysis. In *Econometrics and Economic Theory: The Ragnar Frisch Centennial Symposium*, StromS (ed.). Cambridge University Press: Cambridge.
- Pesaran, M., Shin, Y., & Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, pp. 289–326.

- Perron, P. (1989), The great crash, the oil price shock and the unit root hypothesis, *Econometrica*, 57, 1361-1401.
- Phillips, P., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75, pp. 335-346.
- Piehl, A.M., S.J. Cooper, A.A. Braga, and D.M. Kennedy, (1999), Testing for structural breaks in the evaluation of programs, *NBER working paper 7226*.
- Pradhan, K. C. (2016). Does remittance drive economic growth in emerging economies: evidence from FMOLS and Panel VECM. *Theoretical and Applied Economics Volume XXIII* ,4(609), pp. 57- 74.
- Pradhan, R. P. (2011). Financial development, growth and inflation: the trilateral analysis in India. *Journal of economics and social research*, 13(2), pp. 45-59.
- Pradhan, G., Upadhyay, M., & Upadhyaya, K. P. (2008). Remittances and economic growth in developing countries. *The European Journal of Development Research*, 20, pp. 497–506.
- Psaradakis, Z., Sola, M., & Spagnolo, F. (2004). On Markov error-correction models with an application to stock prices and dividends. *Journal of Applied Econometrics* 19, pp. 69-88.
- Quartey, P. (2006). The impact of migrant remittances on household welfare in Ghana. *AERC Research Paper 158*. African Economic Research Consortium, Nairobi, Kenya.
- Quartey, P., & Afful-Mensah, G. (2014). Financial and Monetary Policies in Ghana: a review of recent trends. *Review of Development Finance*, 4, 115-125.
- Quartey, P., & Prah , F. (2008). Financial development and economic growth in Ghana: is there is causal link? *The African finance journal*, 10, pp. 28-54.
- Rajan, R., & Subramanian, A. (2005). What undermines aid's impact on growth? *IMF Working Paper 05/126*, Washington DC: International Monetary Fund and *NBER Working Paper No. 11657*, Cambridge, Massachusetts: National Bureau of Economic Research.
- Ramirez, M. D. (2013). Do financial and institutional variables enhance the impact of remittances on economic growth in Latin America and the Caribbean? a panel cointegration analysis. *International advances in economic research*, 19(3), pp. 272-288.
- Ramirez, M. D., & Sharma, H. (2008). Remittances and growth in Latin America: A panel unit root and panel cointegration analysis. *Economic development working paper no. 51*. New Haven: Yale University.
- Rana, R. H., & Barua, S. (2015). Financial development and economic growth: evidence from a panel study on South Asian countries. *Asian Economic and Financial Review*, 5(10), pp. 1159-1173.

- Rao, B. B., & Hassan, G. M. (2011). A panel data analysis of the growth effects of remittances. *Economic modelling*, 28, pp. 701-709.
- Rao, B. B., & Hassan, M. (2012). Are the direct and indirect growth effects of remittances significant? *The world economy*, 35(3), pp. 351-372.
- Rao, B.B., & Hassan, G.M. (2011). A panel data analysis of the growth effects of remittances. *Economic Modelling*, 28, pp. 701–709.
- Ratha, D. (2003). *Workers` remittances; an important and stable source of ecternal development finance*. Global development finance. Washington DC: World Bank.
- Ratha, D. (2007). *Leveraging remittances for international capital market access*. Washington D.C.: TheWorld Bank.
- Ratha, D. (2013). *The impact of remittances on economic growth and poverty reduction*. Migration Policy Institute.
- Rioja, P., & Valev, V. (2004). Does one size fit all? a re-examination of the finance and growth relationship. *Journal of development economics*, 74, pp. 429-447.
- Romer, P.M. (1986). Increasing returns and long run growth. *Journal of political Economy*, 94(5), pp. 1002-1037.
- Rousseau, P.L., & Wachtel, P. (2011). What is happening to the impact of financial deepening on economic growth? *Economic Inquiry*, 49(1), pp. 276-288.
- Saha, S. (2017). Do exchange rate changes have symmetric or asymmetric effects on stock prices?. *University of Wisconsin Milwaukee UWM Digital Commons* (Theses and Dissertations). <http://dc.uwm.edu/etd/1535>.
- Sahay, R. (2015). *Does access to financial services improve living standards?* Retrieved April 20, 2019, from: www.weforum.org/agenda/2015/09/does-access-to-financial-services-improve-living-standards/
- Salahuddin, M., & Gow, J. (2015). The relationship between economic growth and remittances in the presence of cross-sectional dependence. *The journal of developing areas*, 49(1), pp. 207-221.
- Schumpeter, J. A. (1912). *The theory of economic development: an inquiry into profits, capital, interest and the business cycle*. (R. Opie, Trans.) Cambridge MA: Harvard University Press.
- Shaw, E. S. (1973). *Financial deepening in economic development*. New York: Oxford University Press.
- Shin, Y., Yu, B., and Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in an ARDL framework. In Horrace, W.C. and Sickles, R. C.(eds), *Festschrift in Honor of Peter Schmidt*. Springer Science & Business Media, New York, pp. 281-314.

