

**UNIVERSITY OF GHANA**

**COLLEGE OF HUMANITIES**

**FOREIGN DIRECT INVESTMENT, CONFLICT AND  
INDUSTRIALISATION IN AFRICA**

**BY**

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REQUIREMENT FOR THE AWARD OF THE MPhil  
FINANCE DEGREE**

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## DECLARATION

I, Joshua Ofoe Sottie, hereby declare that this thesis is the result of my own research work, and that ideas incorporated from the works of other authors and sources have been duly cited and referenced, under the supervision of Dr. Elikplimi Komla Agbloyor and Dr. Agyapomaa Gyeke-Dako.

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Joshua Ofoe Sottie

.....  
Date



**CERTIFICATION**

I certify that this thesis was supervised according to the procedures laid down by the University of Ghana.

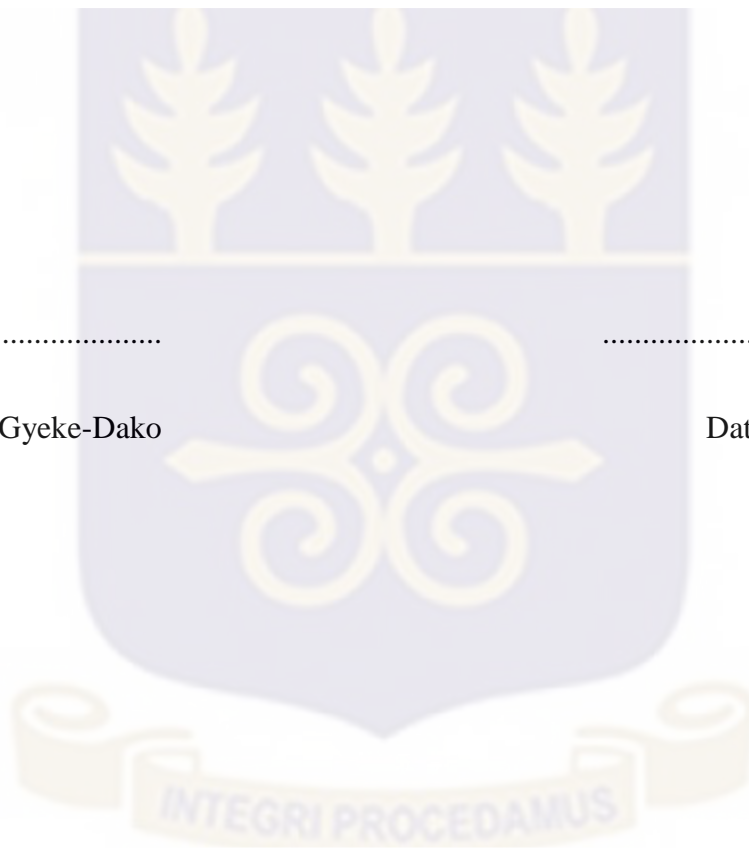
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(Co-Supervisor)

## **DEDICATION**

I single-heartedly dedicate this work to the Praise and Glory of the LORD God Almighty, Our LORD Jesus Christ. You deserve all the Glory, Praise, and Honour! Thank you LORD for Your Faithfulness, Amen!



## ACKNOWLEDGEMENT

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*Oh, Marvellous Grace!!!      Grace Untold!      Boundless Love!!!      Amen!!!*



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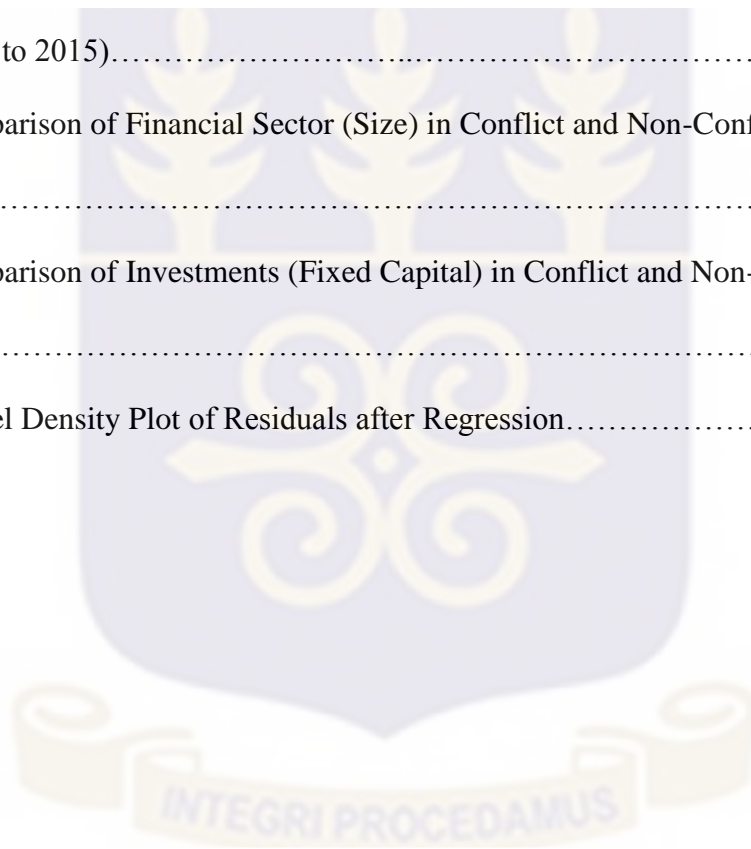
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## ACRONYMS AND ABBREVIATIONS

UNECA.....	United Nations Economic Commission of Africa
UNIDO.....	United Nations Industrial Development Organisation
UNCTAD.....	United Nations Conference on Trade and Development
GDP.....	Gross Domestic Product
FDI.....	Foreign Direct Investment
FGLS.....	Feasible Generalised Least Squares
RE.....	Random Effects
FE.....	Fixed Effects
OLS.....	Ordinary Least Squares
GLS.....	Generalised Least Squares
VIF.....	Variance Inflation Factor
ISIC.....	International Standard Industrial Classification
IMF.....	International Monetary Fund

## **KEY TERMS**

Conflicts/civil wars, conflict countries, non-conflict countries, industrialisation, foreign direct investment, linkages, spill-overs, competition risks, and Africa.



## ABSTRACT

This study set out to examine the effect of conflicts and FDI on industrialisation in Africa using a panel data on 48 African countries during the period 1980 to 2015. The African continent has been a typical recipient of FDI. FDI inflows are believed to boost economic growth and industrialisation, and for that reasons several African countries seek to attract FDI inflows. Theoretically, FDI inflows should boost industrialisation, especially FDI channelled to the manufacturing and industrial sectors by providing additional financial resources, technical expertise, and technology transfer amongst other benefits. Across the world, extant literature across provide mixed and inconclusive results on the effects of FDI inflows on industrialisation. This study sought to provide further evidence on the FDI-Industrialisation nexus in Africa using a more recent dataset, and to further examine the role of conflicts in the FDI-industrialisation nexus. The motivation for considering the potential role of conflicts stem from the fact that during the period 1980 to 2015, the African region experienced numerous incidences of civil wars which produced severe adverse effects on countries involved. Preliminary literature review suggested that civil wars significantly negatively affect economic development in countries that engage in it, and these adverse effects are pervasive and endure into the long term.

To account for the effect of conflicts, the current study classified countries into conflict and non-conflict countries based on relevant and reliable data from multiple sources. A dummy variable was constructed to capture non-conflict countries. This variable takes the value of one (1) for those countries which did not experience civil wars during the period under study, and zero (0) for those countries which experienced civil wars during the same period. The study adapted industrialisation models used in extant literature. The main empirical estimations were run using the Feasible Generalised Least Squares (FGLS) technique under both the Common AR (1) and Panel-Specific AR (1) scenarios following results from

diagnostic tests for autocorrelation, heteroscedasticity, multicollinearity and normal distribution. The estimations were subject to robustness checks by controlling for several relevant controls, and multiple estimation techniques such as the Prais-Winsten's [common and panel-specific AR (1)], Pooled OLS, panel fixed effects and random effects techniques.

The initial results from this study indicated that FDI had a negative significant effect on industrialisation in African countries during the period 1980 to 2015. This finding, seemingly lending support to the status quo, provided a motivation to explore whether conflicts could be an important variable in explaining this 'paradox' in the FDI-industrialisation nexus in Africa. In contributing to explaining the paradox in the FDI-industrialisation nexus, the study found sufficient evidence that FDI net inflows had a positive significant effect on industrialisation in *non-conflict countries* in Africa during the period 1980 to 2015. The study further found strong evidence that non-conflict countries experienced higher levels and faster pace of industrialisation than the conflict countries. The study concludes that the apparent evidence or prima facie evidence of negative significant effect of FDI net inflows on industrialisation observed in our preliminary results was due to the presence of conflict countries in the full sample. We therefore suggest that the negative significant effects or insignificant effects of FDI inflows on industrialisation observed in previous studies in Africa could be explained by the presence of conflict countries in the samples. We find that conflict or civil war is important in explaining industrialisation, and the FDI-industrialisation nexus in Africa.

The study further shed light on the adverse effects of conflicts through the absorptive capacity hypothesis. Theoretically, conflicts destroy financial resources, human capital, infrastructure and systems which should provide countries with the required absorptive capacity to be able to channel FDI inflows into beneficial use to promote industrialisation. Periods of civil wars are associated with wastage, corruption, loss of human capital, loss of financial resources and

destruction of infrastructure. Therefore for countries to benefit from FDI inflows in terms of boosting industrialisation, they should endeavour to eschew conflicts or civil wars.

Other important findings were that manufacturing trade openness, per capita income and the financial sector were significant determinants of industrialisation in Africa during the period 1980 to 2015. Services productivity, government interventions and regulation did not have significant on industrialisation in African countries over the study period. Domestic investments had negative significant effect on industrialisation in African countries during the period 1980 to 2015, partly because large share of domestic investments were directed toward non-manufacturing sectors such as the natural resource sectors. It was also found that the agriculture productivity had a negative significant relationship with industrialisation. This finding suggests that the generally low levels and slower pace of industrialisation in Africa noticed from empirical works might be because most African countries are still agrarian economies. Thus large investments toward agriculture will boost agriculture productivity but slow down industrialisation, unless the investments in agriculture are directed toward agro-processing and production of intermediate inputs for industrial use. Thus policy makers should formulate and implement both medium-term and long-term industrial policies that seek to transform their economies from agrarian to industrial economies as they strive to promote industrialisation in the African region.

## CHAPTER ONE: INTRODUCTION

### 1.1 Research Background

Industrialisation remain a top priority objective for many African countries both in the medium-term to the long-term (UNECA, 2013; UNCTAD, 2016). Industrialisation is conceptualised as the expansion or growth of manufacturing industries. Chandra (1992) defined industrialisation as increase in the value-added of the manufacturing sector. Industrialisation is tied to growth in the manufacturing industries. Various institutions such as UNECA, UNCTAD and UNIDO consider industrialisation the way forward for Africa's development (UNECA, 2016; UNCTAD, 2014). The African Investment Report (2016) states that in line with the region's drive to industrialise, there has been a boost up in manufacturing activities across the African region at an average rate of 5 percent annually between 2011 and 2015. In 2015, global FDI flows stood at \$1.8 trillion, being an increase of about 40% since 2008 when the world experienced the global financial crises; out of this total Africa's share was 8% of Global FDI flows within the same period (UNCTAD, 2016; Africa Investment Report, 2016). According to the African Investment Report (2016), as at 2015, there has been a 6% increase in the number of foreign companies investing in the African markets from 495 in 2014.

Theoretically, and from the perspective of policy makers, FDI inflows should boost industrialisation, especially FDI channelled to the manufacturing and industrial sectors (Markusen & Venables, 1999; Ozturk, 2007; Gorg & Greenaway, 2004). FDI flows are a source of transferring scarce resources including technology, management expertise, financial resources and infrastructure (Keller, 2010; Adam, 2009; Liu, 2008; Liu, 2002) to recipients of FDI. Accessing empirically the impact of FDI on industrialisation is a step in the right direction, as this would provide feedback as to the real benefit of FDI to recipient countries.

The Africa region has experienced high and steady growth over the past decade as its average annual growth rate of real output increased from 1.8 percent in the period 1980–1989 to 2.6 percent in 1990–2000 and 5.3 per cent in the period 2000–2010, and increase in foreign direct investment (FDI) flows contributed to the continent’s growth process (UNCTAD, 2014). In 2015, global FDI flows stood at \$1.8 trillion, being an increase of about 40% since 2008 when the world experienced the global financial crises; out of this total Africa’s share was 8% of Global FDI flows within the same period (UNCTAD, 2016; Africa Development Report, 2016). The African Investment Report (2016) cited that as at 2015, there has been a 6% increase in the number of foreign companies investing in the African markets from 495 in 2014.

The African region has also experienced conflicts of various forms, including civil wars over the past three decades (Le Billon, 2001; Brecke, 2001; Centre for Systemic Peace, 2016; Collier, Hoeffler & Rhooner, 2009; Collier, Hoeffler & Soderbom, 2008) which may affect its industrialisation process due to the destructive effects conflicts or civil wars have on countries (Suliman & Mollick, 2009; Murdoch & Sandler, 2004; Alsan, Bloom, & Canning, 2006; Collier, 1999). In the literature, conflict or civil war is defined as a violent or armed conflict within a state that results in at least 1000 deaths per year (Collier, Hoeffler & Rhooner, 2009; Bannon & Collier, 2003). The literature established that conflicts destroy absorptive capacities of countries in terms of institutional and infrastructural resources (Agbloyor, Gyeke-Dako, Yawson & Abor, 2016; Durham, 2004; Eckhardt, 1991). Hence, countries prone to conflicts have weak economic environment and institutional infrastructure to enable them channel available scarce resources into beneficial use by way of promoting growth or boosting industrialisation (Suliman & Mollick, 2009; Murdoch & Sandler, 2004; Bannon & Collier, 2003; Collier, 1999). However, earlier studies have not considered conflict as a key variable that might explain industrialisation in Africa. This study sought to fill this gap.

## 1.2 Problem Statement

The surge in inward FDI into the African continent has attracted academic and policy-oriented research into several dimensions of FDI impacts and determinants, and FDI's interaction with growth indicators. Various themes explored in FDI literature include FDI and Growth in Africa (see Gui-Diby, 2014; Alfaro, Chanda, Kalemli-Ozcan, Sayek & Moudatsou, 2014; Alfaro 2003), FDI and financial development (see Alfaro, Kalemli-Ozcan, & Sayek, 2009). FDI and health (see Alsan, Bloom, & Canning, 2004; Alsan, Bloom & Canning, 2006). FDI and domestic investment (see Adams, 2009; Barbosa & Eiriz, 2009; Barrios, Görg & Strobl, 2005); FDI Spill-overs and productivity (see Buckley, Clegg & Wang, 2007; Bwalya, 2006; Crespo & Fontoura, 2007). Key areas of interest in FDI literature is determinants of FDI inflows in the African region, and impact of FDI on economic growth. For Alfaro, Chanda, Kalemli-Ozcan, & Sayek et al. (2004), FDI's impact on economic growth depends largely on good financial markets (see also Adjasi, Abor, Osei, & Nyavor-Foli, 2012; Agbloyor, Abor, Adjasi & Yawson, 2013). For Asiedu (2006), FDI's impact on economic growth in Africa could be explained by interplay of factors such as natural resource endowment, market size, government policy, institutions and state of political stability.

Beyond economic growth, African governments are keenly interested in the structural transformation of their economies by way of industrialisation, and they take policy stance which to attract FDI to boost industrialisation (UNECA, 2016; UNCTAD, 2014; African Investment Report, 2016). However, regarding the nexus between FDI and the industrialisation process in Africa, little research has been done. Previous studies in this area in other jurisdictions consider de-industrialisation and how it is impacted by FDI (Kang & Lee, 2011); de-industrialisation and its relationship with economic growth and trade (Rowthorn & Ramaswamy, 1999).

The study closest to the current research is one by Gui-Diby & Renard, 2015. They examined the FDI-industrialisation nexus in Africa and found that FDI inflows had an insignificant effect on Industrialisation. Kaya (2010) also observed that FDI inflows had insignificant or negative effects on industrialisation in developing countries, including Sub-Saharan Africa using multiple estimation techniques on an unbalanced panel of 64 developing countries across the world during the period 1980 to 2003. These findings on the FDI-industrialisation nexus in Africa and some developing countries deviate from the expectations of economic theory and also from the views of practitioners and advocates of FDI flows. However, empirical evidence on the FDI-industrialisation nexus in other jurisdictions shows that FDI had positive effect on industrialisation [examples include Liu, 2002 and Liu, 2008 (China); Kang & Lee, 2011 (Korea); Rowthorn & Ramaswamy, 1999 (OECD countries)]. This study therefore set out to revisit the FDI-industrialisation nexus in Africa in order to provide further evidence on this relationship using a more recent dataset. Multiple evidence on empirical relationships help to improve understanding of the issues or concepts under investigation. Studying this relationship with a more recent dataset would provide feedback as to the benefit of FDI to recipient countries.

This study further sought to address a key gap identified in the literature. An important theme that has been neglected in the literature is the effect of conflicts on the industrialisation process in Africa, and its role in the FDI-industrialisation nexus. Though over time the African region had experienced several incidences of conflicts, including civil wars (Elbadawi & Sambanis, 2000; Gleditsch, Peter, Mikael, Margareta & Håvard, 2002), existing studies in this area have not accounted for the effects of conflicts. From the literature on conflicts, the effects of conflicts are pervasive and enduring into the long term (Suliman & Mollick, 2009; Murdoch & Sandler, 2004; Bannon & Collier, 2003; Collier, 1999). Conflict countries suffer economic and social disadvantages that impede their ability to match non-conflict countries

on economic and financial performance indicators (Bannon & Collier, 2003; Collier, 1999), and for that matter industrialisation. However, no study, to the best of the researcher's knowledge, has empirically examined the effects of conflict on the industrialisation process of African countries. As a rule of thumb, we might believe that conflicts should impact negatively on industrialisation in Africa, but this has not been empirically tested. This research purports to fill this gap by examining the effects of conflicts and FDI on industrialisation in African countries over the period 1980 to 2015; and also by exploring whether conflict is important in explaining the FDI-industrialisation nexus in these countries.

### **1.3 Research Purpose**

The ultimate aim of the study is to explore the FDI-industrialisation nexus in Africa; and to re-examine this relationship in the presence of conflicts. The purpose of this research is to examine the effect of conflicts and FDI on industrialisation in Africa over the period 1980 to 2015.

### **1.4 Research Objectives**

1. To examine the impact of FDI on industrialisation in African countries over the period 1980 to 2015.
2. To examine the effect of conflicts on industrialisation in African countries over the period 1980 to 2015.
3. To examine to what extent conflicts explain the relationship between FDI and industrialisation in African countries.

### **1.5 Research Questions**

1. Does inward FDI have a positive or negative effect on industrialisation in Africa?
2. Do conflicts have a significant effect on industrialisation in Africa?

3. Do conflicts play a key role in explaining the relationship between FDI and industrialisation in Africa?

### **1.6 Research Hypotheses**

Based on the research purpose, objectives and questions, and preliminary review of literature, these hypotheses were set forth to guide the study.

1. *Ho: FDI has a positive effect on industrialisation in Africa.*

*Ha: FDI has a negative effect on industrialisation in Africa.*

2. *Ho: Conflicts have a significant effect on industrialisation in Africa.*

*Ha: Conflicts have an insignificant effect on industrialisation in Africa.*

3. *Ho: Conflict is an important variable in explaining the FDI-industrialisation nexus in Africa.*

*Ha: Conflict is insignificant in explaining the FDI-industrialisation nexus in Africa.*

### **1.7 Significance of the Study**

This study is relevant to current research, practice and policy. In terms of its significance to research, the study advances the literature by exploring the effects of conflicts on Africa's industrialisation, a variable that, to the best of the researcher's knowledge, has not been considered in any empirical study in industrialisation literature. The study also provides further evidence on the nature of the FDI-industrialisation relationship in Africa with a dataset which is much more recent than what was used in earlier studies. Therefore this study extends knowledge on industrialisation by shedding light on the effects of conflicts on industrialisation, and the relationship between FDI and industrialisation in Africa. To the best of the researcher's knowledge, no study has considered conflicts in studies on industrialisation or its related concept, de-industrialisation.

Concerning significance to policy and practice, the results of this study would report on the empirics regarding the effect of FDI on industrialisation on the African region. The results of the study would provide feedback to governments and policy analysts regarding policy initiatives that consider FDI as a catalyst for boosting industrialisation. Results from the conflict effects would also provide basis for making recommendations to governments and state institutions charged with peacekeeping to keep up their operations in order to promote peace in the African region to promote industrialisation in the region.

### **1.8 Limitations of the Study**

This study has been carefully designed to minimise flaws, however, as with all research, it has some limitations. With regards to the sample, the best case situation is to consider the entire population—all the fifty-four (54) African countries. However, due to constraints with the data (insufficient data on key variables) for some countries, forty-eight (48) African countries sufficient data to guarantee reliable results, and they constitute the sample for this study. Though this sample is representative of the population, it is considered a limitation since the best case is a census. The ideal variable for FDI should have been FDI attributed to manufacturing; however, due to unavailability of FDI data by sector, the study made use of the total FDI net inflows. The researcher believes FDI by sector would have provided additional insights. Nonetheless, previous studies such as Gui-Diby & Renard, 2015 used total FDI net inflows for similar reasons as aforementioned.

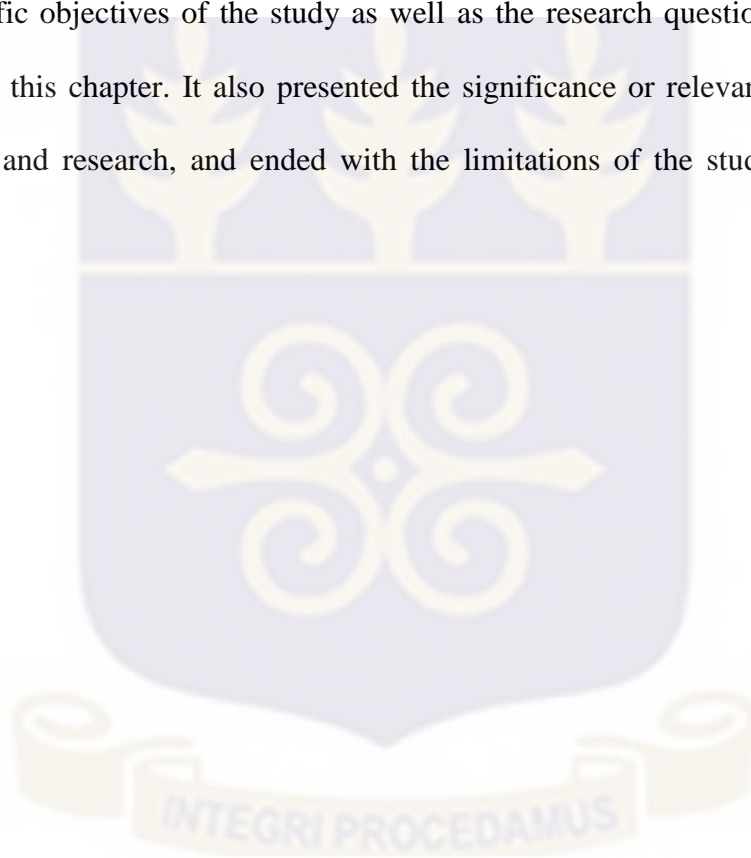
### **1.9 Organisation of the Study**

The thesis is organised into five chapters. Chapter one presents the introduction to the subject matter of industrialisation covering the background of the study, research problem, research purpose, research objectives and research questions, research hypotheses, as well as the significance, limitations and organisation of the study. Chapter two presents a review of theoretical and empirical literature on industrialisation, FDI and civil wars. Chapter three

presents the methodological approaches, sample, empirical model specification and estimation techniques as well as the data analysis approach. Chapter four presents the results and discussions, including the diagnostic tests that guided the data analysis. Chapter five presents the summary of key findings, the conclusions and recommendations which follow from the findings of the study.

### **1.10 Chapter Summary**

This chapter introduced the entire research. The background to the research, the research the broad and specific objectives of the study as well as the research questions and hypotheses were covered in this chapter. It also presented the significance or relevance of the study to policy, practice and research, and ended with the limitations of the study and the chapter outline.



## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter presents a review of relevant literature on industrialisation, FDI and conflict. It begins with a theoretical review which covers basic concepts, industrialisation and the role of FDI as well as key frameworks such as the absorptive capacity hypothesis and the inverted-U hypothesis. The empirical review covers themes such as linkages, spill-overs and the competition risks from FDI inflows; empirical evidence on the effect of FDI on industrialisation across various regions; civil war and its potential effects. The chapter ends with stylised facts on civil wars within the African region over the period 1980 to 2015.

### **2.2 Theoretical Review**

The theoretical review spans across definitions and explanation of key concepts and theoretical underpinnings relevant to the study. Concepts and themes covered in this section include the definition and measurement of FDI; concepts related to FDI and industrialisation; industrialisation and the role of FDI; the inverted U-hypothesis and the absorptive capacity hypothesis; and related theoretical underpinnings.

#### **2.2.1 Foreign Direct Investment (FDI)**

The study adopts the International Monetary Fund's definition of Foreign Direct Investment: "Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor". From the balance of payment accounts, it comprises the sum of equity capital, earnings re-invested, other long-term capital, and short-term capital (IMF, 2016). FDI net inflows are the focus of this study. The FDI net inflow is obtained by deducting disinvestments from total new investment inflows received by a country. To facilitate comparison across countries, we scale FDI net inflow by GDP. The IMF's,

International Financial Statistics and Balance of Payments databases, World Bank's International Debt Statistics provide data on FDI across the world.

The IMF's computation of FDI net inflows is summarized as:

$$FDI \text{ net inflows} = (New \text{ Investment inflows} - Disinvestment)/GDP.$$

*New investment inflows come in the form of equity capital (including earnings re-invested), short-term and long term capital, and greenfield investments. Disinvestments refer to withdrawals of invested funds and cancellation of investment projects. Disinvestments constitute deductions from net FDI inflows, and thus need to be deducted from the total investment inflows in order to ascertain the net FDI inflows.*

The International flow of private capital could be in the form of FDI or portfolio investments. Unlike FDI, portfolio investments are basically driven by interest rate differentials that promise the investor rewarding returns after accounting for expenses. Portfolio investments also do not entitle the investor to control interest in the investee firm, unlike FDI.

### **2.2.2 Industrialisation**

Industrialisation is a term that encapsulates expansion of manufacturing industries and decline in primary industries such fisheries and agriculture which is usually the direct result of policy (industrial and trade policies) to achieve economic and structural transformation (see Bjorvatn & Coniglio, 2012; Dobrinsky, 2009; Harrison & Rodríguez-Clare, 2009). Expansion of manufacturing industries is often associated with investments in capital and intermediate goods (Kang & Lee, 2011). In the initial stages of economic development, countries tend to direct resources toward expansion of manufacturing industries to drive the structural transformation of their economies for long-term growth (Kang & Lee, 2011). However in later stages, there is decline in the rate of industrialiation, and this is termed de-industrialisation. De-industrialisation occurs in later stages of economic development and it

usually pertains to developed economies. UNIDO (2013) defines de-industrialisation as a long-term decline in manufacturing value added relative to other sectors. Extant literature provides the view that industrialisation is prioritised among developing economies to enable them to achieve sustained and transformative growth (Sampath, 2014; UNCTAD, 2014; UNECA, 2013). However, most of these economies experience de-industrialisation at the point of transition to developed economies. Clark (1957) and Kang & Lee (2011) noted that de-industrialisation is only a natural consequence of growth. Industrialisation as a policy objective is important to keep policy makers focused on how to allocate resources across various sectors (UNECA, 2013; Harrison & Rodríguez-Clare, 2009).

### **2.2.3 The Inverted U-Hypothesis**

The inverted U-hypothesis proposed by Clark (1957) provides a theoretical explanation for the evolution from industrialisation which occur along countries economic development cycle. The inverted U-hypothesis is demand-based. Clark (1957) explains that when per capita income begins to increase, households shift demand from unprocessed goods or agricultural raw materials to processed goods, and this increased demand for processed or manufactured goods boosts growth in the manufacturing sector. Therefore in this period, the economy experiences industrialisation. However, with further increase in per capita income beyond a certain point, households switch demand from manufactures to services. At this stage, industrialisation reaches a peak, and de-industrialisation set in as the services sector becomes more dominant than the manufacturing sector. The inverted U-hypothesis thus concludes that increasing per capita income boosts industrialisation in the early phases of economic growth, and de-industrialisation in later stages of economic development through the shifts in household demand from unprocessed goods to manufactured goods to services over time. The inverted U-hypothesis basically illustrates that growth in income has a positive but decreasing effect on industrialisation beyond a certain turning point- and de-industrialisation sets in. The

inverted U-hypothesis is an important concept which predicts the potential of countries to achieve higher levels of industrialisation given their levels of economic development. Empirical studies such as Kang & Lee, 2011; Kaya, 2010; Rowthorn & Ramaswamy, 1999; Gui-Diby & Renard, 2015, found evidence confirming the inverted U-hypothesis in both developing and developed economies. This study also seeks to find evidence of the inverted-U hypothesis for African countries.

#### **2.2.4 Industrialisation and Role of FDI**

Industrialisation is still in its infant stages in several countries in the African region (UNECA, 2016). UNECA (2013) records that the Africa region is excessively dependent on primary commodity exports; its average export concentration index has increased since 1995 and shows relatively higher commodity dependence than both Asian developing countries and Latin American commodity exporters. Africa's persistent dependence on merchandise exports of raw materials and unprocessed commodities have contributed to poor export earnings, reduced job creations and slow economic growth in the region (UNECA, 2013). It is in view of this that African countries are increasingly called upon to enact economic policies towards promoting industrialisation (UNECA, 2015; UNECA, 2016). Industrialisation is able to help developing countries achieve a structural transformation of their economies, diversify the structure of countries exports, improve household demand and to create more jobs (UNECA 2013). Many African countries have set out to boost industrialisation in their economies in the medium to the long term (UNCTAD, 2014). However, the pursuit of this transformation agenda requires huge investments, and additional technical and financial resources often beyond domestic investments and government resources (Gui-Diby & Renard, 2015). And foreign direct investments have emerged as a suitable conduit to advance industrialisation by providing these additional financial and technological resources.

Foreign Direct Investment (FDI) inflows do play a key role in providing the much needed additional financial and technical resources to support the industrialisation process (Gui-Diby & Renard, 2015). FDI is widely considered a primary channel for boosting economic growth in developing economies including Africa region (Cleeve & Ibeh, 2012; Markusen & Venables, 1999; Rodriquez-Clare, 1996), hence most developing economies set out to attract FDI inflows. All regions in Africa are recipients of FDI flows. FDI inflows into Africa as a whole remained stable at \$54billion in 2014. By regional blocks, East Africa had an 11% increase in FDI inflows to \$6.8billion in 2014. North Africa received FDI flows of \$11.5billion in 2014, down by 15% compared to the preceding year; West Africa recorded FDI inflows of \$12.8 billion, being a 10% decline from that recorded in 2013; Central Africa received \$12.1billion of FDI in 2014, up by 33% from that received in 2013; and Southern Africa received 10.8 billion of FDI in 2014, down by 2.4% compared to 2013 (UNCTAD, 2015). Developing economies serve as attractive destination for FDI projects because developing region such as the African Sub region are endowed with rich natural resources, human capital, and large market size (Asiedu, 2002, Asiedu, 2006). Previous studies such as Dong, Song, & Zhu (2011); Borensztein, Gregorio, & Lee (1998); and Rodriquez-Clare (1996) have shown that FDI inflows benefit host countries through technological transfers, forward and backwards linkages. Markusen & Venables (1999) also show theoretically that FDI can boost industrialisation through spill-over effects which results the growth of local industrial sectors when multinationals depend on intermediate goods from the local economy. Thus FDI inflows seemingly support the industrialisation process, and might be an important determinant of industrialisation.

### **2.2.5 Theoretical underpinnings**

This section considers some theories and models in the literature developed to explain the movement of capital in general and FDI in particular, as well as the effect of FDI on

Industrialisation. The theories seeking to explain reasons for FDI flows have been grounded on various factors such as market imperfections, competitive advantage, demand structure, ownership, location and international environment (Dima, 2010; Dunning, 1988). In essence, FDI inflows hinge on the notion of capitalising on advantages in other markets while maintaining management control. The extant literature indicate that in capitalising on these advantages, firms make a choice between FDI and alternative approaches such as exporting/importing, franchising, licensing, based on factors such as government policy, market size, competition from domestic rivalry firms, and risk factors (Nayak & Choudhury, 2014; Dima, 2010). Kindleberger (1969) argues that in the presence of market imperfections, firms with advantages over competitors in foreign markets in terms of superior technology, management expertise, quality products and services can exploit them through FDI.

In analysing the direct impacts of FDI on industrialisation, we fall on two models developed by Rodriquez-Clare (1996), and Markusen & Venables (1999). Markusen & Venable's model examines FDI's impact on industrialisation in terms of value-added or contribution to GDP whiles Rodriquez-Clare (1996)'s model examines FDI's impact on industrialisation in terms of manufacturing share in total employment. Rodriquez-Clare (1996) and Markusen & Venable (1999) argue that entrance of multinational companies in the host country has two effects: competition effect and linkage effect. The competition effect holds that multinationals primarily compete with local firms in the industry when the multinationals produce/trade in substitutes goods, and they consequently out-compete the domestic firms due to economies of scale (see also Caves, 1974; Barrios, Görg & Strobl, 2005) . Again, multinationals also compete with domestic firms for financing from local financial markets, and they are likely to attract funds at cheaper costs than domestic firms. Consequently, the entrance of multinationals in horizontal industries might lead to crowding out of domestic firms through competition effects (see Caves, 1974; Barrios, Görg & Strobl, 2005). However, when

multinational businesses complement domestic firms, they are able to imitate the advanced technologies and business practices of the multinationals (parent companies) in order to grow their businesses. Existence of such complementarities among multinationals and domestic firms in the manufacturing and industrial sectors would promote industrialisation (UNECA, 2013; Barrios, Gorg & Strobl, 2005).

The linkage effect holds that multinationals create linkages with local firms in its value chain that improve the performance of local firms. When multinationals use intermediate goods from local firms in its production process, it boosts demand for local firms that produce intermediate goods (Rodríguez-Clare, 1996; Markusen & Venables, 1999). This linkage effect, however, decreases when multi-nationals import intermediate goods. Literature shows that linkage effects manifest as both forward and backward linkages (Liu, 2008). When linkages are strong, multinationals would pass on technology, management training to help local firms grow (UNECA, 2013; Fosfuri, Motta, & Ronde, 2011). This would inure to growth of the industry and consequently contribute to industrialisation.

Apart from the direct impacts, FDI also impacts industrialisation indirectly through the channel of technological transfers, and human capital. Multinationals come in with advanced technology, and through spill-over effects and labour mobility, domestic firms benefit from the advanced technologies of multinationals (Fosfuri, Motta, & Ronde, 2011; Glass & Sage, 2002). Technological transfers help to improve the productivity, value-added, and profit of domestic firms (Liu, 2002; Liu, 2008). Domestic firms also benefit from knowledge transfers as they employ skilled labour who worked with multinational companies. We hypothesise FDI inflows should have a positive impact on industrialisation.

### **2.2.6 The absorptive capacity hypothesis**

According to the absorptive capacity hypothesis, for host countries to benefit from FDI inflows, they require some institutional and infrastructural resources/capacity. Where these pre-requisite institutional and infrastructural resources are absent or inadequate, host countries of FDI are unable to channel FDI into judicious use in order to benefit their economies. Durham (2004) found evidence that the effects of FDI and equity foreign portfolio investment are contingent on the absorptive capacity of host countries, especially capacity in terms of financial or institutional development. The absorptive capacity hypothesis implies that it is not every country which receives FDI flows which will enjoy the benefits in terms of boosting economic growth or industrialisation. When certain internal structures are not in place in the host country, they would not reap the expected benefits from FDI flows. In support of the absorptive capacity hypothesis, Agbloyor, Gyeke-Dako, Yawson, & Abor (2016) found empirical evidence suggesting that the expected positive effect of FDI on economic growth and industrialisation is contingent on to the conditions of the host country.

Incidences of civil wars put host countries of FDI in a disadvantageous position because they lose absorptive capacity. Studies on conflicts show that conflicts result in the destruction of human capital, institutional infrastructure, financial resources and businesses and development projects (Allansson, Marie, Erik & Lotta, 2017; Bannon & Collier, 2003; Collier, 1999). Consequently conflict countries lack absorptive capacities or the required capacity to accommodate FDI inflows and translate them in beneficial use in terms of promoting economic growth and boosting industrialisation. Based on the proposition of the absorptive capacity hypothesis and the destructive effects of conflict, we predict that conflict countries might not be able to channel FDI into industrial growth because they lack or have inadequate absorptive capacity. Hence we expect that the impact of FDI on industrialisation should differ among conflict and non-conflict countries because non-conflict countries are

more likely to have stronger absorptive capacities, and to channel FDI inflows toward boosting industrialisation.

## **2.3 Empirical Review**

This section discusses the empirical studies relevant to this study. Some themes covered in this section include whether FDI is a curse or a blessing to the local economy; linkages, spillovers and competition effects from FDI; and the effects of FDI inflows on industrialisation. This section also studies on civil war and its effects, and brief stylised facts on conflicts in the African region during the period 1980 to 2015.

### **2.3.1 Is FDI a curse or blessing to the local industry?**

Empirical studies sought to examine the mechanisms through which FDI could affect local industries. Empirical literature different along two schools of thought: the pessimistic or traditional view to FDI and the optimistic view. The pessimists contend that FDI is detrimental to the welfare of the local industrial sector because multinational firms out-compete local firms, and also FDI projects worsen balance of payments through repatriation of profits (Ozturk, 2007; Gorg & Greenaway, 2004). The pessimistic view or the traditional view had been prevalent in the 1970s, however with growth in research and positive impacts of FDI, in the 1990's the optimists' view emerged (Ozturk, 2007; Rodriquez-Clare, 1996). The optimists propose that FDI is a channel to drive growth of the local industrial sector (Markusen & Venables, 1999; Ozturk, 2007; Gorg & Greenaway, 2004) because FDI benefits recipient countries through access to additional capital, transfer technology, acquisition of skilled labour, and promotion of healthy competition in the local market (Blomstrom et al., 1996, Borensztein et al. 1998, and De Mello, 1999). Modern research has however refined these two extreme views through empirical studies which explain that the impact of FDI on the local industry depend on linkages existing between multinational firms and the local industrial sector, and the absorptive capacities of the local economy (Markusen & Venables,

1999; Rodriquez-Clare, 1996; Durham, 2004). Hence FDI inflows in itself is not necessarily 'evil or a curse', neither is it automatically a 'blessing'. The next section further explores the modern view to analysing FDI's impact on the domestic economy; that is linkages and spill-overs and competition risks from FDI inflows.

### **2.3.2 Linkages, Spill-overs and Competition from FDI**

Liu (2008) explains that spill-overs may occur vertically across industries or horizontally within an industry through either backward linkages, where domestic firms supply intermediate inputs to multinational firms or through forward linkages where, domestic firms purchase intermediate inputs from multinational firms (see also Barbosa & Eiriz, 2009; Blomström & Kokko, 1998; Crespo & Fontoura, 2007; Kugler, 2006; Gorg, Strobl, 2001; Rodriguez-Clare, 1996; Waldkirch & Ofosu, 2010). The theoretical literature shows that forward and backward linkages create complementary effects which enable FDI inflows to create positive spill-overs for domestic firms in both horizontal and vertical industries (see Sayek, Alfaro, Chanda & Kalemli-Ozcan, 2003; Alfaro, Rodríguez-Clare, Hanson & Bravo-Ortega, 2004; Buckley, Clegg & Wang, 2007). Spill-overs from FDI occur in the form of technology transfers, knowledge transfers, human capital development, and capital transfers (see Findlay, 1978; Liu, 2008; Bwalya, 2006; Ortega, 2004; Fosfuri, Motta & Rønne, 2001; Alfaro, Rodríguez-Clare, Hanson, & Bravo- Xu, 2000; Blomström, & Kokko, 1998; Brainard, 1993). Da Rin & Hellman (2002) further underscored the financial intermediation role of banks as in promoting industrialisation. FDI inflows in the financial sector help to increase domestic firms' access to capital to expand manufacturing projects. Similarly, Agbloyor, Abor, Adjasi & Yawson (2013) and Adjasi, Abor, Osei & Nyavor-Foli (2012) also emphasise on the key role of the financial sector (financial markets) in catalysing FDI inflows toward promoting economic growth and industrialisation through access to finance for undertaking productive manufacturing projects.

Beside the potential benefits of FDI through positive spill-over effects, critics of FDI flows contend that FDI is detrimental to the welfare of the local industrial sector through competition effects. Proponents of competition effects or risks hypothesis argue that the presence of foreign firms creates additional competition or heightens competition in the local industry which may lead to crowding out of infant domestic firms (Caves, 1974). The competition risk is strong toward domestic firms in the same industry as the foreign firms (Barrios, Görg & Strobl, 2005). Nevertheless, it is also argued that competition from foreign firms is good to the extent that it helps to stabilise prices of consumer goods and intermediate inputs (Waldkirch & Ofori, 2010). Another argument against FDI flows is that FDI projects worsen balance of payments through repatriation of profits (Ozturk, 2007; Gorg & Greenaway, 2004) because remittances by foreign firms pose foreign exchange risks through depreciation of local currencies. Akkemik (2009) and Akkemik (2014) underscore the importance of industrial policy for mitigating the competition risks from the entrance of foreign firms. Appropriate trade and industrial policies could be enacted and enforced to protect infant industries from the competition risks posed by multinational undertaking FDI projects in the local industry (Bjorvatn & Coniglio, 2012; Dobrinsky, 2009; Harrison & Rodríguez-Clare, 2009). Such policies may include requirement that limiting foreign firms in the production or distribution of certain consumer goods which form the backbone of the local industrial sectors; requiring foreign firms to partner with domestic firms; requiring foreign firms to employ workers from the workforce of host countries; encouraging foreign firms to share technology and knowledge with domestic firm; and finally regulating the scope of competition between foreign firms and the local firms. It is this context that government interventions and regulations are perceived to be important determinants of industrialisation (Gui-Diby & Renard, 2015). In spite of the criticisms against FDI inflows, several researchers

believe that the benefits from FDI inflows outweigh the downsides (Görg & Greenaway, 2004; Markusen & Venables, 1999) so FDI inflows serve as a catalyst for industrialisation.

Empirical evidence across the world remains inconclusive on FDI's benefits through forward and backward linkages in both horizontal and vertical industries. Barrios, Gorg & Strobl (2005) show that emergence of multinationals in the same industry as the local firms (horizontal industries) could have a negative impact on local firms at the initial stages, but at later stages, local firms may experience positive impacts when these firms are able to improve and adjust their absorptive capacities over time. Durham (2004) indicate that absorptive capacities serve as basis for domestic firms to benefit from foreign presence in the form of foreign direct invests and equity portfolio investments. For example, in a case study conducted in developing East Asia, Hobday (1995), found that intial FDI inflows created backward linkage effects which boosted demand for local firms supplying intermediate goods such as personal computers, computer keyboards, and sewing maching to multinational firms. However with time, the local industrial sector developed competitive advantage in the production and distribution of intermediate goods as well as final goods strong enough to offset the competition risks which the multinational firms posed to the local firms dealing in similar final goods domestic firms.