- Siddique, M. A., Selvanathan, E. A., & Selvanathan, S. (2010). Remittances and economic growth: Empirical evidence from Bangladesh, India and Sri Lanka. In *Discussion paper, 10(27)*, University of Western Australia.
- Solimano, A. (2003). Remittances by emigrants: Issues and evidence, WIDER Discussion Papers No. 2003/89, World Institute for Development Economics (UNU-WIDER).
- Sowa, N. K. (1991). Monetary control in Ghana: 1957-1988. *ODI working paper 45*, London: Overseas Development Institute.
- Svirydzienka, K. (2016). Introducing a new broad-based index of financial development. *IMF Working Paper WP/16/5*.
- Todaro, M. P., & Smith, S. C. (2012). *Development economics* (11 ed.). Boston: Addison Wesley.
- UNCTAD (2011). *Impact of remittances on poverty in developing countries*. New York and Geneva: United Nations publication.
- UNCTAD (2013). *Maximizing the development impact of remittances*. New York and Geneva: United Nations publication.
- UNDESA (2017). *International Migration Report 2017* New York: United Nations Department of Economic and Social Affairs (UNDESA)
- Ustarz, Y., & Issahaku, H. (2017). International migrant remittances and productivity growth in Ghana. *Ghana journal of development studies*, 14(2), pp. 63-82.
- World Bank (2006). The development impact of workers' remittances in Latin America. *Vol. II: Detailed Findings*, Washington D.C.: The World Bank Group.
- World Bank (2008). *Migration and Remittances Factbook 2008*. Washington, D.C.: World Bank.
- World Bank (2011). *Migration, remittances, and development in Africa*. Washington, D.C.: The World Bank Group.
- World Bank. (2018). *Migration and remittances: recent development and outlook*. World Bank Brief 29.
- Xu, Z. (2000). Financial development, investment, and economic growth. *Economic Inquiry*, 38, pp. 331-344.
- Zivot, E. and D. Andrews, (1992), Further evidence of great crash, the oil price shock and unit root hypothesis, *Journal of Business and Economic Statistics*, 10, pp. 251-270.

APPENDIX

Appendix A.

Dep Var:	(1)	(2)	(3)	(4)
$\Delta GDPPC$	FI	FID	FIA	FIE
$GDPPC_{t-1}$	-0.226 (0.134)	-0.424*** (0.121)	-0.378** (0.168)	-0.283** (0.115)
REM_{t-1}^+	0.0366 (0.0653)	0.0130 (0.0566)	0.00702 (0.0847)	0.0731 (0.0789)
REM_{t-1}^-	-0.191** (0.0884)	-0.0915 (0.0698)	-0.253** (0.0899)	-0.101 (0.104)
FD_{t-1}^+	-1.291* (0.714)	0.547* (0.297)	0.0490 (0.346)	-1.778** (0.693)
FD_{t-1}^-	-1.976*** (0.506)	-0.557 (0.578)	-1.435** (0.679)	-1.648*** (0.435)
$\Delta GDPPC_{t-1}$	-0.298 (0.204)	-0.0658 (0.181)	-0.203 (0.220)	-0.137 (0.186)
ΔREM^+	0.0680 (0.0534)	0.122** (0.0529)	0.119** (0.0525)	0.0925 (0.0597)
ΔREM_{t-1}^+	0.0319 (0.0526)	0.0642 (0.0656)	0.0537 (0.0729)	0.0330 (0.0505)
ΔREM^-	-0.377*** (0.0800)	-0.269** (0.0948)	-0.397*** (0.0942)	-0.339*** (0.0836)
ΔREM_{t-1}^-	-0.174* (0.0947)	-0.120 (0.0871)	-0.143 (0.0962)	-0.174* (0.0980)
ΔFD^+	-0.0444 (0.983)	0.218 (0.282)	0.451 (0.439)	-0.952 (0.858)
ΔFD_{t-1}^+	1.426* (0.685)	0.0834 (0.332)	0.152 (0.456)	1.237* (0.675)
ΔFD^-	-0.692 (0.649)	0.162 (0.858)	0.162 (0.794)	-0.550 (0.503)
ΔFD_{t-1}^-	-0.0310 (0.603)	0.863 (0.841)	1.590** (0.738)	0.0934 (0.484)
GCF	0.151 (0.141)	0.0688 (0.173)	0.0119 (0.184)	0.162 (0.149)
INF	-0.127** (0.0488)	-0.0525 (0.0851)	-0.0929 (0.0595)	-0.115** (0.0497)
TOPEN	-0.690*** (0.159)	-0.779*** (0.191)	-0.779*** (0.195)	-0.557*** (0.161)
FDI	-0.120** (0.0497)	-0.106* (0.0621)	-0.0892 (0.0549)	-0.0975* (0.0532)