Marken & Venables (1999) agree with Hobday (1995), and postulates that multinationals are not necessarily detrimental to the local industry, and that it is possible for the local industry to develop through the entrance of multinationals, and grow much more rapidly to displace multinationals out of the market. A related study by Rodriquez-Clare (1996) based in Brazil, Chile and Venezuela finds that the entry of the multinationals created backward linkages but insignificant spill-over effects in the domestic economies. Rodriquez-Clare (1996) further noted that FDI impacts positively on the economy through labour employment and concludes that multinationals are disposed to using local inputs to create more jobs. Borensztein,

Gregorio, & Lee (1998) examined the impact of FDI on 69 countries over the period 1970 to 1989, and found that FDI inflows contribute to the transfer of technology to the domestic firms, and concludes that through this channel, FDI inflows contributes to the growth of domestic firms, and consequently growth in GDP. Thus in the presence of strong linkages and spill-over ties, FDI inflows to the manufacturing sector should contribute positively to the growth of local industry to promote industrialisation. In a nutshell, the theoretical and empirical literature suggests a positive effect of FDI inflows on industrialisation through forward and backward linkages in the manufacturing or industrial sectors of domestic firms as well as through the financial intermediation role of banks and the financial markets.

#### **2.4 FDI and Industrialisation**

Empirical research on FDI and industrialisation is quite few across the world. There is however a vast literature on FDI and economic growth (examples include: Gui-Diby, 2014; Asteriou, D., & Moudatsou, 2014; Tang, Selvanathan & Selvanathan, 2008; Jyun-Yi & Chih-Chiang, 2008; Buckley, Clegg & Wang, 2007; Asiedu, 2006; Li & Liu, 2005; Hermes & Lensink, 2003; Asiedu, 2002; De Mello, 1999; Borensztein, De Gregorio & Lee, 1998; De Mello, 1997; Balasubramanyam, Salisu, & Sapsford, 1996). Moreover existing studies on the impact of FDI and industrialisation produced mixed findings. While some studies found FDI to have positive effect on industrialisation (for example, Liu, 2002; Kang & Lee, 2011; Rowthorn & Ramaswamy, 1999; Markusen & Venables, 1999); others found FDI to have insignificant effect or negative effect on industrialisation (for example, Gorg, & Greenaway, 2004). These empirical findings are not far-fetched. Empirical evidence on the impact of FDI on economic growth has also reported mixed findings; FDI was found to either have positive effect, insignificant effect or negative on economic growth across various regions, samples, and statistical methods ( for example, Gui-Diby, 2014; Alfaro, Chanda, Kalemli-Ozcan, Sayek & Moudatsou, 2014; Alfaro 2003).

In a study based in China, Liu (2002) finds that FDI had a positive and significant impact on the value generated by manufacturing firms, thus FDI contributed positively toward industrialisation in the Chinese economy. In a related study based in Korea, Kang & Lee (2011) analysed the impact of FDI on the share of manufacturing employment in total employment, a variant measure of industrialisation, and found that while FDI inflows impact industrialisation positively, FDI outflows do impact industrialisation negatively. Rowthorn & Ramaswamy (1999) extended the debate further by including additional variables: they examined the relationship between Trade, Growth and industrialisation. The results from their study suggested that a positive trade balance and gross fixed capital formation (domestic investments) promote industrialisation using both the output share of the manufacturing sector to total output and the share of manufacturing employment to total employment as proxies for industrialisation. In essence trade and investments are significant determinants of industrialisation.

The study closest to the current research is that of Gui-Diby & Renard, 2015. Gui-Diby & Renard (2015) examined the FDI-industrialisation nexus 47 African countries and find that FDI inflows had an insignificant effect on Industrialisation. Kaya (2010) also observed that FDI inflows had insignificant or negative effects on industrialisation in developing countries, including Sub-Saharan Africa using multiple estimation techniques on an unbalanced panel of 64 developing countries across the world during the period 1980 to 2003. These findings on the FDI-industrialisation nexus in Africa and some developing countries deviate from the expectations of economic theory and also from the views of practitioners and advocates of FDI flows. Nonetheless, empirical evidence on the FDI-industrialisation nexus in other jurisdictions shows that FDI had positive effect on industrialisation [examples include Liu, 2002 and Liu, 2008 (China); Kang & Lee, 2011 (Korea); Rowthorn & Ramaswamy, 1999

(OECD countries)]. This study therefore set out to revisit the FDI-industrialisation nexus in Africa in order to provide further evidence on this relationship using a more recent dataset.

### **2.3.3 Civil Wars**

Sivard, (1991) defined civil wars as “armed conflict involving one or more governments and causing the death of 1000 or more people per year” Stockholm International Peace and Research Institute (1991) defines armed conflicts as “prolonged combat between the military forces of two or more governments or of one government and at least one organised group, involving the use of weapons and incurring battle-related deaths of at least 1,000 persons”. Collier, Hoeffler & Rhooner (2008) consider civil wars as organised military action in which 1,000 deaths resulted in a given year. The central theme from the definitions of civil war is on violence involving arms occurring within the same country or between countries which result in death of at least 1000 per year. Conflicts can be intra-state or inter-state (international) as well as along ethnic, racial or political routes (Buhaug & Gates, 2002; Mack, 2002). Intra-state conflicts refer to conflicts within a country that result in at least 1000 deaths per year. Inter-state conflicts refer to conflicts between countries that result in at least 1000 deaths per year.

Empirical evidence on conflicts shows that the effects of civil wars are destructive and pervasive. Civil wars affect families, the society, businesses, governments and the entire economy in adverse ways (Collier, 1999; Collier & Hoeffler, 2002; Bannon & Collier, 2003; Collier, Hoeffler & Soderbom, 2008; Le Billon, 2001; Brecke, 2001). Conflict results in the destruction of human capital, infrastructure, and generally slows down economic growth (Suliman & Mollick, 2009; Murdoch & Sandler, 2004; Alsan, Bloom, & Canning, 2006). Periods of civil wars are associated with wastage, corruption, loss of human capital, loss of financial resources and destruction of infrastructure (Eckhardt, 1991; Bannon & Collier, 2003). Because of the negative or destructive effects of conflicts, we hypothesise that the

conflict might have a negative effect on industrialisation. Table 2.1 and Table 2.2 show the schedule of conflict and non-conflict countries used in the study.

**Table 2.1 African Countries which experienced civil wars during the period 1980 to 2015 (Conflict Countries)**

<i>No.</i>	<i>Country</i>	<i>Duration</i>	<i>Data Source</i>
1	<i>Algeria</i>	<i>1991-2004</i>	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008</i>
2	<i>Angola</i>	<i>1980-1994; 1988-2001</i>	<i>Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008</i>
3	<i>Burundi</i>	<i>1988; 1991-2005</i>	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008</i>
4	<i>Central African Republic</i>	<i>1988-2003; 2006-2015</i>	<i>Center for Systemic Peace, 2016; UN Mission (MINURCAT)</i>
5	<i>Chad</i>	<i>1980-1988; 1990; 2005-2010</i>	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008</i>
6	<i>Congo, Rep.</i>	<i>1993; 1997-1999; 2002</i>	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008</i>
7	<i>Congo, Dem. Rep.</i>	<i>1993; 1996-2015</i>	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008; CIA World Factbook</i>
8	<i>Cote d'Ivoire</i>	<i>2000-2005; 2010-2011</i>	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008; CIA World Factbook</i>
9	<i>Djibouti</i>	<i>1991-1994</i>	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008</i>
10	<i>Eritrea</i>	<i>1998-2000</i>	<i>Center for Systemic Peace, 2016; UN Mission (UNMEE), CIA World Factbook</i>
11	<i>Ethiopia</i>	<i>1998-2000;</i>	<i>Center for Systemic Peace, 2016; UN Mission</i>

		2007-2015	(UNMEE), CIA World Factbook
12	Ghana	1981; 1993	Center for Systemic Peace, 2016
13	Guinea-Bissau	1998-1999	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008
14	Guinea	2000-2001	Center for Systemic Peace, 2016
15	Kenya	2006-2008	Center for Systemic Peace, 2016
16	Libya	2011; 2014-2015	Center for Systemic Peace, 2016
17	Liberia	1985; 1989- 1997; 2000-2003	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008
18	Mali	1990- 1995; 2012-2015	Center for Systemic Peace, 2016
19	Mozambique	1980-1992	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008
20	Niger	1990-1997	Center for Systemic Peace, 2016
21	Nigeria	1980- 1993; 1997-2015	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008
22	Rwanda	1990- 2003; 2009	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008; CIA World Factbook
23	Senegal	1992-1999	Center for Systemic Peace, 2016
24	Sierra Leone	1991-2003	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008
25	South Africa	1983-1995	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2009
26	Sudan	1983- 1992; 1995-2004	Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008

27	<i>Uganda</i>	1980-1988; 1996-2006	<i>Center for Systemic Peace, 2016; Collier, Hoeffler and Rohner, 2008; Collier, Hoeffler and Soderbom, 2008</i>
28	<i>Zimbabwe</i>	1981-1987	<i>Center for Systemic Peace, 2016</i>

**Table 2.2 African Countries which did not experience civil wars during the period 1980 to 2015 (Non-Conflict Countries)**

<b>No.</b>	<b>Country</b>
1	<i>Benin</i>
2	<i>Botswana</i>
3	<i>Burkina Faso</i>
4	<i>Cabo Verde</i>
5	<i>Cameroon</i>
6	<i>Comoros</i>
7	<i>Equatorial Guinea</i>
8	<i>Gabon</i>
9	<i>Lesotho</i>
10	<i>Malawi</i>
11	<i>Madagascar</i>
12	<i>Mauritania</i>
13	<i>Mauritius</i>
14	<i>Namibia</i>
15	<i>Seychelles</i>
16	<i>Swaziland</i>
17	<i>Tanzania</i>
18	<i>Togo</i>
19	<i>Tunisia</i>
20	<i>Zambia</i>

*Source: List compiled by the authors from conflicts data obtained from relevant*

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*sources such as Center for Systemic Peace, Collier, Hoeffler and Rohner, 2008; and Collier, Hoeffler and Soderbom, 2008*

### **2.3.4 Conflicts in African countries during the period 1980 to 2015**

Over the past three decades, the African region experienced numerous incidences of civil wars which occurred at various degrees and varying durations, and plagued affected countries with severe adverse consequences (Monty, 2016; Elbadawi & Sambanis, 2000; Gleditsch, Peter, Mikael, Margareta & Håvard, 2002; Singer & Small, 1994; Collier, 1999; Bannon & Collier, 2003; Fearon, 2004). Out of forty-eight (48) African countries used in this study, twenty-eight (28) countries, representing 58.33% of the full sample had experienced at least an incidence of civil war during the period 1980 to 2015 while only 32.5% twenty (20) countries did not experience civil wars over the same period. Thus the *conflict countries* formed the majority of the full sample, being 41.67% [seven (8)] more than the *non-conflict countries*. We consider the proportion of active civil wars prevalent within the African region by sub-periods to have a fair view of the distribution of conflicts within the region over the past three decades. Out of a total of 28 *conflict countries*, within the period 1980 to 2015, 42.86% of the *conflict countries* [twelve (12)] were involved in active civil wars during the period 1980 to 1989. 82.14% of the *conflict countries* [twenty-three (23)] were involved in active civil wars during the period 1990 to 1999, indicating that the rate of civil violence in Africa increased by about 91.65% by the second decade.

Indeed, the period 1980 to 1999 marked a period of major political unrests in several African countries arising from electoral violence, ethnic clashes, coup d'états and organised military attacks, a period when several African countries were striving to gain political independence and to stabilize their economies (Collier, 1999; Collier & Hoeffler, 1998; Collier & Hoeffler, 2002; Collier, Hoeffler & Rohner, 2009; Allansson, Erik & Lotta, 2017). 64.29% of the *conflict countries* [eighteen (18)] were involved in active civil wars or violent conflicts within

the period 2000 to 2009. Thus the rate of violent conflicts or active civil wars within the African region had declined by 27.36% from the second decade to the third (from 1990-1999 to 2000-2009). During the period 2010 to 2015, 28.57% of the conflict countries [eight (8)] were still in active violent conflicts or civil wars. The incidence of civil wars over the past three decades slowed down economic growth in affected countries (Murdoch & Sandler, 2004; Nafziger, & Auvinen, 2002). We believe the incidence of conflicts also affected industrialisation, and essence of this paper is to empirically access this assertion.

#### **2.4 Chapter Summary**

This chapter presented the theoretical and empirical review of relevant literature. The theoretical review considered definition of FDI: this study uses the IMF definition of FDI. The concepts of industrialisation and de-industrialisation were explained. In addition, we considered the conceptual frameworks for industrialisation, FDI and civil war, highlighting the inverted-U hypothesis in industrialisation, the electric paradigm in FDI, the linkage effects and competition effects associated with multinational entry as well as greed, grievances and feasibility as predictors of civil wars. The final subsection considered a review of empirical literature covering the effect of FDI on industrialisation, whether FDI is indeed a blessing or curse to the local industry, and linkages, spill-overs and completion risks from FDI inflows.

## **CHAPTER THREE: DATA AND METHODOLOGY**

### **3.1 Introduction**

This chapter discusses the methodological approaches adopted to carry out the study. It outlines the population and the sample, data, econometric model specification, the data analysis approach and estimation techniques.

### **3.2 Research Design**

This study adopts the quantitative approach. The quantitative approach is useful when the research makes use of numerical data. Yauch & Stendel (2003) explain that the quantitative research design follow rigorous systematic processes to answer research questions and ensure findings are objective, and could be generalised.

### **3.3 Study Population and Sample**

The study population comprises all African countries (54). Within the time period understudy, 1980 to 2015, some countries do not have sufficient data points on certain key variables. Hence it became necessary to make use of the countries with sufficient data points that would guarantee reliable results. The only criteria for including selecting countries for the sample is having reasonably sufficient data points for all relevant variables to be used in the study. Hence those countries which too many missing values for key variables were dropped. Given these considerations, the study considered a sample of 48 African countries across the period 1980 to 2015. This sample constitutes 88.89% of the population, and it is clearly representative of the population.

### **3.4 Conflict Data**

This study set out to examine the effect of conflicts and FDI on industrialisation in Africa. Collier, Hoeffler & Rhooner (2008) define conflict (civil war) as military combat within a state that resulted in 1000 battle-related deaths per year. Civil wars occur within a given

country or state. The conflict data was obtained from multiple sources such as the Center for Systemic Peace (2016); Collier, Hoeffler & Rhooner (2008); Collier, Hoeffler & Soderbom (2008), CIA World Factbook & UN Mission (MINURCAT and UNMEE). The data comprise the African countries which have experienced civil war, including ethnic or political violence which resulted in at least 1000 deaths per year during the period 1980 to 2015. The countries were categorised into conflict and non-conflict countries. The countries which did not experience conflicts (civil wars) during 1980 to 2015 (*non-conflict countries*) are coded one (1) while the countries which experienced civil wars during the same period (*conflict countries*) are coded zero (0). From the data compiled, the *conflict countries* are twenty-eight (28), while the *non-conflict countries* are twenty (20). Table 2.1 presents the *conflict countries* and Table 2.2 presents the *non-conflict countries*.

### 3.5 Empirical Model Specification

The econometric model was adapted from Gui-Diby & Renard (2015) following a panel data model. Panel data models are useful when a dataset has both cross-section and time dimensions (Wooldridge, 2013). Below is the general form of the panel data model:

$$Y_{it} = \alpha_i + \gamma_t + \beta X_{it} + \varepsilon_{it} \dots \dots \dots (1)$$

Where: the subscript *i* represents the cross sectional dimension (entities observed-in this case countries),  $i=1 \dots N$ . Subscript *t* represents the time series dimension (time),  $t=1 \dots T$ ;

*Y<sub>it</sub>* denotes the dependent variable.

$\alpha_i$  is a scalar, constant term for all periods (*t*) and country specific effect (*i*).

$\gamma_t$  is the time fixed effect.

$\beta$  is a  $k \times 1$  vector of parameters to be estimated on the independent variables.

$X_{it}$  is a  $1 \times k$  vector of observations on the independent variables

$\varepsilon_{it}$  is the error term.

Below is the specification of the model for the study (adapted from Gui-Diby & Renard 2015)

$$Indust_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 NonConflict_i + \beta_3 FDI_{it} NonConflict_i + \beta_4 INV_{it} + \beta_5 IntTrade_{it} + \beta_6 Agric_{it} + \beta_7 Service_{it} + \beta_8 lnGDPCAP_{sqit} + \beta_9 Finsector_{it} + \beta_{Rulelaw}_{it} + U_{it} \dots \dots \dots (1)$$

$\beta_0$  denotes the constant terms in equations (1)  $U_{it}$  represents the error term.  $U_{it}$  is however decomposed into  $u_i + v_t + e_{it}$  where  $v_t$  denote the term for time-specific effect;  $u_i$  denotes the term for country-specific effect, and  $e_{it}$  is the idiosyncratic term. The dependent and independent variables are explained in the next sections.

### 3.6 Definition of Variables and Data Sources

This section identifies the dependent variable and independent variables (variables of interest and controls). It indicates the sources from which data on the variables were obtained, and the expected relationship between the independent variables and the dependent variable based on the theoretical and empirical review.

#### 3.6.1 Dependent Variable

$Indust_{it}$  denotes the level of industrialisation in country  $i$  for period  $t$ .  $Indust_{it}$ , the dependent variable is proxied by the value added of the manufacturing sector as a percentage of GDP at 2005 constant US dollars. This variable is measured in constant prices drawing precedence from Gui-Diby & Renard, 2015. Given the aim of the study, to verify the status-quo in the FDI-industrialisation nexus, it is important to align variable measurements to the measures used in the previous studies. Data on share of manufacturing value-added to total output is accessed from the World Development Indicators published by the World Bank. The data was originally extracted from the World Bank national accounts data, and OECD's national

accounts data files. UNIDO (2013) defines industrialisation as the increase in the value added of the manufacturing sector. The industrialisation processes centre on expanding the capacity and productivity the manufacturing sector to spur structural transformation. The literature postulates two measures for industrialisation:

*1) the value added of manufacturing to GDP (Gui-Diby & Renard, 2015; Kaya, 2010; Kang & Lee, 1999).*

*(2) the share of manufacturing employment in total employment (Gui-Diby & Renard, 2015; Kaya, 2010; Kang & Lee, 2011; Rowthorn & Ramaswamy, 1999).*

This study used the first measure, the value added of manufacturing to GDP as a proxy for industrialisation. Access to data on the share of manufacturing employment in total employment would have aided in supplementing findings from the first measure, however to data availability issues, only the first measure is used. This notwithstanding, most studies used only one measure at a time (Gui-Diby & Renard, 2015; Kang & Lee, 2011).

### **3.6.2 Independent Variables (Variables of Interest)**

The independent variables of interest are those independent variables central to the theme or purpose of the study. FDI net inflows, the conflict variable and the interaction of FDI and Conflict represent the independent variables of interest for this study. These variables have been selected based on purpose of the study, giving regard to existing literature and empirical models used by researchers in the area of research.

#### **3.6.2.1 Foreign Direct Investment Net Inflows (FDI net inflows or simply FDI)**

$FDI_{it}$  represents the net inflows of Foreign Direct Investment as a percentage of GDP at current prices for country  $i$  in period  $t$ , following the conventional measure of FDI in the literature (Kaya, 2010; Gui-Diby & Renard, 2015, Kang & Lee, 2011).  $\beta_1$  is the coefficient of the variable  $FDI_{it}$ . Data on FDI net inflows is obtained from the International Monetary Fund,

International Financial Statistics and Balance of Payments databases, World Bank, International Debt Statistics, and World Bank and OECD GDP estimates. FDI is expected to have a positive association with Industrialisation (Kang & Lee, 2011, Markusen & Venables, 1999) because through strong linkages and spill-over effects, FDI promote growth of the local industrial sector. FDI inflows to the manufacturing sector are likely to boost industrialisation.

### 3.6.2.2 Conflict Variable

*NonConflict<sub>i</sub>* is a dummy variable which captures conflict status of African countries. It takes the value of 1 if a country has not experienced conflicts during the period 1980 to 2015 and zero (0) otherwise. Countries which have not experienced civil wars during the study period are classified ‘*non-conflict countries*’ and those countries which experienced civil wars during the same period are classified ‘*conflict countries*’. Again with the dummy variable approach, the conflict effects could be captured with *respect to the actual periods of conflicts*. In this case, we have ‘*non-conflict periods*’ representing the years in which civil wars did not occur and ‘*conflict-periods*’ representing the years in which civil wars occurred for any given country, during the period understudy.

From the conflict data compiled, there have been significant discrepancies on the ‘*specific duration of conflicts*’ or the ‘*actual periods of conflicts*’ across the various sources. The various sources identified the countries which experienced conflicts during the period under study; however, there has not been a great deal of consensus among these sources on the ‘*specific duration of the conflicts*’. The study therefore defines the conflict variable (*non-conflict countries*) in terms of those countries which did not experience civil wars (at all) during the period under study, given the conventional definition of conflicts or civil wars (Collier, Hoeffler & Rhooner, 2008; Collier, Hoeffler & Rhooner, 2009). Those countries which experienced civil wars, regardless of the duration, were classified as ‘*conflict-countries*’. Consequently, the conflict dummy variable captures one (1) for the ‘*non-conflict*

*countries*', and zero (0) for the '*conflict countries*'. The study could not precisely account for the specific years of conflicts; that is '*conflict periods*' and '*non-conflict periods*', due to the reasons enunciated above.

Another approach to account for the effect of conflicts could be to divide the full sample into two sub-samples; where sub-sample one captures the countries affected by conflicts and sub-sample two captures the countries not affected by conflicts. Then the regression analyses and statistical tests would be performed on each sub-sample separately. The weakness of this approach is that it reduces the number of observations, unlike the dummy variable approach.

Data on conflicts have been extracted from various sources including Collier, Hoeffler & Rhooner (2009); Collier, Hoeffler & Soderbom (2008); Center for Systemic Peace (2016);  $\beta_2$  represent the coefficient of the variable *NonConflict<sub>it</sub>*. From the literature review, industrialisation is expected to be higher in non-conflict countries than in conflict countries.

### **3.6.2.3 Interaction of FDI and Conflict Variable**

*FDIxNonConflict<sub>it</sub>* is the interactive term considering the joint effect on conflict and FDI on industrialisation. It was included in the model to examine whether the variable conflict play a significant role in the relationship between industrialisation and FDI in Africa. Again from the literature review, a positive relationship is expected between the interactive term and industrialisation. FDI is expected to have a positive effect on industrialisation in the non-conflict countries because they have absorptive capacity to help them benefit from FDI inflows.

### **3.6.3 Independent Variables (Controls)**

The control variables are those independent variables, beside the variables of interest which also significantly explain the dependent variable, which when included in the model improves the completeness and validity of the model. Excluding relevant controls from the model

results in an error termed ‘omitted variable bias’. The study therefore controlled for relevant independent variables based on extant literature such as Gui-Diby & Renard, 2011, Kang & Lee, 2011; and Rowthorn & Ramaswamy, 1999. These control variables are per capita income (Household income), square of per capita income, investments (fixed capital), agriculture value-added, Services valued-added, Trade Openness, Financial Sector depth or size.

### **3.6.3.1 Per Capita Income (Household Income)**

$\ln GDPCAP_{it}$  represents the natural log of GDP per capita, a measure of household income and market size of each country  $i$  at time period  $t$ .  $\ln GDPCAP_{it}$  is expected to impact positively on industrialisation since growth in household income and market size can promote industrialisation (Gui-Diby & Renard, 2015; Kaya, 2010, Kang & Lee, 2011). As per capita income rises, households tend to demand more of manufactured and processed/value added products than unprocessed goods (Kang & Lee, 2011). Data on  $\ln GDPCAP_{it}$  was obtained from the World Development Indicators/Africa Development Indicators.  $\beta_4$  represents the coefficient of the variable  $\ln GDPCAP_{it}$ .

### **3.6.3.2 Per Capita Income Squared**

The square of per capita income,  $\ln GDPCAPsq_{it}$  is expected to impact negatively with the dependent variable (Kaya, 2010; Kang & Lee, 2011). The essence of including the squared term is to confirm the inverted U-hypothesis that beyond a certain level increase in per-capita income leads to decline in industrialisation (Clark 1957, Kang & Lee, 2011).

### **3.6.3.3 Domestic Investments (Fixed Capital)**

$INV_{it}$  represents the Gross Fixed Capital Formation, a proxy for domestic investments in country  $i$  at time period  $t$ .  $\beta_5$  is the coefficient of the variable  $INV_{it}$ . Domestic investment is expected to impact positively on industrialisation (Kang & Lee, 2011). Countries with large

capital stocks (domestic investments) are more likely to channel domestic investments to the manufacturing sector to spur industrialisation. Kaya (2010) found that domestic investment enhances the industrialisation of developing countries. Data on  $INV_{it}$  is obtained from the World Development Indicators and African Development Indicators.

#### **3.6.3.4 Agriculture Productivity**

$AGRIC_{it}$  denotes the value added of the agriculture in total output for country  $i$  at time period  $t$ . The value added of the manufacturing sector which proxy industrialisation is affected by the importance placed on other sectors of the economy such as the agriculture sector, hence the study controlled for agriculture. A negative relationship is expected with the dependent variable because promoting growth of the agriculture sector, imply that more resources are diverted toward agriculture, and ceteris paribus, fewer resources would be directed to the manufacturing or industrial sector. Gui-Diby & Renard (2015) noted that channelling investments into non-manufacturing sectors might not promote industrialisation, because the bedrock of industrialisation is the manufacturing and industrial sectors. Data on share of agriculture value-added in total output was obtained from the World Development Indicators (WDI). The original data source for this data is the World Bank national accounts data, and OECD national accounts data files.

#### **3.6.3.5 Manufacturing Trade Openness**

$IntTrade_{it}$  denotes openness to trade in manufacturing goods and services in country  $i$  at time period  $t$ . It is constructed as manufactures exports and manufactures imports divided by GDP. Studies such as Kaya (2010) and Rowthorn & Ramaswamy (1999) noted that international trade is an important variable in explaining differences in manufacturing share in total output or total employment (see also Trindade, 2005). It is not uncommon to find studies which account for the role of international trade by employing imports and exports as distinct independent variables. The belief is that it is easier to identify the unique effects of exports

and imports in the model. However, trade openness, which is a composite measure, captures the net effect of the trade variables on the dependent variable (Kang & Lee, 2011). Kaya (2010) found a positive significant effect of exports on manufacturing employment. Kang & Lee (2011) observed that imports and exports (indicative of the openness of the manufacturing industry) had negative effects on industrialisation in Korea. Data on manufactures exports and imports was obtained from United Nations Statistics Division.

### **3.6.3.6 Financial Sector (size)**

$FinSector_{it}$  denotes broad money supply (M2) as a percentage of GDP. It was used as a proxy for the size of the financial sector or financial depth.  $\beta_{10}$  is the coefficient of the variable  $FinSector_{it}$ .  $FinSector_{it}$  is expected to relate positively with the dependent variable. Extant literature emphasise on the significant role financial sectors play in industrialisation across the world (Gui-Diby & Renard, 2015).

### **3.6.3.7 Service Sector Productivity**

$Service_{it}$  represents the value-added of the services sector as a share of GDP.  $B_7$  represents the coefficient of the variable  $Service_{it}$ . This variable was included in the model following previous studies which found service sector productivity as an important determinant of industrialisation. Kaya (2010) proposed that the service sector could be important in economic development, hence its effects should be examined in studies on economic development and related areas such as industrialisation. Kang & Lee, 2011, found that the productivity of the service sector had a significant effect (negative) in the industrialisation model. Data on share of services value-added in total output was obtained from the World Development Indicators (WDI). The original data source for this data is the World Bank national accounts data, and OECD national accounts data files.

### **3.6.3.8 Rule of Law (Regulation)**

$Rulelaw_{it}$  is a proxy capturing regulation and government intervention. Gui-Diby & Renard (2015) proposed that the role of regulation and government interventions should be controlled for in the models for industrialisation. Data on this variable is obtained from the civil rights category of the freedom house dataset published. We expect positive relationship between regulation and industrialisation. Governments and regulatory institutions could take policy stance and create an enabling environment to drive industrialisation. Our prior expectation is that effective government interventions and regulations should have a positive effect on industrialisation.

### **3.7 Data Analysis Approach**

The primary aim of the study was to examine the FDI-industrialisation nexus, and to examine the role of conflicts in explaining this relationship. The data was analysed with the Stata Software, and the Microsoft office excel package. There was need to perform the regression analysis without the conflict variable as a way of providing evidence on existing studies. Next, the regressions were run with the conflict variable and interaction term inclusive to account for the effects of conflicts in the base industrialisation model. To check the model for robustness, control variables suggested in literature as relevant for explaining industrialisation were included in a stepwise manner to identify their marginal effect in the models estimated. The complete model was then subject to robustness checks across multiple estimation techniques.

### **3.8 Comparison of Estimation Techniques**

This section explores various estimation approaches and techniques, examining the assumptions underlying these techniques, their strengths, weaknesses and application in line with modern research methods. With panel or cross-sectional time-series data, the commonly estimated models are the fixed effects (FE), random effects (RE), pooled OLS or population-

average techniques. The feasible generalised least squares (FGLS) and the Prais-Winsten techniques are also techniques developed to handle panel data which do not meet certain OLS assumptions. The issue of which model is most appropriate for a given study depends on the characteristics of the dataset, given the descriptive statistics and diagnostic tests. This subsection briefly discusses these possible estimation techniques in light of their strengths, weaknesses, and relevant application.

### **3.8.1 Random Effects (FE) Models or Estimators**

Random-effects models for panel data treats the panel-specific errors as uncorrelated random variables drawn from a population with zero mean and constant variance. In order for the parameter estimates from the random effects model to be consistent, the explanatory variables must have no correlation with the unobserved variables or random effects. The random-effects model is so-called because the unobserved variables or panel-specific errors are assumed to have random effects on the parameter estimates from the model since all the unobserved variables are statistically independent of all the observed variables. Hence the RE is best applicable when it is believed that the explanatory variables in the model are uncorrelated with unobserved variables (Gujarati & Porter, 2009). Under these circumstances, the RE is able to produce unbiased estimates of the coefficients of the explanatory variables and also smaller standard errors than the FE model (Wooldridge, 2013). The RE model is suitable for estimating effects of time invariant variables or dummy variables.

### **3.8.2 Fixed Effects (FE) Models or Estimators**

The fixed-effects model is a model for panel data in which the panel-specific errors are treated as fixed parameters. The linear fixed effects estimator is consistent, even if the explanatory variables are correlated with the panel-specific errors or fixed effects, unlike in the random-effects estimator. Fixed Effects (FE) models assume that unobserved variables are correlated with the observed variables. FE models provide a means for controlling for

omitted variable bias, because the effects of omitted variables are assumed to be fixed or constant (Kaya, 2010). In such case, the omitted variables should have time-invariant values with time invariant effects. FE models are not appropriate for estimating the effects of time-invariant variables (Beck & Katz, 1995). What the FE model does is to control for time-invariant variables with time-invariant effects (Brooks, 2008).

### **3.8.3 The Pooled OLS or Population-averaged estimation technique**

Pooled data refers to a dataset having a time-series of cross-sections, where the observations in each cross section do not necessarily refer to the same unit; unlike panel data where the *same* cross sectional units are observed at across a time series (Wooldridge, 2013). The pooled OLS estimator ignores the panel features of the dataset, and considers observations in the dataset as though they were purely cross sectional (Long & Ervin, 1998). The pooled OLS model is also called a population averaged model because the parameters measure the effects of the observed variables on the dependent variable for the average unit within the population. The pooled estimator treats the panel-specific errors as uncorrelated random variables drawn from a population with zero mean and constant variance (Greene, 2012). The Pooled OLS estimator requires the assumption of no autocorrelations of errors (Wooldridge, 2013).

### **3.8.4 The Feasible Generalised Least Square Estimation Technique (FGLS)**

The FGLS is generalised least square estimator used to estimate panel data which do not certain assumptions of the OLS estimator such as '*no-autocorrelation*' and homoscedasticity or constant variance of errors. The FGLS handles panel data estimations in the presence of autocorrelation and heteroscedasticity issues (Greene, 2012, Pirotte, 2011, and Gui-Diby & Renard, 2015); in these circumstances, FGLS is superior to the OLS, FE and RE models. The FGLS is able to produce consistent and asymptotically efficient estimates, and robust standard errors that overcome the problem of heteroscedasticity, if the pattern of heroscedasticity is known (Long & Ervin, 1998). With data that has issues of heteroscedasticity and

autocorrelation, the fixed effects and random effects do not produce reliable and efficient estimates (Greene, 2012; Pirotte, 2011).

### **3.8.5 The Prais-Winsten Estimation Technique**

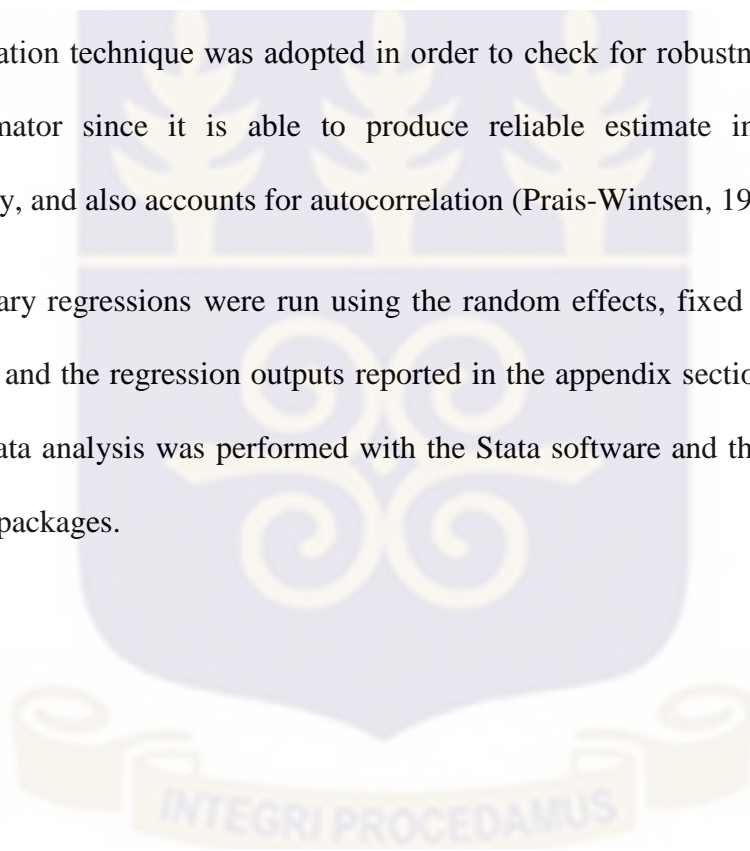
The Prais-Winsten estimation technique is also a type of Generalised Least Squares (GLS) estimator, similar to the FGLS estimator. Generalised Least Squares estimators do not require the OLS assumptions such as homoscedasticity and '*no-autocorrelation*'. The Prais-Winsten estimator, like the FGLS, is suitable for panels with are heteroscedastic and auto-correlated errors as well as panels with only heteroscedastic errors (Prais-Winsten, 1954). The Prais-Winsten estimator was employed to check for the robustness of results from the FGLS estimator. The Prais-Winsten's estimator reports standard errors which are corrected for heteroscedasticity. Prais-Winsten's estimator also accounts for the first-order autocorrelation in panel data. Compared with the fixed effects and random effects estimators, in the presence of autocorrelation and heteroscedasticity, the prais-winsten's estimator produce efficient results (Prais-Winsten, 1954).

### **3.9 Chapter Summary**

This chapter explored the methodological approaches used to conduct the study. The research adopted a quantitative approach. The study population is all African countries, and a sample of 48 countries was used due to issues of data availability. The econometric model was specified as a panel data model following the panel structure of the dataset; it had both cross-section and time-dimensions. The dependent and independent variables were selected and measured following industrialisation models used in previous studies (such as Gui-diby & Renard, 2015; Kang & Lee, 2011; and Kaya, 2010). The chapter also discussed the data analysis approach and various estimation approaches and techniques relevant for panel data, examining their basic assumptions, strengths, weaknesses and relevant application.

Given the characteristics of the dataset, certain assumptions required for OLS techniques were violated, specifically the assumptions of constant variance of errors (homoscedasticity) and absence of correlations between errors and regressors (no autocorrelations or no serial correlation)- the section on diagnostics tests in chapter four provides further details. Consequently the estimators requiring these assumptions may not produce reliable results, for instance, the OLS estimator, and random effects, and fixed effect estimation techniques (Greene 2011). Therefore the study proceeded to use the FGLS estimator and the Prais Wintsen's estimators as the main estimation techniques for the regression analysis. The Prais-Wintsen's estimation technique was adopted in order to check for robustness of results from the FGLS estimator since it is able to produce reliable estimate in the presence of heteroscedasticity, and also accounts for autocorrelation (Prais-Wintsen, 1954).

However, auxiliary regressions were run using the random effects, fixed effects and pooled OLS estimators, and the regression outputs reported in the appendix section, for comparative purposes. The data analysis was performed with the Stata software and the Microsoft Office Excel statistical packages.



## **CHAPTER FOUR: RESULTS AND DISCUSSION OF FINDINGS**

### **4.1 Introduction**

In this chapter, the results of the empirical estimations are presented, analysed and discussed. From the descriptive statistics and graphs, we present some stylised facts about the African region, conflict and non-conflict countries in relation to key economic and financial indicators (relevant to the study) over the period of 1980 to 2015. The results of the correlation analysis and diagnostic tests such as tests for normality, multicollinearity, autocorrelation and heteroscedasticity are presented and discussed as well as results of the regression analysis.

### **4.2 Descriptive Statistics**

Descriptive statistics give an overview of the dataset on which the data analysis is performed. It covers the number of observations for each variable (excluding missing values), the average or arithmetic mean, the standard deviation (a measure of the volatility or variation around the mean), the minimum and maximum values which give an indication of the range for the values of a given variable. The descriptive statistics are provided for conflict countries and non-conflict countries separately to allow for comparison of the two sub-samples. This comparison is important because one of the basic motivations for testing for the effects of conflicts was based on the belief that conflict and non-conflict countries are not homogenous units; they vary significantly along major economic and financial indicators. Table 4.1 presents the descriptive statistics for the conflict countries whiles Table 4.2 presents that for the non-conflict countries. The values in percentages were transformed into decimals.

**Table 4.1 Descriptive Statistics (Conflict Countries)**

<i>Variable</i>	<i>Observations</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min.</i>	<i>Max.</i>
<i>Indust</i>	773	.0961615	.0513319	.0023706	.2953704
<i>FDI</i>	903	.0329461	.0921709	-.828921	.8947596
<i>lnGDPcp</i>	709	7.512018	.882551	5.508054	10.28102
<i>lnGDPcpsq</i>	709	57.20821	13.90314	30.33866	105.6994
<i>IntTrade</i>	501	.7885254	.1846882	.3121434	1.531859
<i>Inv</i>	883	.1738363	.0857507	-.0242436	.597324
<i>Agric</i>	878	.312431	.1578844	.0186516	.7202926
<i>Service</i>	874	.4354652	.1189872	.1287196	.8225964
<i>finsector</i>	904	.2931418	.2291117	.002673	1.51549
<i>Rulelaw</i>	995	5.304523	1.569557	1	7
<i>Note. The variation in number of observations is due to the effect missing values in some variables.</i>					

**Table 4.2 Descriptive Statistics (Non-Conflict Countries)**

<i>Variables</i>	<i>Observations</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>Indust</i>	629	.131238	.0752026	.0036408	.394649
<i>FDI</i>	692	.0393028	.0925509	-.0858943	1.618237
<i>lnGDPcp</i>	519	8.214411	1.039325	6.574254	10.8325
<i>lnGDPcpsq</i>	519	68.55466	17.63553	43.22082	117.3431
<i>IntTrade</i>	434	.9331392	.3257487	.3595287	1.641686

<i>Inv</i>	609	.2606924	.2110747	.0791809	2.190694
<i>Agric</i>	660	.2067186	.1308008	.00892	.5002372
<i>Service</i>	660	.507276	.1118197	.1482502	.798896
<i>finsector</i>	675	.3319203	.2026075	.057355	1.10769
<i>Rulelaw</i>	711	4.448664	1.952923	1	7
<i>Note: Variations in number of observations is due to the effect of missing values in some variables.</i>					

### 4.3 Inferences from Descriptive Statistics (Stylised Facts)

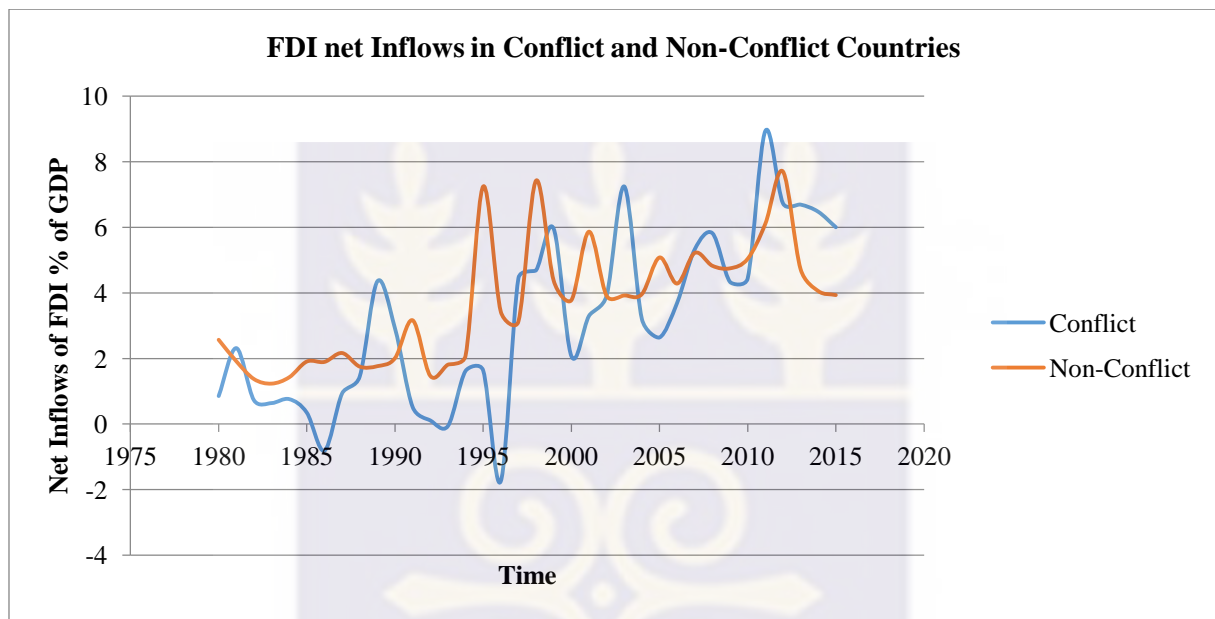
Stylised facts are simple factual inferences which we can make from a given dataset, without necessarily performing rigorous statistical and econometric tests. From the descriptive statistics above and graphs below, stylised facts about the conflict and non-conflict countries in the African region are discussed based on variables or indicators relevant to the study.