_cons	2.546** (1.021)	3.931*** (1.039)	3.750*** (1.182)	2.625** (0.933)
Observations	36	36	36	36
R-squared	0.787	0.724	0.737	0.772
Diagnostics:				
B-G LM test	14.06(0.5943)	22.31(0.1334)	20.08(0.2167)	15.18(0.5112)
B-P Chi ²	4.319(0.0377)	.39(0.5323)	.01359(0.9072)	2.232(0.1352)
Ramsey RESET	2.468(0.1049)	1.495(0.2590)	1.692(0.2144)	1.316(0.3085)
Jacque-Bera	0.731(0.6938)	0.7909(0.6734)	0.3445(0.8418)	.9346(0.6267)

Notes: All variables are log transformed. Standard Errors are in the parentheses for the short-run results and F-statistic in parentheses for the long-run results. *, **, and *** indicates significance at 10%, 5% and 1% levels respectively. B-G LM test is the Breusch-Godfrey Lagrange Multiplier test for serial correlation/autocorrelation; B-P Chi² is the Breusch-Pagan Chi-square test for Heteroscedasticity, Ramsey RESET is the test for functional form of the model and Jacque-Bera is the test for normally distributed residuals. P-values for the diagnostic tests are in parenthesis.

Appendix B

Dep Var: $\Delta GDPPC_t$	(1) FI	(2) FID	(3) FIA	(4) FIE
$GDPPC_{t-1}$	-0.222* (0.115)	-0.256* (0.148)	-0.147 (0.186)	-0.279** (0.0970)
REM_{t-1}^+	0.281*** (0.0695)	0.370*** (0.122)	0.363*** (0.0748)	0.259*** (0.0824)
REM_{t-1}^-	0.0109 (0.0701)	0.00746 (0.0841)	0.0305 (0.0781)	-0.0107 (0.0716)
$REM_FD_{t-1}^+$	-0.392 (0.343)	-1.811 (1.253)	-1.850** (0.847)	-0.127 (0.154)
$REM_FD_{t-1}^-$	-0.713 (0.560)	-4.436 (2.820)	-7.096** (2.686)	-0.0987 (0.238)
$\Delta GDPPC_{t-1}$	-0.185 (0.178)	-0.168 (0.196)	-0.250 (0.200)	-0.163 (0.177)
ΔREM^+	0.242*** (0.0580)	0.282*** (0.0785)	0.271*** (0.0601)	0.228*** (0.0627)
ΔREM_{t-1}^+	0.0668 (0.0540)	0.0299 (0.0533)	0.0493 (0.0558)	0.0585 (0.0532)
ΔREM^-	-0.378*** (0.0770)	-0.379*** (0.0895)	-0.396*** (0.0848)	-0.366*** (0.0775)
ΔREM_{t-1}^-	-0.274*** (0.0813)	-0.290** (0.107)	-0.316*** (0.0940)	-0.253*** (0.0841)
ΔREM_FD^+	-0.373** (0.175)	-1.367** (0.598)	-1.219** (0.458)	-0.138 (0.0814)
$\Delta REM_FD_{t-1}^+$	-0.208 (0.249)	-0.272 (0.629)	-0.278 (0.677)	-0.0879 (0.108)
ΔREM_FD^-	-0.0551 (0.338)	-0.373 (1.023)	-0.636 (0.817)	0.00354 (0.152)
$\Delta REM_FD_{t-1}^-$	0.850 (0.566)	4.332* (2.410)	6.654** (3.058)	0.193 (0.224)
GCF	0.0255 (0.120)	-0.0421 (0.129)	-0.0137 (0.138)	0.0330 (0.120)
INF	-0.0881* (0.0437)	-0.103* (0.0587)	-0.112** (0.0529)	-0.0794* (0.0436)
TOPEN	-0.681*** (0.151)	-0.733*** (0.162)	-0.739*** (0.160)	-0.679*** (0.152)
FDI	-0.0586 (0.0371)	-0.0463 (0.0393)	-0.0740 (0.0431)	-0.0535 (0.0366)

FI	-0.618 (0.375)			
FID		-0.165 (0.308)		
FIA			-0.310 (0.288)	
FIE				-0.500 (0.324)
_cons	1.616 (1.257)	2.192 (2.112)	1.171 (2.045)	2.686 ^{***} (0.823)
Observations	36	36	36	36
R-squared	0.831	0.796	0.814	0.831
B-G LM	11.48(0.778)	19.22(0.257)	16.74(0.403)	11.61(0.770)
B-P Chi ²	1.67(0.196)	0.5298(0.467)	0.708(0.400)	2.048(0.152)
Ramsey RESET	2.286(0.127)	3.265(0.056)	1.75(0.206)	2.498(0.106)
Jacque-Bera	1.443(0.486)	3.1(0.212)	2.746(0.253)	1.463(0.481)

Notes: All variables except the interaction term between REM and FD are log transformed. Standard Errors are in the parentheses for the short-run results and F-statistic in parentheses for the long-run results. *, **, and *** indicates significance at 10%, 5% and 1% levels respectively. B-G LM test is the Breusch-Godfrey Lagrange Multiplier test for serial correlation/autocorrelation; B-P Chi² is the Breusch-Pagan Chi-square test for Heteroscedasticity, Ramsey RESET is the test for functional form of the model and Jacque-Bera is the test for normally distributed residuals. P-values for the diagnostic tests are in parenthesis.