#### 4.3.1 FDI net inflows in Conflict and Non-Conflict Countries

Over the period 1980 to 2015, the average net inflows of FDI to conflict countries was 3.29% of GDP with standard deviation of 9.22% while that to non-conflict countries was 3.93% with standard deviation of 9.26%. For the full sample (47 African countries), the average was 3.68% over the same period. Non-conflict countries received 0.64% more in FDI net inflows than the conflict countries. This marginal increase may be attributed to the fact that investors consider the relative peace in non-conflict countries and invest more in these countries than the conflict countries with the expectation of good returns. From Figure 4.1, the net inflows of FDI to both conflict and non-countries appear equally volatile; however, Tables 4.1 and 4.2 show distinctly that the standard deviation of the net inflows of FDI to the conflict countries is 9.22% while that for the non-conflict countries is 9.26%. Thus net FDI inflows to the non-

conflict countries is relatively unstable than in the conflict countries. On average, both conflict and non-conflict countries received similar proportions of FDI net inflows during the period 1980 to 2015.

**Figure 4.1 Comparison of FDI net inflows in Conflict and Non-Conflict Countries (1980 to 2015)**



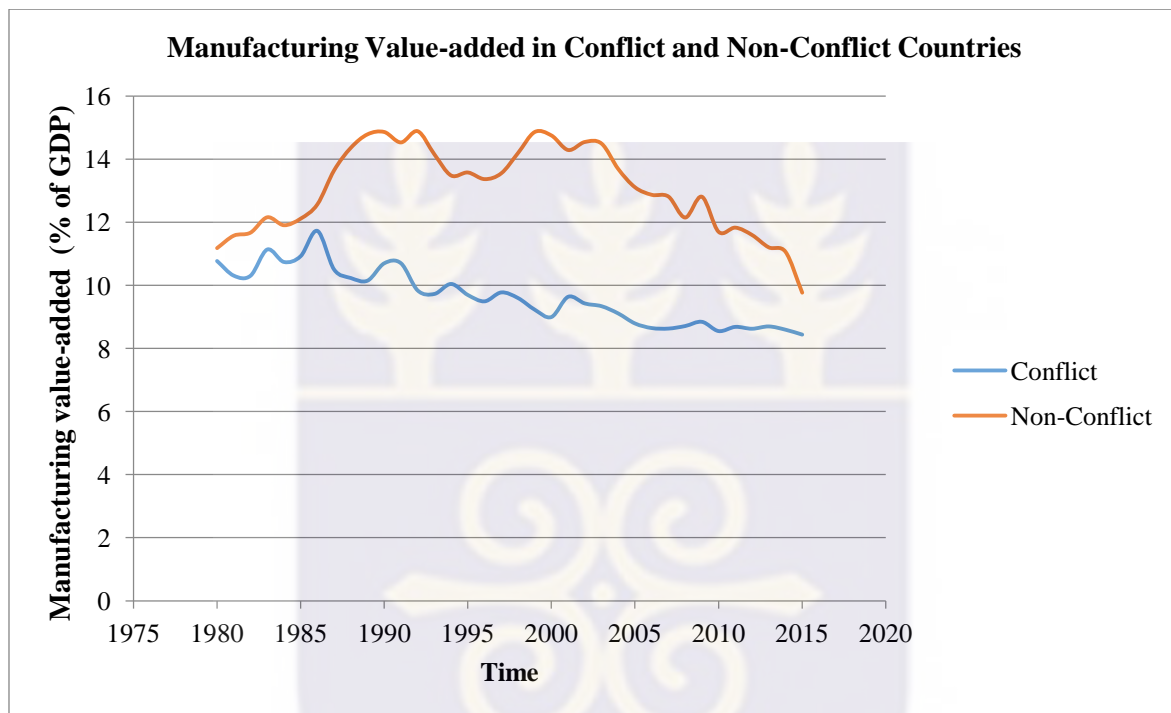
*Source: Author's computation using data obtained from the World Development Indicators provided by the World Bank*

#### **4.3.2 Manufacturing Valued Added in Conflict and Non-Conflict Countries**

Over the period 1980 to 2015, for the conflict countries, the average valued added of manufacturing to total output (*indust*) was 9.62% with standard deviation of 5.13% while non-conflict recorded 13.13% over the same period with standard deviation of 7.52%. The average for the 47 African countries over the same period was 11.73%. Figure 4.2 also show that over the entire period, conflict countries recorded lower value-added from manufacturing (3.51% less) than the non-conflict countries. In clearer terms, over the period, conflict countries experience lower level of industrialisation than the non-conflict countries. This might be a

reflection of the destructive effects conflicts (civil war) have on countries that engage in it. The effects of a war could be enduring into the long term (Coffler, Hoefler & Soderbom, 2008).

**Figure 4.2 Comparison of Evolution of Manufacturing Valued Added in Conflict and Non-Conflict Countries (1980 to 2015)**



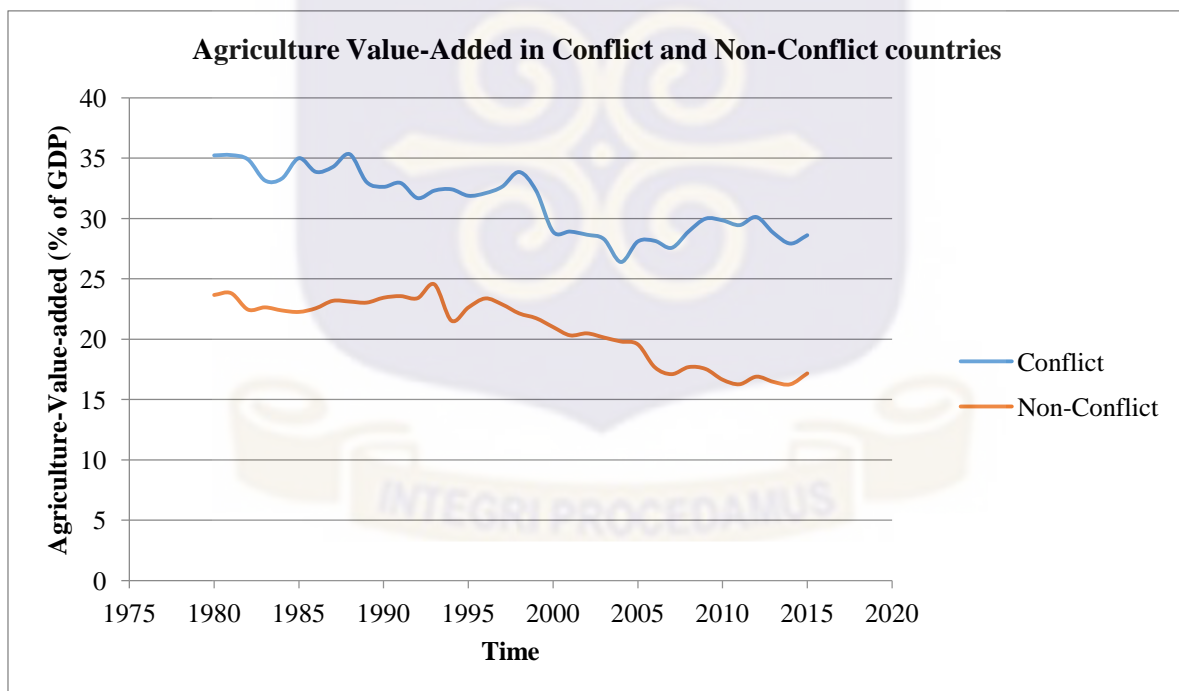
*Source: Author's computation using data obtained from the World Development Indicators provided by the World Bank*

### 4.3.3 Agriculture Valued-Added in Conflict and Non-Conflict Countries

The contribution of agriculture is considered because agriculture is one of the major sectors in Africa. Considering other sectors apart from the industrial sector is important to guide the explanation of findings, and to provide information on the relative contribution of other sectors beside industry or manufacturing. Over the period 1980 to 2015, the average value-added of the agriculture sector to total output was 31.24% with standard deviation of 15.8% for the conflict countries and 20.67% with standard deviation of 13.08% for the non-conflict

countries while the average for Africa (full sample comprising 47 countries) was 28.08%. From Figure 4.3, generally, the contribution of Agriculture to total output had been on a downward trend since the 1980's for both conflict and non-conflict countries. However, we notice that across the entire period, conflict countries recorded higher valued added of Agriculture (10.57% more) than the non-conflict countries. This suggests that in the conflict countries, greater priority is placed on agriculture than on the manufacturing or industrial sector. Intuitively, in the aftermath of civil war, when countries are reviving, they find it convenient to develop their agriculture sector, and then when they become stable enough, they tend to develop the manufacturing or industrial sectors.

**Figure 4.3 Comparison of Agriculture Value-Added in Conflict and Non-Conflict Countries (1980 to 2015)**

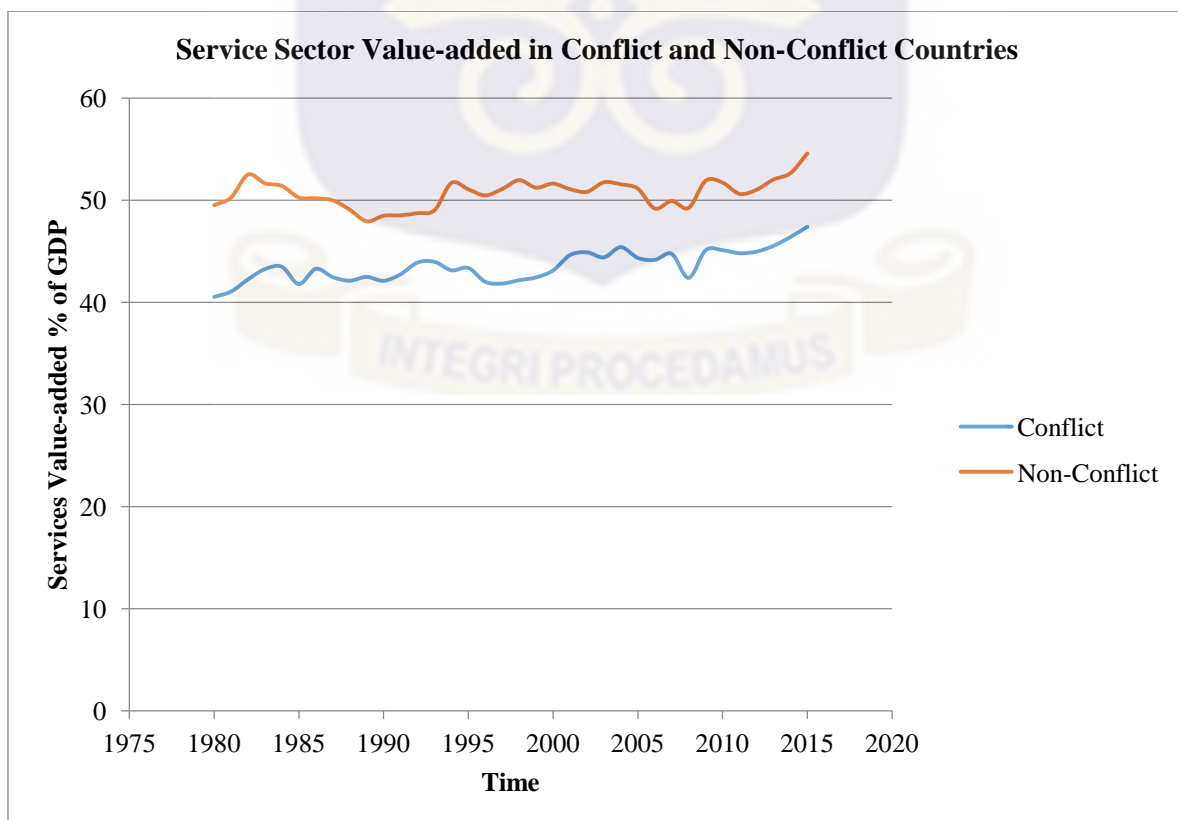


*Source: Author's computation using data obtained from the World Development Indicators provided by the World Bank*

#### 4.3.4 Services Sector Value-Added in Conflict and Non-Conflict Countries

Over the period 1980 to 2015, the value-added of the services sector to total output in conflict countries was 43.55% with standard deviation of 11.90% and 50.73% with standard deviation of 11.18% in non-conflict countries. The average for Africa from the full sample was 49.18%. From Figure 4.4, we observe that over the entire period, the value added of services for both conflict and non-conflict countries have been nearly stable with marginal increases most of the time. Over the entire period, conflict countries recorded lower value-added from the service sector (7.18% less) than the non-conflict countries. Intuitively, non-conflict countries are relatively stable politically and economically and thus able to attract investment into their service sectors than conflict countries. To recall, we observed in Figure 4.3 that the conflict countries place larger priority on the agriculture sector than the non-conflict countries.

**Figure 4.4 Comparison of Services Sector Value-Added in Conflict and Non-Conflict Countries (1980 to 2015)**



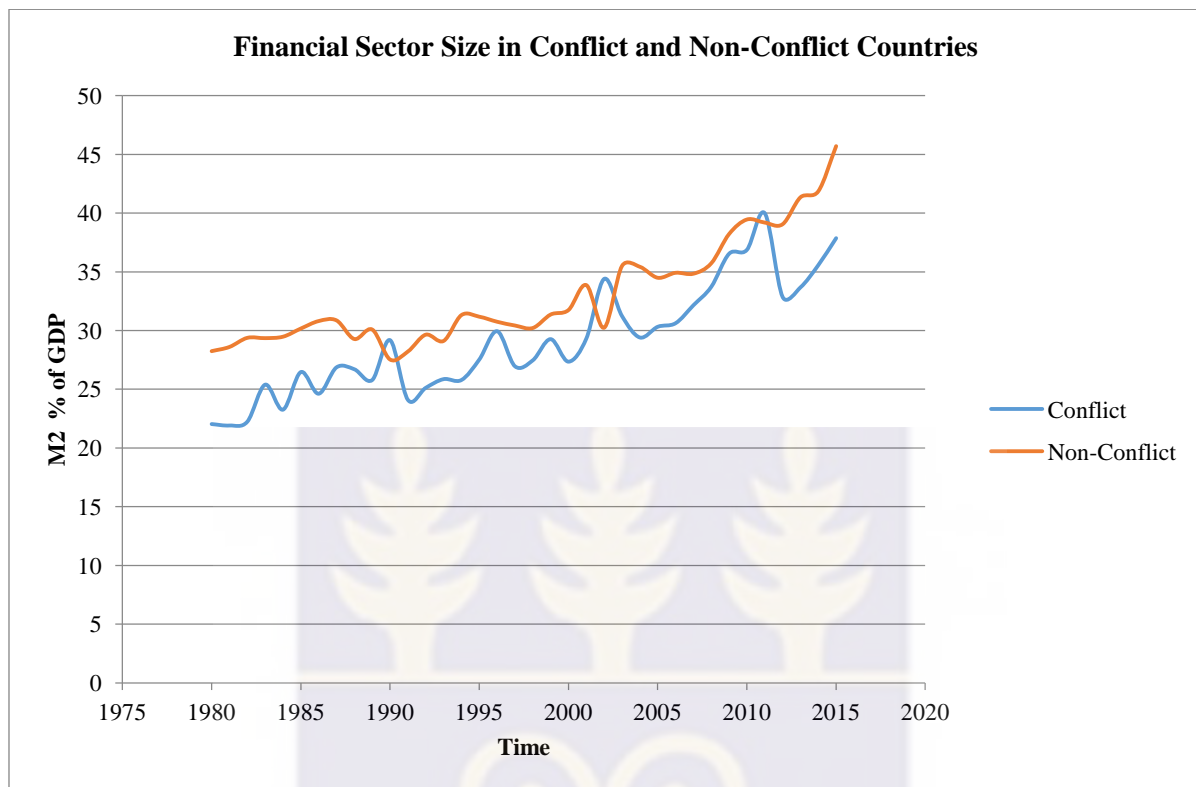
*Source: Author's computation using data obtained from the World Development Indicators provided by the World Bank*

#### **4.3.5 The Financial Sector in Conflict and Non-Conflict Countries**

Figure 4.5 compares the size of the financial sector in conflict and non-conflict countries over the period 1980 to 2015. The size of the financial sector is measured using the broad money supply indicator (M2) scaled by GDP. This indicator has been used in studies such as Guidiby & Renard (2015). Over the period, 1980 to 2015, the average value of the financial sector indicator was 23.21% for the conflict countries and 33.19% for the non-conflict countries respectively while the average for Africa from the full sample was 33.19%. From Figure 4.5 below, we see that for most of the period, conflict countries have smaller financial sectors (9.98% less) than the non-conflict countries. Growth rate in the financial sector (size) also appears slightly more volatile for the conflict countries than for the non-conflict countries with standard deviations 2.29% and 2.03% respectively. Generally, the financial sector in both conflict and non-conflict countries, thus is in Africa for the matter, has been growing since the 1980s as depicted in Figure 4.5.



**Figure 4.5 Comparison of Financial Sector (Size) in Conflict and Non-Conflict Countries (1980 to 2015)**

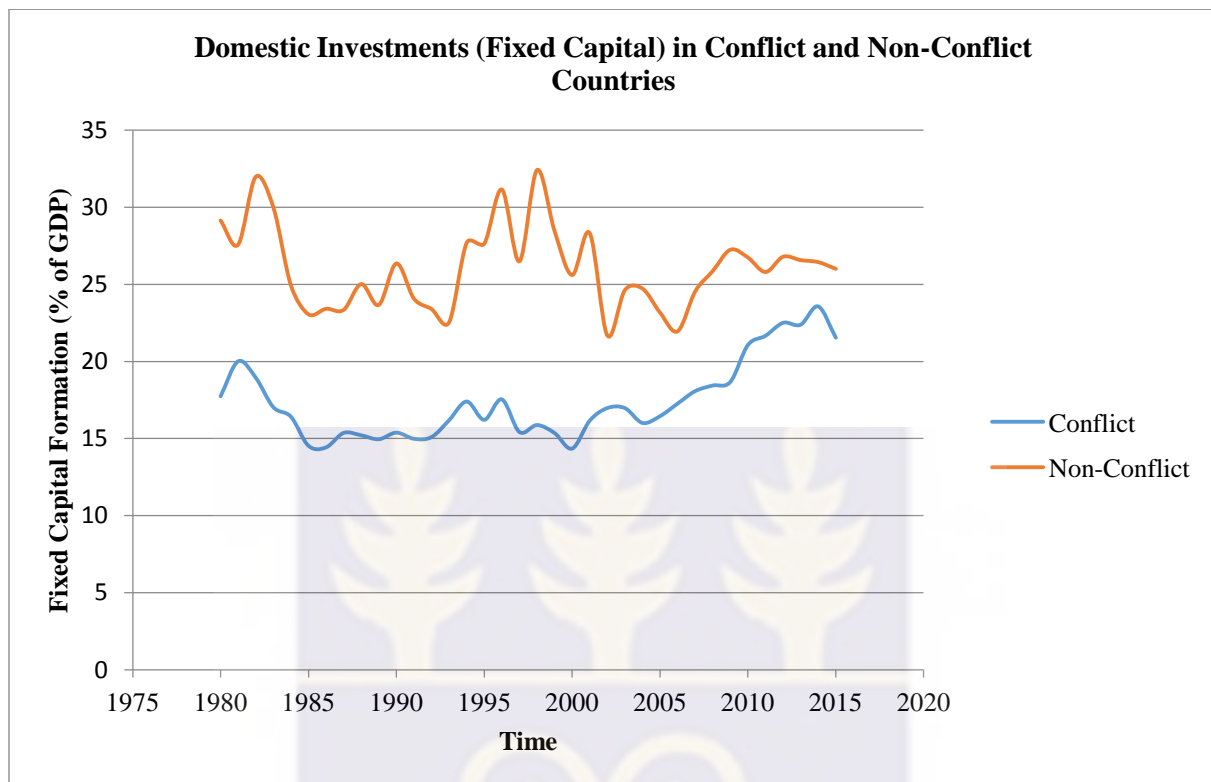


*Source: Author's computation using data obtained from the World Development Indicators provided by the World Bank*

#### **4.3.6 Investments (Fixed Capital) in Conflict and Non-Conflict Countries**

Over the period 1980 to 2015, the average fixed capital formation was 17.38% with standard deviation of 8.58% in conflict countries and 26.07% with standard deviation of 21.12% in non-conflict countries with while the average for Africa from the full sample was 22.04%. From Figure 4.6, we observe that over the entire period, conflict countries had lower investments (8.69% less) than the non-conflict countries. This might also be reflection of the adverse effect of conflicts (Collier, 1999, Bannon & Collier, 2003), since conflict countries may not be able to sustain and grow their fixed capital in during and in the aftermaths of civil wars.

**Figure 4.6 Comparison of Domestic Investments (Fixed Capital) in Conflict and Non-Conflict Countries (1980 to 2015)**



*Source: Author's computation using data obtained from the World Development Indicators provided by the World Bank*

#### 4.3.7 Summary

From the descriptive statistics and stylised facts, we gather that conflict and non-conflict countries do vary appreciably in several financial and economic indicators. Over the period, 1980 to 2015, compared to the conflict countries, the non-conflict countries received 0.64% more in FDI net inflows, 3.51% more in manufacturing value-added to GDP, 10.57% less in agriculture value-added to GDP, 7.18% more in services value-added to GDP, 9.98% more in terms of the size or depth of the financial sector, and 8.69% more in investments (fixed capital). These differences observed show that indeed conflicts negatively affects countries; the conflict countries performed poorly on key financial and economic indicators than the non-conflict countries.

#### **4.4 Correlation Analysis**

Correlation shows the level of association between variables, without implying causality. Though correlation analysis does not seek to show causality between the dependent and independent variables, it helps to identify the type and strength of the linear relationship existing among variables. It also helps to detect and address issues of multicollinearity among variables in a model (Wooldrige, 2013).

##### **4.4.1 Correlation Matrix**

The correlation matrix is a matrix of the results from a correlation analysis which reports the strength and direction of the linear relationship between pairs of dependent and independent variables. Simply, it is the matrix of the correlation coefficients among pairs of dependent and independent variables. However, modern statistical tools allow for the statistical significance of the linear relationship to be reported in the correlation matrix. The correlation coefficient indicates the direction of the linear relationship (positive or negative) between a pair of variables as well as the strength of the linear relationship (weak or strong). The higher the absolute value of the correlation coefficient, the stronger the relationship between the variables, and vice versa. A positive sign indicates a positive relationship, thus the variables move in the same direction; and a negative relationship indicates that the variables move in the opposite direction (Brooks, 2008). Additionally, a significant correlation coefficient indicates that the linear relationship between a pair of variables is statistically significant at a given level of significance.

The Pearson's product moment correlation technique which is a parametric approach, and the Spearman's correlations technique, a non-parametric approach are the most common techniques for performing correlation analysis (Gujarati & Porter, 2009). The non-parametric approach, Spearman's correlation is relevant when the relationship among variables is non-linear, and the data is not normally distributed. The Pearson's correlation is suitable when the

relationship among variables is linear and the data is normally distributed. In this study, the Pearson’s product moment correlation technique was used to examine the linear relationship

**Table 4.3 Pearson Product Moment Correlation Matrix**

<i>Pearson Product Moment Correlation Matrix</i>											
	<i>Indust</i>	<i>FDI</i>	<i>Non- Conft</i>	<i>InGD Pcp</i>	<i>InGD Pcpsq</i>	<i>IntTr ade</i>	<i>Inv</i>	<i>Agric</i>	<i>Servic e</i>	<i>Finset or</i>	<i>Rulel aw</i>
<i>Indus t</i>	1.00 00										
<i>FDI</i>	-0.11 07*	1.00 00									
<i>Non- Conft</i>	0.26 64*	0.03 41	1.00 00								
<i>InGD Pcp</i>	0.18 45*	0.03 54	0.34 27*	1.00 00							
<i>InGD Pcpsq</i>	0.17 99*	0.03 59	0.33 86*	0.99 75*	1.00 00						
<i>IntTr ade</i>	0.36 80*	0.00 39	0.26 77*	0.35 79*	0.35 04*	1.00 00					
<i>Inv</i>	- 0.00 49	0.54 17*	0.27 37*	0.27 16*	0.27 27*	0.12 01*	1.00 00				
<i>Agric</i>	-0.33 43*	-0.2 018*	-0.33 58*	-0.75 31*	-0.74 78*	-0.40 63*	-0.38 04*	1.00 00			
<i>Servi ce</i>	0.21 07*	0.04 28	0.29 33*	0.23 19*	0.22 01*	0.28 53*	0.10 59*	-0.5 74*	1.00 00		
<i>Finse ctor</i>	0.14 16*	-0.01 74	0.08 76*	0.37 63*	0.37 05*	0.34 60*	0.06 58	-0.49 66*	0.52 03*	1.00 00	
<i>Rule law</i>	-0.07 20	-0.03 00	-0.23 59*	-0.11 30*	-0.10 53*	-0.29 47*	0.01 91	0.26 39*	-0.36 27*	-0.25 74*	1.00 00

Source: Table constructed by the author using output generated from data analysis software

among the variables in the industrialisation model. Table 4.3 exhibits the Pearson product moment correlation matrix for the variables. The presence of a star (\*) attached to a correlation coefficient indicate that the correlation is statistically significant at a 5% significance level.

#### 4.4.2 Inferences from Correlation Matrix

From the correlation matrix in Table 4.3, the variable of interest, FDI was negatively correlated with the dependent variable (*indust*), having a correlation coefficient of -0.1107, significant at a 5% level of significance. Thus net FDI inflows and Industrialisation tend to move in opposite direction. From theory, a positive association was expected between net FDI inflows and industrialisation because FDI inflow is believed to boost industrialisation (Markusen & Venables, 1999; Kang & Lee, 2011). The observed negative association between FDI and industrialisation is however consistent with the results of Gui-Diby & Renard (2015). The urge to further investigate this paradox was a key motivation for this study, considering the effects of conflict. From Table 4.3, we observe that the dummy for the non-conflict countries (*NonConflict*), another variable of interest, had a positive association with industrialisation (0.2664, significant at a 5% level of significance). The variable *Agric* is also negatively associated with the dependent variable (-.3343, significant at a 5% level). This negative relationship suggests that boosting activities in agriculture may not promote industrialisation. Extant literature documents that achieving industrialisation is essentially a shift from being agriculture-oriented to being manufacturing or industry-oriented (UNECA, 2013, UNECA, 2015). Other controls variables are discussed in detail in section 4.6.

From the correlation matrix (Table 4.3), some pairs of independent variables have correlations suggesting issues of multicollinearity. It is therefore important to apply formal statistical tests for multicollinearity to determine whether there are issues of severe multicollinearity. This was done and the results are presented section 4.5.2.

## 4.5 Diagnostic Tests

Diagnostic tests are statistical tests that are carried out on a sample or a given dataset to critically examine the fitness of the data for further statistical and econometric analyses. Diagnostic tests help to examine a given dataset holistically, and to provide inferences which suggest the appropriate statistical and econometric tools to apply to analyse the dataset. It is imperative to perform diagnostics tests since every econometric model and estimation technique is based on assumptions which must be verified and satisfied in order to adopt it for use. This section presents diagnostic tests performed on the sample such as tests for normality, multicollinearity, heteroscedasticity, and autocorrelation. The results from these tests formed the basis for the choice of the estimation techniques applied in the regression analysis.

### 4.5.1 Normality Test

Normality is a concept that describes how symmetrical or evenly the dataset is distributed around the mean. A dataset which is perfectly normally distributed has a ‘bell shape’ distribution. When a dataset is normally distributed, then parametric statistical techniques can be applied in making statistical and econometric inferences about the sample. However, when the dataset is not normally distributed, then non-parametric statistical and econometric tools should be applied. The normality assumption is important mainly for hypothesis testing, and for making predictions. The normality of the distribution of the data was tested adopting two approaches: the statistical test, ‘Shapiro-Wilk W test’ for normality (Shapiro & Wilk, 1965), and the graphical approach, using the Kernel density plot. Both approaches were applied to enhance reliability or robustness of the results. Among four notable statistical tests, Razali & Wah (2011) showed that the Shapiro-Wilk W test was the most superior followed by the Anderson–Darling, Kolmogorov–Smirnov and Lilliefors tests respectively. The Kernel density plot is a non-parametric approach to detecting normal distribution. To plot obtain the

Kernel Plot, we run a linear regression, and estimate the residuals. Then based on the residuals from the regression, we obtain the Kernel density estimates which are plotted in comparison with the normal distribution plot or density.

#### 4.5.1.1 Results from Normality Tests

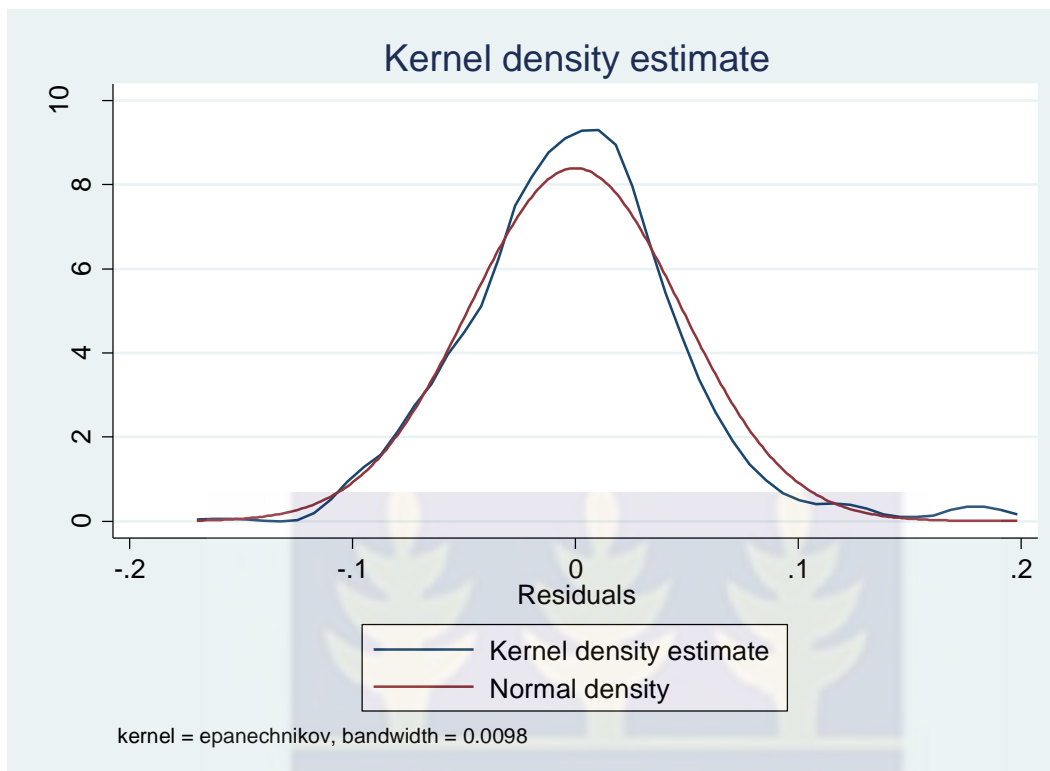
*Table 4.4 Shapiro-Wilk W test for Normality*

<i>Variable</i>	<i>Obs</i>	<i>W</i>	<i>V</i>	<i>Z</i>	<i>Prob&gt;z</i>
<i>r</i>	626	0.9707	12.045	6.042	0.0000

*Source: Table constructed by the author using output generated from data analysis software*

From the Shapiro-Wilk W test of normality, since the p-value (0.0000) is less than .05, the null of normal distribution is rejected at a 5% level of significance, indicating that the dataset is not normally distributed. From the graphical approach (Figure 4.7), the kernel density plot indicates that the data deviate marginally from the normal ('bell-shape') distribution. Because the deviation from normality is marginal, the study proceeds with the correlations and regressions, hitherto assuming normality (see O'Brien, 2007).

**Figure 4.7 Kernel Density Plot of Residuals after Regression**



*Source: Author's computation using data obtained from the World Development Indicators provided by the World Bank*

#### **4.5.2 Test for Multicollinearity**

Multicollinearity exists if the pairs of independent variables are highly correlated. In the presence of multicollinearity, the unique effect of the independent variables on the dependent variable cannot be clearly identified. Multicollinearity affects the stability of the coefficients and it results in high (inflated) standard errors. It is quite rare to obtain empirical data without any issue of multicollinearity (O'Brien, 2007). So statisticians and econometricians allow for minimal issues of multicollinearity, however when statistical tests show that the degree of multicollinearity is beyond 'permissible limits', then the dataset had to be critically examined before further analyses are performed (O'Brien, 2007). Statistical tools such as the variance inflation factor (VIF) and tolerance value analyses can be used to detect the presence and

degree of multicollinearity. From the correlation matrix some pairs of independent variables have correlations suggesting issues of multicollinearity. The study therefore employed the Ender's collinearity diagnostics, presented in Table 4.5 and the simple VIF diagnostics, presented in Table 4.6 to examine the dataset for the issues of multicollinearity.

#### 4.5.2.1 Results from Multicollinearity tests

Extant literature postulates that a VIF above 10 is problematic and indicative of severe multicollinearity (Hair, Anderson, Tatham, & Black, 1995; O'brien, 2007). From both approaches (Table 4.5 and Table 4.6), except for the related pairs, 'lnGDPcp' and its squared term 'lnGDPcpsq', no variable has a VIF above 10. The variable lnGDPcp which denotes of per capita income and its squared term are often included in industrialisation models to illustrate *the inverted U-hypothesis* (Gui-Diby & Renard, 2015; Kang & Lee, 2011; Rowthorn & Ramaswamy, 1999). These variables have unusually high VIFs there are perfectly related (one is the square of the other). It is however important to include both variables in the regression to verify the inverted U-hypothesis. This is a usual practice in extant literature (see Kaya 2010, Kang & Lee, 2011; Gui-Diby & Renard, 2015).

**Table 4.5 Ender's Collinearity Diagnostics**

<i>Variables</i>	<i>VIF</i>	<i>SQRT VIF</i>	<i>Tolerance</i>	<i>R-Squared</i>
<b><i>FDI</i></b>	<b>2.18</b>	<b>1.48</b>	<b>0.4590</b>	<b>0.5410</b>
<b><i>NonConflict</i></b>	<b>1.59</b>	<b>1.26</b>	<b>0.6289</b>	<b>0.3711</b>
<b><i>FDI*NonConflict</i></b>	<b>2.47</b>	<b>1.57</b>	<b>0.4050</b>	<b>0.5940</b>
<b><i>InGDPcp</i></b>	<b>339.79</b>	<b>18.43</b>	<b>0.0029</b>	<b>0.9971</b>
<b><i>InGDPcpsq</i></b>	<b>347.13</b>	<b>18.63</b>	<b>0.0029</b>	<b>0.9971</b>
<b><i>IntTrade</i></b>	<b>1.48</b>	<b>1.22</b>	<b>0.6761</b>	<b>0.3231</b>
<b><i>Inv</i></b>	<b>1.64</b>	<b>1.28</b>	<b>0.6114</b>	<b>0.3886</b>

<i>Agric</i>	<b>5.77</b>	<b>2.40</b>	<b>0.1734</b>	<b>0.8266</b>
<i>Service</i>	<b>2.52</b>	<b>1.59</b>	<b>0.3966</b>	<b>0.6034</b>
<i>finsector</i>	<b>2.50</b>	<b>1.58</b>	<b>0.4000</b>	<b>0.6000</b>
<i>Rulelaw</i>	<b>1.32</b>	<b>1.15</b>	<b>0.7571</b>	<b>0.2429</b>

*Source: Table constructed by the author using output generated from data analysis software*

**Table 4.6 Variance Inflation Factor (VIF) Diagnostics**

<i>Variables</i>	<i>VIF</i>	<i>Tolerance</i>
<i>FDI</i>	<b>2.13</b>	<b>0.4695</b>
<i>NonConflict</i>	<b>1.56</b>	<b>0.6393</b>
<i>FDIxNonConflict</i>	<b>2.47</b>	<b>0.4050</b>
<i>InGDPcp</i>	<b>333.61</b>	<b>0.0030</b>
<i>InGDPcpsq</i>	<b>338.39</b>	<b>0.0030</b>
<i>IntTrade</i>	<b>1.43</b>	<b>0.7012</b>
<i>Inv</i>	<b>1.61</b>	<b>0.6151</b>
<i>Agric</i>	<b>5.38</b>	<b>0.1860</b>
<i>Service</i>	<b>2.49</b>	<b>0.4020</b>
<i>finsector</i>	<b>2.47</b>	<b>0.4050</b>
<i>Rulelaw</i>	<b>1.32</b>	<b>0.7582</b>

*Source: Table constructed by the author using output generated from data analysis software*

### 4.5.3 Heteroscedasticity tests

Heteroscedasticity is a common problem with panel data. Heteroscedasticity basically means that the residuals do not have a constant variance. Homoscedasticity (assumption that the errors have a constant variance) is a very important assumption for the ordinary least squares (OLS) estimator. The presence of heteroscedasticity is a violation of the OLS assumption of homoscedasticity. In the presence of heteroscedasticity, OLS estimates will be inefficient and the standard errors inconsistent, thus statistical tests using the standard errors are invalid (Long & Ervin, 1998; Wooldrige, 2013).

However, a basic way to manage the issue of heteroscedasticity in the OLS estimator is to use ‘robust’ standard errors or ‘heteroscedasticity-corrected’ standard errors (Wooldrige, 2013). This technique corrects the standard errors; however the OLS estimates still remain inefficient (Long & Ervin, 1998). Two statistical tests were adopted to check the dataset for issues of heteroscedasticity, in order to guide the choice of estimation technique. First is the Breusch-Pagan/Cool-Weisberg test, a formal test for heteroscedasticity developed in 1979 by Trevor Breusch and Adrian Pagan (Breusch & Pagan, 1979). The second is the White’s test, also a formal test for heteroscedasticity proposed by Halbert White in 1980 (White, H. (1980). The results for these tests are presented in Tables 7.4 and 8.5 respectively.

#### 4.5.3.1 Results from heteroscedasticity tests

*Table 4.7 Breuch-Pagan/Cook-Weisberg test for Heteroscedasticity*

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*Breuch-Pagan/Cook-Weisberg test for Heteroscedasticity*

*Ho: Constant Variance*

*Variables: Fitted Values of Indust*

*Chi2(1) = 75.06*

---

---

***Prob > Chi2 = 0.0000***

---

*Source: Table constructed by the author using output generated from data analysis software*

From the results of the Breusch-Pagan/Cool-Weisberg test for heteroscedasticity with the null of homoscedasticity or constant variance of errors (Table 4.7), we reject the null at 5% significance level, and conclude that there is evidence of heteroscedasticity. Again from the White's test for heteroscedasticity with the null of homoscedasticity (Table 4.8), we reject the null at 5% significance level and conclude that there is evidence of heteroscedasticity. The presence of heteroscedasticity suggests that OLS and Panel Fixed Effects and Random Effects models might not be appropriate estimation techniques to adopt for analysing this dataset because they would produce biased and inefficient estimates (Greene, 2012).

***Table 4.8 White's test for Heteroscedasticity***

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***White's test for Ho: homoskedasticity***

***Ha: unrestricted heteroskedasticity***

***Chi2(63) = 422.11***

***Prob > Chi2 = 0.0000***

---

*Source: Table constructed by the author using output generated from data analysis software*

#### **4.5.4 Autocorrelation Tests**

Autocorrelation, also known as serial correlation occurs when the error terms are correlated- the current value of the error depends on its previous values. Absence of autocorrelation ('no autocorrelation') is another critical assumption for the OLS estimator to be valid and reliable (Wooldridge, 2013). The presence of autocorrelation violates the OLS assumption of 'no autocorrelation'. OLS estimates from a model with autocorrelation issues are no more the

Best Linear Unbiased Estimates-*BLUE* (Brook, 2008). To test the dataset for autocorrelation, the Wooldridge test for autocorrelation, developed in 2002 by Jeffrey M. Wooldridge (Wooldridge, 2013), was adopted and the results are presented in Table 4.9. The Wooldridge test for autocorrelation is attractive because it can be applied under general conditions and is easy to implement (Drukker, 2003).

#### 4.5.4.1 Results from Autocorrelation tests

*Table 4.9 Wooldridge test for Autocorrelation in Panel Data*

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*Wooldridge test for autocorrelation in panel data*

*Ho: no first-order autocorrelation*

*$F(1, 33) = 174.154$*

*$Prob > F = 0.0000$*

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*Source: Table constructed by the author using output generated from data analysis software*

From the results of the Wooldridge test for autocorrelation with the null of no first-order autocorrelation, we reject the null at a 5% significance level. This implies that the dataset has issues of autocorrelation. Again, the presence of autocorrelation indicates that OLS and Fixed Effects and Random Effect Panel estimation might not be appropriate techniques for estimating regressions from this dataset (Greene 2011).

#### 4.5.5 Summary

From the diagnostic tests, heteroscedasticity and autocorrelation stand out as issues of concern in the dataset. From extant literature, we gather that with these issues, the Ordinary Least Squares (OLS) and Fixed Effects (FE) and Random Effect (RE) panel estimations techniques might not produce efficient and unbiased estimates (Wooldridge, 2013; Green, 2012; Brooks,

2008; Gujarati & Porter, 2009). The presence of these issues do not however, render the data invalid, it only suggests the use of alternative estimation techniques which can overcome or better address issues of autocorrelation and heteroscedasticity in panel data (Wooldridge, 2013, Drucker, 2003) than the estimation techniques aforementioned.

#### **4.6 Multiple Regression Analysis**

Multiple Regression analysis is an econometric technique that allows for the estimation of the linear relationship existing between a dependent or explanatory variable (LHS) and a set of independent variables (RHS) under a suitable assumption of the error term. The purpose of multiple regression analysis is to identify the most relevant set of independent variables that explain variations in the dependent variable. The type of estimation technique adopted directly influences the outcomes of any regression, hence it is very critical that the estimation technique adopted suit the characteristics of the data (Wooldridge, 2013).

##### **4.6.1 Choice of Estimation Techniques**

To handle the problems of heteroscedasticity and autocorrelation, the feasible generalised least square estimation technique (FGLS) and Prais-Winsten's estimation techniques (Guidiby & Renard, 2015) were employed for regression analysis. The FGLS was used as the primary estimator while the Prais-Winsten's estimator was adopted as the main robustness check technique. Nevertheless, auxiliary regressions were run using the Random Effects, Fixed Effects and Pooled OLS estimators, and the regression outputs were reported to provide allow for a basic comparison results across multiple estimation techniques. Such a comparative view of the results is important to have a fair idea of how the results actually appear across each estimating technique, subject to their strengths and weaknesses.

#### **4.6.1.1 The Feasible Generalised Least Square Estimator (FGLS)**

The FGLS is able to produce consistent and asymptotically efficient estimates, and robust standard errors that overcome the problem of heteroscedasticity, if the pattern of heteroscedasticity is known (Long & Ervin, 1998). The FGLS estimator is suitable for panels with heteroscedastic and autocorrelated errors (Green, 2012). It is also suitable for panels which are only heteroscedastic but with uncorrelated errors. The FGLS estimator allows for the specification of the form of autocorrelation; whether the basic/ common AR(1) or the panel-specific AR(1). In addition, it provides flexibility in the choice of methods for the computation of autocorrelation coefficients within the estimator. This is important to allow researchers to properly estimate the regressions to suit the forms of autocorrelation in the sample or dataset. It is however important to note that the FGLS addresses only first-order autocorrelation-AR(1). The FGLS was used as the primary estimation technique in this study given the characteristics of the data. The Prais-Winsten estimator, which is also similar to the FGLS has been employed as the main robustness check technique.

#### **4.6.1.2 The Prais-Winsten Estimation Technique**

To check for robustness of the regression results, another estimation technique which is able to address issues of heteroscedasticity and autocorrelation in panel data was employed the Prais-Winsten estimation technique (Prais-Winsten, 1954). The Prais-Winsten's estimator is very similar to the FGLS estimator. The Prais-Winsten estimation technique is also a generalised least squares (GLS) estimator. The Prais-Winsten estimator, like the FGLS, is suitable for panels with heteroscedastic and auto-correlated errors as well as panels with only heteroscedastic errors. The standard errors of the parameter estimates reported by the Prais-Winsten estimator are the heteroscedasticity-corrected standard errors. In addition, like the FGLS, the Prais-Winsten estimator provides flexibility in that it allows for both

specification of both the form of autocorrelation (Common AR(1) and Panel-Specific AR(1)), and the methods for the computation of correlation within the estimator.

#### **4.6.2 Presentation of Results from Multiple Regression Analysis**

The results from the empirical estimations are presented in this section. The results from the FGLS estimator under the Common AR (1) assumption are presented in Table 4.10. The results from the FGLS estimator under the Panel-Specific AR (1) assumption are presented in Table 4.12. The results from the robustness analysis are shown in Table 4.15 where we compare estimations for the complete model under various estimation techniques.

##### **4.6.2.1 Regression Results from the FGLS Estimator under the Common AR (1)**

###### **Assumption**

Table 4.10 shows the main regression results estimated in a step-wise manner from the FGLS estimator under the assumption of Common AR (1). The base model (*Model 1*) captures the basic industrialisation model, and by a step-wise approach, relevant variables of interest and controls have been augmented to obtain the complete model (*Model 5*). The contribution or relevance of each additional variable has been explained. The results from five estimations (*Model 1 to Model 5*) under the Common AR (1) scenario are presented in Table 4.10. Finally, the results from complete model (with all relevant variables inclusive) estimated in unison under the Common AR (1) have been presented in Table 4.11 to provide a complete view of the results with further details not captured in the results presented in Table 4.10.

*Table 4.10 Main Regression Results from the FGLS Estimator under Common AR(1) Assumption (Step-wise Approach)*

<i>Cross Sectional Time-Series FGLS Regression [Common AR (1)]</i>					
<i>Dependent Variable (Indust)</i>					
<i>Independent Variables</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
<i>FDI</i>	<b>-0.03642</b> ** (0.01787)	<b>-0.10273</b> *** (0.02913)	<b>-0.10961</b> *** (0.03023)	<b>-0.11568</b> *** (0.03057)	<b>-0.11670</b> *** (0.03066)
<i>NonConflict</i>		<b>0.00904</b> * (0.00512)	<b>0.00932</b> * (0.00502)	<b>0.00776</b>  (0.00496)	<b>0.00817</b> * (0.00495)
<i>FDIxNonConflict</i>		<b>0.09729</b> *** (0.03577)	<b>0.10444</b> *** (0.03682)	<b>0.11818</b> *** (0.03718)	<b>0.11897</b> *** (0.03718)
<i>lnGDPcp</i>	<b>0.07285</b> ** (0.03409)	<b>0.09786</b> *** (0.03310)	<b>0.09834</b> *** (0.03324)	<b>0.13975</b> *** (0.03175)	<b>0.14233</b> *** (0.03241)
<i>lnGDPcpsq</i>	<b>0.07285</b> ** (0.03409)	<b>-0.00639</b> *** (0.00206)	<b>-0.00648</b> *** (0.00208)	<b>-0.00943</b> *** (0.00208)	<b>-0.00958</b> *** (0.00203)
<i>IntTrade</i>	<b>0.14001</b> *** (0.00447)	<b>0.01398</b> *** (0.00443)	<b>0.01602</b> *** (0.00454)	<b>0.01602</b> *** (0.00454)	<b>0.01621</b> *** (0.00461)
<i>Inv</i>	<b>-0.05444</b> *** (0.01526)	<b>-0.05191</b> *** (0.01470)	<b>-0.05531</b> *** (0.01493)	<b>-0.05438</b> *** (0.01575)	<b>-0.05324</b> *** (0.01571)
<i>Agric</i>	<b>-0.16058</b> *** (0.01524)	<b>-0.14008</b> *** (0.01482)	<b>-0.16435</b> *** (0.02098)	<b>-0.15231</b> *** (0.02128)	<b>-0.15315</b> *** (0.02121)
<i>Service</i>			<b>-0.02472</b>  (0.01878)	<b>-0.02209</b>  (0.01875)	<b>-0.02190</b>  (0.01873)
<i>Finsector</i>				<b>0.05871</b> *** (0.01194)	<b>0.06079</b> *** (0.01212)
<i>Rulelaw</i>					<b>0.00092</b>

					(0.00071)
<b>Constant</b>	<b>-0.12084</b> (0.13516)	<b>-0.22864</b> * (0.13176)	<b>-0.20866</b> (0.13155)	<b>-0.37144</b> *** (0.12524)	<b>-0.38700</b> *** (0.12848)
<b>No. of Obs.</b>	<b>649</b>	<b>649</b>	<b>647</b>	<b>624</b>	<b>624</b>
<b>Autocorrelation</b>	<b>Common-AR(1)</b>	<b>Common-AR(1)</b>	<b>Common-AR(1)</b>	<b>Common-AR(1)</b>	<b>Common-AR(1)</b>
<b>Chi-Square Stat P-value</b>	<b>150.74</b> <b>0.000</b>	<b>158.75</b> <b>0.000</b>	<b>200.70</b> <b>0.000</b>	<b>200.7</b> <b>0 0.000</b>	<b>202.35</b> <b>0.000</b>

*Notes:*

*i: \*\*\*, \*\*, \* indicate that the coefficients are significant at 1%, 5% and 10% levels of significance respectively while those figures in parentheses are the standard errors.*

*ii 'lnGDPcp' represent log of GDP per capita, 'lnGDPcpsq' represent a square of log of GDP per capita, 'IntTrade' represent international trade in manufactures, 'Inv' represent investment (fixed capital formation), 'Agric' represent Agriculture value added to GDP, 'Service' represent Services value added to GDP, 'finsector' represent financial sector size or depth proxied by m2 (broad money supply), Rulelaw represent civil rights.*

*iii: Variations in number of observations is due to missing values in some variables.*

*iv: The variables, 'NonConflict' and 'FDIxNonConflict', have been excluded from the base model because they are new variables, not included in the original model. This study seeks to explore their relevance in the industrialisation model*

*v: The variable 'Service' was excluded from the base model unlike Agric because it was not part of the original model. This study considers it a possible relevant variable to affect the industrialisation model*

*Source: Table constructed by the author using output generated from data analysis software*

#### **4.6.2.1.1 Model 1 (Base Model)**

*Model 1*(Table 4.10) illustrates the basic industrialisation model by employing the relevant variables found to be significantly related to industrialisation in empirical studies following Gui-Diby & Renard, 2015. The essence of *Model 1* is to contribute to the FDI-industrialisation nexus in Africa. Does FDI have a positive or negative effect on industrialisation in Africa? Though previous studies found the relationship to be insignificant or negative, it is imperative the current study confirmed or verified the status quo before proceeding with any further analysis, that is, whether conflicts could play a role in explaining

the observed relationship. From the results in *Model 1* (Table 4.10), the parameter estimate or coefficient of *FDI* was negative (-0.03642), and statistically significant at a 5% significance level. The remaining variables were significant at 5% and 10% levels of significance. Gui-Diby & Renard (2015) also observed that FDI had insignificant effect in the industrialisation model in African countries. Kaya (2010) also found that inward FDI stock and FDI flows had either negative significant effect or insignificant effect on industrialisation in all the regressions observed for an unbalanced panel of 64 developing countries. Kaya (2010) suggested that direct investments by foreign firms may be less important for industrialisation than variable such as trade. Departing from these findings, Kang & Lee, 2011 observed that FDI inflows had positive significant effect on industrialisation Korea.

#### **4.6.2.1.2 Model 2 (Accounting for the Effects of Conflicts)**

In *Model 2*, the conflict variable (*NonConflict*) and the interaction term (*FDIxNonConflict*) were added to the base model (model1). The essence of including this interaction term was to investigate whether the negative effect of FDI on industrialisation (observed in model 1) could be driven by conflicts. It is observed that the parameter estimate for *NonConflict* was positive (0.00904) and statistically significant at a 10% significance level. The parameter estimate for *FDIxNonConflict* was also positive (0.09729) and statistically significant at a 1% significance level. *FDI* variable still showed a negative coefficient (-0.10273) which is statistically significant at a 1% significance level. All the control variables had coefficients highly significant, and their signs are consistent with the signs observed for these variables in earlier studies such as Kaya 2010, Kang & Lee, 2011, and Gui-Diby & Renard, 2015). What is interesting in these results is the fact that the negative effect of FDI on industrialisation has been offset by the interaction of FDI and non-conflict countries dummy variable, into a positive significant effect, and also the non-conflict dummy variable had a positive and significant relationship with industrialisation. In essence, FDI has positive effect on

industrialisation in non-conflict countries but otherwise in the conflict countries.

#### **4.6.2.1.3 Model 3 (Controlling for the Role of the Service Sector)**

For robustness purposes, *Model 3* augments the variables in *Model 2* with an additional control variable- '*Service*'. The variable, *Service* was included in the model for robustness or to avoid omitted variable bias. Kaya (2010) proposed that the service sector could be important in economic development, hence its effects should be examined in studies on economic development and related areas such as industrialisation. Kang & Lee, 2011, found that the productivity of the service sector had a significant effect (negative) in the industrialisation model. It was observed that the results remained robust even with the inclusion of the variable, '*service*' in the model. The coefficients for the variables of interest, *FDI*, *NonConflict* and *FDIxNonConflict* maintained their signs and levels of significance. The coefficients for the control variables also maintained their signs and remained significant except for '*Service*'. The control variable, *Service*, had insignificant in industrialisation model. Kang & Lee, 2011 however, found that service sector productivity had a negative significant effect in the industrialisation model in their Korean based study.

#### **4.6.2.1.4 Model 4 (Controlling for the Role of the Financial Sector)**

Again for robustness purposes, an additional control variable (*Finsector*) was included in *Model 4*. *Finsector* captures the influence of the financial sectors' size or depth on industrialisation. Extant literature stressed the significant role of the financial sector in promoting industrialisation (Gui-Diby & Renard, 2015). As seen from Table 4.10, in *Model 4*, *Finsector* had positive coefficient or parameter estimate (0.05871) which is highly significant (at a 1% significance level), suggesting that the financial sector is important for promoting industrialisation. The coefficients for *FDI* (-0.11568), and *FDIxNonConflict* (0.11818), the interaction term also remained highly significant. The coefficient for *NonConflict*, the dummy for the non-conflict countries was insignificant in *Model 4*. The variable *Service* had

insignificant effect in *Model 4* while the coefficients for the other control variables were all highly significant. Da Rin & Hellman (2002) & Gui-Diby & Renard, 2015 also obtained similar results showing that the financial sector is important for industrialisation.

#### **4.6.2.1.5 Model 5 (Complete Model)**

*Model 5* was the final estimation under the common AR (1) scenario in Table 4.10. In *Model 5*, the last control variable, *Rulelaw* defined by the civil rights indicators in the civil liberties database was included in the model to proxy for regulation and government intervention. Earlier studies also controlled for the role of regulation and government intervention since these are believed to affect industrialisation. Both *Model 5* and *Table 4.11* display results for the complete model. The regression results from *Model 5* and *Table 4.11* show that *Rulelaw* had insignificant effect in the model, suggesting that an insignificant effect of regulation and government intervention on industrialisation in the African region.

From *Table 4.11* and *Table 4.10* (*Model 5*), we observe that *FDI* still had a negative coefficient (-0.11670) highly significant, the p-value (0.000) is than 0.01. The coefficient of *NonConflict* (0.00817) with p-value (0.099) is significant at a 10% significance level. The dummy variable for non-conflict countries, *FDIxNon-Conflict* had a positive coefficient (0.00817), statistically significant at a 10% significance level. *FDIxNonConflict*, the interaction term, also had a positive coefficient (0.11897) with p-value (0.001), thus statistically significant at a 1% significance level. The coefficients or parameter estimates for all the control variables were highly significant, except for service sector productivity, *Service* and *Rulelaw* with insignificant coefficients. Gui-Diby & Renard, 2015 obtain similar results for the role of regulation and government intervention, and concluded that there were insignificant determinants of industrialisation.

**Table 4.11 Regression Results from the FGLS Estimator-under Common AR (1) Assumption  
(Complete Model)**

<i>Cross Sectional Time-Series FGLS Regression [Common AR (1)]</i>						
<i>Dependent Variable (Indust)</i>						
<i>Independent Variable</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>z</i>	<i>P&gt; z  (P-Value)</i>	<i>95% Confidence (Lower)</i>	<i>Interval (Upper)</i>
<i>FDI</i>	<b>-0.116697***</b>	<b>0.030664</b>	<b>-3.81</b>	<b>0.000</b>	<b>-0.176797</b>	<b>-0.005660</b>
<i>NonConflict</i>	<b>0.008169</b>	<b>0.004953</b>	<b>1.65</b>	<b>0.099</b>	<b>-0.001539</b>	<b>0.017877</b>
<i>FDIxNonConflict</i>	<b>0.118968***</b>	<b>0.037176</b>	<b>3.20</b>	<b>0.001</b>	<b>0.046106</b>	<b>0.191832</b>
<i>lnGDPcpsq</i>	<b>-0.009582***</b>	<b>0.002032</b>	<b>-4.71</b>	<b>0.000</b>	<b>-0.013567</b>	<b>-0.005598</b>
<i>IntTrade</i>	<b>0.016208***</b>	<b>0.004613</b>	<b>3.51</b>	<b>0.000</b>	<b>0.007166</b>	<b>0.025250</b>
<i>Inv</i>	<b>-0.053237***</b>	<b>0.015707</b>	<b>-3.39</b>	<b>0.001</b>	<b>-0.084023</b>	<b>-0.022451</b>
<i>Agric</i>	<b>-0.153150***</b>	<b>0.021207</b>	<b>-7.22</b>	<b>0.000</b>	<b>-0.194715</b>	<b>-0.111583</b>
<i>Service</i>	<b>-0.021901</b>	<b>0.018734</b>	<b>-1.17</b>	<b>0.242</b>	<b>-0.058619</b>	<b>0.014818</b>
<i>finsector</i>	<b>0.060793***</b>	<b>0.012115</b>	<b>5.02</b>	<b>0.000</b>	<b>0.037048</b>	<b>0.084538</b>
<i>Rulelaw</i>	<b>0.000922</b>	<b>0.000712</b>	<b>1.30</b>	<b>0.195</b>	<b>-0.000473</b>	<b>0.002317</b>
<i>Constant</i>	<b>-0.386994***</b>	<b>0.128485</b>	<b>-3.01</b>	<b>0.003</b>	<b>-0.638820</b>	<b>-0.135169</b>
<i>Panels</i>	<b>Heroscedastic</b>					
<i>Correlations</i>	<b>Common AR(1)</b>					
<i>No. of Obs</i>	<b>624</b>					
<i>Wald chi2(11)</i>	<b>202.35</b>					
<i>P-value</i>	<b>0.0000</b>					

#### 4.6.2.2 Regression Results from the FGLS Estimator-under the Panel-Specific AR(1)

##### Assumption

Table 4.12 exhibits the regression results from the FGLS estimator under the second scenario, the panel-specific AR (1) specification.

**Table 4.12 Main Regression Results from the FGLS Estimator under Panel-Specific AR (1)**

*Assumption (Step-wise Approach)*

<i>Cross Sectional Time-Series FGLS Regression [Panel-Specific AR(1)]</i>					
<i>Dependent Variable (Indust)</i>					
<i>Independent Variables</i>	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>	<i>Model 9</i>	<i>Model 10</i>
<i>FDI</i>	-0.04154 ** (0.01720)	-0.09882 *** (0.02704)	-0.10861 *** (0.02825)	-0.10547 *** (0.02799)	-0.10492 *** (0.02774)
<i>NonConflict</i>		0.01437 *** (0.00486)	0.01278 *** (0.00492)	0.00702  (0.00478)	0.00881 * (0.00482)
<i>FDIxNonConflict</i>		0.08393 ** (0.03394)	0.09088 ** (0.03575)	0.08174 ** (0.03596)	0.08064 ** (0.03586)
<i>lnGDPcp</i>	0.13742 *** (0.03127)	0.13046 *** (0.02988)	0.14522 *** (0.03026)	0.12015 *** (0.02961)	0.12217 *** (0.02950)
<i>lnGDPcpsq</i>	-0.00903 *** (0.00193)	-0.00867 *** (0.00184)	-0.00963 *** (0.00187)	-0.00823 *** (0.00183)	-0.00834 *** (0.00182)
<i>IntTrade</i>	0.01194 *** (0.00393)	0.01346 *** (0.00394)	0.01522 *** (0.00404)	0.01601 *** (0.00405)	0.01640 *** (0.00402)
<i>Inv</i>	-0.04610 *** (0.01380)	-0.04816 *** (0.00394)	-0.04940 *** (0.01374)	-0.04463 *** (0.01436)	-0.04414 *** (0.01423)

<b><i>Agric</i></b>	<b>-0.17262</b> *** <b>(0.01441)</b>	<b>-0.14897</b> *** <b>(0.01416)</b>	<b>-0.17674</b> *** <b>(0.01919)</b>	<b>-0.15085</b> *** <b>(0.01876)</b>	<b>-0.14908</b> *** <b>(0.01871)</b>
<b><i>Service</i></b>			<b>-0.02057</b> <b>(0.01707)</b>	<b>-0.00491</b> <b>(0.01625)</b>	<b>-0.00592</b> <b>(0.01631)</b>
<b><i>Finsector</i></b>				<b>0.05181</b> *** <b>(0.01091)</b>	<b>0.05253</b> *** <b>(0.01092)</b>
<b><i>Rulelaw</i></b>					<b>0.00024</b> <b>(0.00068)</b>
<b><i>Constant</i></b>	<b>-0.36148</b> ** <b>(0.12539)</b>	<b>-0.34723</b> *** <b>(0.12031)</b>	<b>-0.38331</b> *** <b>(0.12066)</b>	<b>-0.30704</b> ** <b>(0.11978)</b>	<b>-0.31885</b> *** <b>(0.11959)</b>
<b>No. of Obs.</b>	<b>649</b>	<b>649</b>	<b>647</b>	<b>624</b>	<b>624</b>
<b>Autocorrelation</b>	<b>Panel-Specific AR(1)</b>	<b>Panel-Specific AR(1)</b>	<b>Panel-Specific AR(1)</b>	<b>Panel-Specific AR(1)</b>	<b>Panel-Specific AR(1)</b>
<b>Chi-Square Stat P-value</b>	<b>263.36</b> <b>0.000</b>	<b>218.01</b> <b>0.000</b>	<b>240.49</b> <b>0.000</b>	<b>244.63</b> <b>0 0.000</b>	<b>244.63</b> <b>0.000</b>

*Notes:*

*i: \*\*\*, \*\*, \* indicate that the coefficients are significant at 1%, 5% and 10% levels of significance respectively while those figures in parentheses are the standard errors.*

*ii 'lnGDPcp' represent log of GDP per capita, 'lnGDPcpsq' represent a square of log of GDP per capita, 'IntTrade' represent international trade in manufactures, 'Inv' represent investment (fixed capital formation), 'Agric' represent Agriculture value added to GDP, 'Service' represent Services value added to GDP, 'finsector' represent financial sector size or depth proxied by m2 (broad money supply), Rulelaw represent civil rights.*

*iii: Variations in number of observations is due to missing values in some variables.*

*iv: The variables, 'NonConflict' and 'FDIxNonConflict', have been excluded from the base model because they are new variables, not included in the original model. This study seeks to explore their relevance in the industrialisation model*

*v: The variable 'Service' was excluded from the base model unlike Agric because it was not part of the original model. This study considers it a possible relevant variable to affect the industrialisation model*

As noted earlier, both the common and panel specific AR(1) forms of autocorrelation are considered in the FGLS estimator to enhance robustness of the results. Under this estimation, five regression equations (*Model 6 to Model 10*) have been estimated following a similar structure as in Table 10 (in terms of the pattern of combination of variables, and the reasoning behind the inclusion of each variable).

#### **4.6.2.2.1 Model 6 (Base Model)**

We observe that in *Model 6* (Table 4.12), constructed similar to *Model 1* (Table 4.10) the coefficient of the FDI was negative (-0.04661) and significant at a 1% significance level. Compared with its corresponding coefficient in *Model 1*, we observe a marginal increase in the magnitude of the FDI coefficient in this model. However the level of significance remained the same. The coefficient of the dummy for the non-conflict countries, *NonConflict* was positive (0.01826) and significant at a 1% significance level. Again, compared with the common AR (1) scenario, the coefficient of *NonConflict* in *Model 6* was more significant than the its correspondent in *Model 1* (5% significance level). To a large extent the coefficients of the control variables did not suffer significant variations in terms of its magnitude or size and the significance level.

#### **4.6.2.2.2 Model 7 (Accounting for the Effects of Conflicts)**

*Model 7* (Table 4.12) compares with *Model 2* (Table 4.10) under the common AR (1) scenario in terms of the combination of variables. In *Model 7*, the interaction term, *FDIxNonConflict* was introduced. The motivation for this had been previously explained in *Model 2*. With regards to the variables of interest, FDI again had a negative and highly significant coefficient (-0.09882, significant at a 1% significance level). The other variable of interest, *NonConflict* still had a positive coefficient and highly significant coefficient (0.01437, significant at a 1% significance level). The interaction term, *FDIxNonConflict* also had a positive and significant

coefficient (0.08393, significant at a 5% significance level). All the control variables remained consistent in terms of the size and the levels of significance of their coefficients.

#### 4.6.2.2.3 Model 8 (Controlling for the Role of the Service Sector)

Again, in terms of the combination of variables, *Model 8* (Table 4.12) mirrors *Model 3* (Table 4.10) which was considered under the common AR (1) scenario. In *Model 8*, the variable, 'Service' was introduced to examine whether the results remain robust with the addition of other relevant variables such as the productivity of the service sector as found by Kang & Lee, 2011. The variables of interest, FDI still had a negative coefficient (-0.10861) and significant at a 1% significance level. *NonConflict*, the dummy for the non-conflict countries still had a positive coefficient (0.01278) significant at a 1% significance level. However, it could be seen that the negative coefficient of the variable *NonConflict* is more significant in *Model 8* (1% significance level) than it was in *Model 3* (5% significance level). The interaction term, *FDIxNonConflict* also had a positive coefficient (0.09088) significant at a 5% significance level. The new variable introduced, *Service* did not have a significant coefficient. Kang & Lee, 2011 however found that the productivity of the service sector was significantly negatively correlated with the employment share of manufacturing, the variant measure for industrialisation. Coefficients of all the other control variables remained highly significant (at a 1% significance level) and had the appropriate signs.

#### 4.6.2.2.4 Model 9 (Controlling for the Role of the Financial Sector)

In *Model 9* (Table 4.12), a new control variable, *Finsector* was introduced into the model to control for the size or depth of the financial sector. *Model 9* mirrors *Model 4* (Table 4.10) in terms of the variable combinations. FDI still had a negative and highly significant coefficient (-0.10547, significant at a 1% significance level). *NonConflict*, the dummy for the non-conflict countries this model had an insignificant coefficient in this model. The interaction term, *FDIxNonConflict*, however still had a positive coefficient (0.08174), significant at a 5%

significance level. The financial sector variable, *Finsector* had a positive and highly significant coefficient (0.05181, significant at a 1% significance level), and the size of the coefficient is about 4.5 times the standard error. The other control variables were also significant and maintained their signs, except for the variable 'Service'.

#### 4.6.2.2.5 Model 10 (Complete Model)

Model 10 (Table 4.12) was the final estimation under the panel-specific AR (1) scenario. Model 10 was constructed similar to *Model 5* (Table 4.10) under the common AR (1) assumption. Table 4.13, the complete model, show similar results as model 10, but with further details. The final control was introduced, *Rulelaw* to control for the government interventions and regulation. With regards to the key variables, FDI had a negative and highly significant coefficient [-0.10492 with p-value (0.000), thus significant at a 1% significance level]. *NonConflict*, the dummy for the non-conflict countries had a positive coefficient [(0.00881, with p-value (0.068)], thus significant at a 10% significance level. The interaction term, *FDIxNonConflict* had a positive coefficient [0.08064, with p-value (0.025), thus significant at a 5% significance level]. The variable, *Rulelaw* had an insignificant coefficient, again suggesting that regulation and government interventions were not significant in explaining industrialisation in Africa during the period, 1980 to 2015. With the exception of *Service*, all the remaining control variables were highly significant with signs consistent with prior expectations and results from similar studies most of the times.

**Table 4.13 Regression Results from the FGLS Estimator-under Panel-Specific AR (1)**

**Senario (Complete Model)**

<i>Cross Sectional Time-Series FGLS Regression [Panel-Specific AR (1)]</i>						
<i>Dependent Variable (Indust)</i>						
<i>Independent</i>	<i>Coefficient</i>	<i>Standard</i>	<i>z</i>	<i>P&gt; z </i>	<i>95% Confidenc</i>	<i>Interval</i>

<i>Variable</i>		<i>Error</i>		<i>(P-Value)</i>	<i>e (Lower)</i>	<i>(Upper)</i>
<i>FDI</i>	<b>-0.104920</b>	<b>0.027742</b>	<b>-3.78</b>	<b>0.000</b>	<b>-0.159294</b>	<b>-0.050547</b>
<i>NonConflict</i>	<b>0.008811</b>	<b>0.004822</b>	<b>1.83</b>	<b>0.068</b>	<b>-0.000639</b>	<b>.018261</b>
<i>FDIxNonconflict</i>	<b>0.080637</b>	<b>0.035864</b>	<b>2.25</b>	<b>0.025</b>	<b>0.010344</b>	<b>0.150928</b>
<i>lnGDPcp</i>	<b>0.122170</b>	<b>0.029503</b>	<b>4.14</b>	<b>0.000</b>	<b>0.064346</b>	<b>0.179994</b>
<i>lnGDPeq</i>	<b>-0.008336</b>	<b>0.001822</b>	<b>-4.57</b>	<b>0.000</b>	<b>-0.011908</b>	<b>-0.004764</b>
<i>IntTrade</i>	<b>0.016397</b>	<b>0.004021</b>	<b>4.08</b>	<b>0.000</b>	<b>0.008516</b>	<b>0.024279</b>
<i>Inv</i>	<b>-0.044141</b>	<b>0.014226</b>	<b>-3.10</b>	<b>0.002</b>	<b>-0.072025</b>	<b>-0.016257</b>
<i>Agric</i>	<b>-0.149078</b>	<b>0.018714</b>	<b>-7.97</b>	<b>0.000</b>	<b>-0.185757</b>	<b>-0.112398</b>
<i>Service</i>	<b>-0.005918</b>	<b>0.016314</b>	<b>-0.36</b>	<b>0.717</b>	<b>-0.037893</b>	<b>0.026057</b>
<i>Finsector</i>	<b>0.052526</b>	<b>0.010921</b>	<b>4.81</b>	<b>0.000</b>	<b>0.031121</b>	<b>0.073931</b>
<i>Rulelaw</i>	<b>0.000240</b>	<b>0.000676</b>	<b>0.36</b>	<b>0.723</b>	<b>-0.001084</b>	<b>0.001564</b>
<i>Constant</i>	<b>-0.318847</b>	<b>0.119587</b>	<b>-2.67</b>	<b>0.008</b>	<b>-0.553233</b>	<b>-0.084460</b>
<i>Panels</i>	<b>Heteroscedastic</b>					
<i>Correlations</i>	<b>Panel-Specific AR(1)</b>					
<i>No. of Obs</i>	<b>624.</b>					
<i>Wald chi2(11)</i>	<b>256.26</b>					
<i>P-value</i>	<b>0.0000</b>					

#### 4.6.2.3 Results from Robust Regression Analysis

For Robustness analysis the complete model has been run under multiple estimation techniques. The primary robust estimation techniques employed in this study are the Prais-Winsten estimation techniques and the pooled OLS techniques. Regressions analysis have also been performed for the panel fixed effects and random effects estimation techniques, though studies have found them to be inappropriate for handling dataset with which violate OLS strong assumptions such as homoscedasticity and no-autocorrelation. Hence results from the panel fixed effects and random effects are also reported as auxiliary regressions results.

**Table 4.14 Multiple Regression Results-Comparison of Estimation Techniques (Robustness Check)**

<i>Comparison of Regression Results under Multiple Estimation Techniques</i>							
<i>Dependent Variable (Indust)</i>							
<i>Independent Variable</i>	<i>FGLS [Common AR(1)]</i>	<i>FGLS [Panel-Specific AR(1)]</i>	<i>Prais-Winsten [Common AR(1)]</i>	<i>Prais-Winsten [Panel-Specific AR(1)]</i>	<i>Pooled OLS</i>	<i>Fixed Effects</i>	<i>Random Effects</i>
<i>FDI</i>	-0.11670 *** (0.03066)	-0.10492 *** (0.02774)	-0.09221 ** (0.03750)	-0.08897 *** (0.03196)	-0.14385 *** (0.03170)	-0.13019 *** (0.03199)	-0.13019 *** (0.03200)
<i>NonConflict</i>	0.00816 *** (0.00495)	0.00881 * (.00482)	0.02417 *** (0.00586)	0.03013 *** (.00606)	0.04373 ** (0.02120)	N/A	0.03748  (0.04355)
<i>FDIxNonConflict</i>	0.11896 *** (0.03717)	0.08063 ** (0.03586)	0.07363 * (0.04414)	0.05500  (0.04374)	0.04554  (0.04333)	0.03748  (0.04355)	0.06283  (0.04214)
<i>lnGDPcp</i>	0.14232 *** (0.03241)	0.12217 *** (0.02950)	0.09390 ** (0.03883)	0.04012  (0.03879)	0.06481  (0.04080)	0.06283  (0.04214)	-0.00698 *** (0.00265)
<i>lnGDPcpsq</i>	-0.00958 *** (0.00203)	-0.00834 *** (0.00182)	-0.00670 *** (0.00243)	-0.00320  (0.00242)	-0.00665 *** (0.00253)	-0.00698 *** (0.00265)	0.00081  (0.00750)
<i>IntTrade</i>	0.01621 *** (0.00461)	0.01639 *** (0.00402)	0.02423 *** (0.00711)	0.02839 *** (0.00709)	0.00654  (0.00736)	0.00265  (0.00750)	0.06001  (0.01829)
<i>Inv</i>	-0.05323 *** (0.01571)	-0.04414 *** (0.01422)	-0.05083 *** (0.02057)	-0.04567 ** (0.02181)	0.05243 *** (0.01821)	0.06001 *** (0.01829)	-0.22138 *** (0.02772)
<i>Agric</i>	-0.15314 *** (0.02121)	-0.14907 *** (0.01871)	-0.16867 *** (0.02751)	-0.12878 *** (0.02843)	-0.22405 *** (0.02714)	-0.22138 *** (0.02772)	-0.15263 *** (0.02081)
<i>Service</i>	-0.02190  (0.01873)	-0.00591  (0.01631)	-0.00181  (0.02397)	-0.00355  (0.02349)	-0.15186 *** (0.02007)	-0.15263 *** (0.02081)	-0.02789 *** (0.02010)
<i>Finsector</i>	0.06079 ***	0.05252 ****	0.01203	0.00477	-0.02584 **	-0.02789 **	-0.02509 **

	(0.01211)	(0.01092)	(0.01393)	(0.00907)	(0.01227)	(0.01287)	(0.01224)
<i>Rulelaw</i>	0.00092 (0.00071)	0.00024 (0.00067)	0.00004 (0.00103)	-0.00071 (0.00094)	0.00015 (0.00097)	-0.00011 (0.00098)	0.00021 (0.00097)
<i>Constant</i>	-0.38699 *** (0.12848)	-0.31884 *** (0.11958)	-0.18770 (.15586)	0.00067 (0.15475)	0.12086 (0.16751)	0.18913 (0.17183)	0.10991 (0.16767)
<i>No. of Obs.</i>	624	624	626	626	626	626	626
<i>Wald chi2(11)/ F-Stat Prob &gt; chi2/F</i>	202.35 0.0000	256.26 0.0000	134.11 0.0000	123.79 0.0000	208.86 0.0000	21.81 0.0000	203.76 0.0000
<i>R-Squared</i>	N/A	N/A	0.4377	0.6319	N/A	0.2743	0.2707
<i>Autocorrelation</i>	Common AR(1)	Panel- Specific AR(1)	Common AR(1)	Panel- Specific AR(1)	N/A	N/A	N/A

#### 4.6.2.3.1 Comparison of Regression Results under FGLS, Prais-Winsten and Pooled

##### OLS Estimation Techniques

FDI has consistently shown negative and highly significant coefficients most of the time. This observed negative significant relationship is robust across the Prais-Winsten's estimation, both under the common-AR(1) and Panel-Specific Assumptions, and it is also robust in the Pooled OLS estimator. The auxiliary estimations, both fixed effects and random effects techniques show that FDI had a negative significant effect on industrialisation in the African region during the period under study.

*NonConflict*, the non-conflict countries dummy variable consistently showed positive and highly significant coefficients in the FGLS estimator. Similar results are obtained for this variable in the Prais-Winsten's estimator [under both the Common AR(1) and Panel-Specific AR(1) scenarios], and in the Pooled OLS estimator, thus suggesting that highly significant

positive relationship observed between the non-conflict countries dummy and industrialisation is robust across several controls and multiple estimation techniques.

*FDIxNonConflict* showed positive and highly significant parameter estimates in the FGLS estimator (under both scenarios), but the correlation was significant at a 10% significance level only under the Common AR (1) scenario in the Prais-Winsten's estimator. The coefficients for *FDIxNonConflict* were insignificant under the Panel-Specific AR (1) specification in the Prais-Winsten's estimator, and also insignificant in the Pooled OLS technique. Thus the observed positive relationship between, the interaction of FDI and Non Conflict Countries dummy (*FDIxNonConflict*), and industrialisation is less robust across multiple estimation techniques, but highly robust to several controls under the FGLS (both scenarios) and the Prais-Winsten's Common AR (1) specification.

#### **4.7 Discussion of Results**

This section discusses the findings from the main regressions and the robustness analysis under relevant themes, for variables that have a significant relationship with the industrialisation.

##### **4.7.1 FDI and Industrialisation**

The result for FDI appears quite intriguing. The theoretical argument for FDI flows is hinged on boosting of business activities and growth in the recipient countries. Thus we expected FDI flows into Africa to boost industrialisation. Indeed FDI inflows do provide additional capital, human resources in terms of supplying management and technical expertise, and technological spill-overs (Sayek, Alfaro, Chanda, & Kalemli-Ozcan, 2003). However, the results from the regressions show that FDI did not necessarily promote Africa's industrialisation.

From Table 4.10 and Table 4.12, FDI shows negative and highly coefficients most of the regression equations. The coefficient of FDI is statistically significant at 1% in *Models 2 to 10*, and similar coefficients statistically significant at 5% in *Model 1*. The size of the coefficients varied marginally at the inclusion of additional control variables, however the coefficients were (-0.10432) on average. The size of the coefficients were more than three times the size of the coefficients most of the regression equations. In the robustness estimations presented in Table 4.14, we observe that the results for FDI are robust in the Prais-Winsten's estimator (under both the common AR(1) and panel-specific AR(1) specifications), and in the Pooled OLS estimator. The auxiliary regressions via the fixed effects and random effects estimations techniques also show negative and significant results for FDI. However, the results from the auxiliary regressions are not incorporated in the discussion because the characteristics of this dataset from the diagnostics do not suggest the use of the panel fixed effects and random effects estimation techniques. These results suggestive of a negative significant effect of FDI on industrialisation in Africa are consistent and robust across several relevant controls and multiple estimation techniques.

Previous studies found that FDI had either an insignificant or a negative effect on industrialisation (Gui-Diby & Renard, 2015; Rowthorn & Ramaswamy, 1999; Kaya, 2010). Gui-Diby & Renard (2015) also observed that FDI had insignificant effect in the industrialisation model in 47 African countries observed from 1980 to 2015. Kaya (2010) also found that inward FDI stock and inward FDI flows had either negative significant effect or insignificant effect on industrialisation in all the regressions observed for an unbalanced panel of 64 developing countries. Kaya (2010) suggested that direct investments by foreign firms may be less important for industrialisation than variable such as trade. Departing from these findings, Kang & Lee, 2011 observed that FDI inflows had positive significant effect on industrialisation Korea. This this prima facie evidence (or status quo) of negative significant

effect of FDI on industrialisation in Africa, suggests that there is the need to efficiently allocate FDI resources to harness its potential benefits in boosting industrialisation. Markusen & Venables (1999) show theoretically that FDI can be a catalyst to boosting industrialisation. Empirical evidence in other jurisdiction shows that FDI inflow is important for industrialisation. However, this study has proceeded with further analysis seeking to explore the potential role of conflicts or civil wars on the nexus between FDI inflows and industrialisation in Africa

#### **4.7.2 Conflict and Industrialisation**

To exploring the effects of conflicts, we started with its unique effects on industrialisation. The Conflict variable (*NonConflict*) is constructed as a dummy which takes a value of 1 for countries which did not experienced civil wars during the period 1980 to 2015 (*non-conflict countries*), and zero (0) for the *conflict countries*. Because of the destructive effects of countries through the destruction of human lives, infrastructure, businesses, social and economic stability (Collier, 1999; Bannon & Collier, 2003), we hypothesised that the conflicts should have a negative effect on industrialisation. Industrialisation should be lower in *conflict countries* than in *non-conflict countries*. In other words, industrialisation should be higher in *non-conflict countries* than in *conflict countries*. The results from the regression analysis confirmed this hypothesis.

The study found that the variable capturing non-conflict countries (*NonConflict*) had highly significant positive association or relationship with industrialisation in most of the regressions (see Table 4.10 to Table 4.14); and this relationship is robust to the inclusion of relevant controls, and across multiple relevant estimation techniques. For example, *NonConflict*, the dummy variable for non-conflict countries had positive coefficients which are more than three times the standard errors most of the most of the time, and these coefficient are highly significant (at 1% significance levels) most of the time. The signs and significance of the

coefficients of the non-conflict countries dummy remained robust in the across the FGLS [both Common and Panel-Specific AR(1)], Prais-Winsten, and Pooled OLS estimation techniques. These results provide strong evidence that the *non-conflict countries* experienced higher levels and faster pace of industrialisation than the *conflict countries* during the period 1980 to 2015 in the African region. In other words, the *conflict countries* experienced a slower pace of industrialisation than the *non-conflict countries* during the period under study.

This finding is important in many respects. It clearly lends support theoretical and empirical evidence that conflicts or civil wars have destructive effects on the economic and social wellbeing of countries that fall victim to it (Allansson, Erik & Lotta, 2017; Bannon & Collier, 2003; Fearon, 2004; Gleditsch, Peter, Mikael, Margareta & Håvard, 2002; Collier, 1999). These results suggest that first; conflict or civil war is a significant determinant of industrialisation in Africa. The level of industrialisation was relatively higher in the African countries which did not experience civil wars during the period understudy than in those countries which experienced civil wars. By implication, the level of industrialisation was relatively lower in *conflict countries* than in *non-conflict countries*. These results provide strong evidence of a negative impact of conflict on industrialisation in African countries during the period 1980 to 2015. This finding helps to explain the low levels and slow pace of industrialisation in Africa countries (UNECA, 2013). Stylised facts on the incidence of civil of civil wars in Africa show that during the period 1980 to 2015, majority of African countries experienced civil wars ( 28 countries out of a sample of 48, representing 58.33%) . Thus more than half of these countries experienced civil wars, and our results show that civil wars slow down industrialisation.

This study suggests that the overall outlook of industrialisation in Africa has been low and at a slow pace over the past three decades (UNECA, 2013; UNECA, 2016) partly because of the dominance of conflicts in the region. From the stylised facts, 42.86% (12 African countries)

of the *conflict countries* (28) were in *active civil wars* during the period 1980-1989. The proportion of *conflict countries* involved in *active civil wars* (*rate of active civil wars*) rose to 82.14% (23 out of 28 *conflict countries*) during next decade, 1990-1999 being a 91.64% increase in *rate of active civil war per decade*. By the third decade, 2000-2009, the *rate of active civil wars* rose to 64.29% from 82.14% observed in the immediate past decade, indicating decline in *rate of active civil wars per decade* by 17.85%. Indeed, the period 1980-1999 marked a period of major political unrests in several African countries arising from electoral violence, ethnic clashes, coup d'états and organised military attacks, a period when several African countries were striving to gain political independence and to stabilize their economies (Collier, 1999; Collier & Hoeffler, 1998; Collier & Hoeffler, 2002; Collier, Hoeffler & Rohner, 2009; Allansson, Erik & Lotta, 2017). This accounted for the surge in rate of active civil wars (91.64%) from the first to the second decade (1980-1989 to 1990-1999). From the period 2000-2009, there have been improvements in peace keeping operations with active supports and ceasefire orders from international bodies such as the United Nations which helped countries involved in civil wars in previous years to cease. These peaceful resolutions accounted for the decline in the *rate of active civil wars* during the period 2000-2009. Finally within the half decade, 2010-2015, proportion of conflict countries in active civil wars (*rate of active civil wars*) was 28.57% (8 out of 28 conflict countries) [see Appendix I for the methods used to compute statistics on conflicts]. Shedding light on these stylised facts is important to understand the empirical results which suggested that conflicts or civil wars had significant negative effect on industrialisation in African countries during the past three decades, and that general outlook of low level of industrialisation in the African region during the past three decades could be explained by the prevalence of civil wars during these periods. The empirical evidence expounds the disastrous effects of civil wars on conflict

prone countries. Indeed Agbloyor, Gyeke-Dako, Yawson & Abor (2016) also show that economic growth is lower in conflict countries than in non-conflict countries in Africa.

#### 4.7.3 FDI, Conflict and Industrialisation

The next objective of the study was to account for the potential intermediary role of conflicts or civil wars in explaining the FDI-industrialisation nexus in African countries, in a quest to go beyond the boundary of knowledge provided by existing studies. To account for the potential effects of conflicts in the FDI-industrialisation nexus, there is need to ascertain the joint impact of FDI and Conflict on industrialisation, hence, the interactive term, *FDI $\times$ NonConflict* was constructed. The motivation for analysing this relation is to find out whether *FDI* and the *NonConflict* dummy will jointly have a positive or negative impact on industrialisation. If the interaction term carries positive and statistically significant coefficients with respect to the industrialisation variable, then we can conclude that it is the interaction of the variable capturing *non-conflict countries* which offset the negative significant effect FDI had with the industrialisation variable. Such a result would help us to infer that to a large extent, the non-conflict countries experienced significant positive effects from FDI inflows on industrialisation, although the general outlook, the full sample show that FDI had negative significant effects on industrialisation during the same period.

We have already seen from the initial or preliminary results that there is strong evidence that *FDI* net inflows had a negative significant relationship with industrialisation during the period 1980 to 2015, and this confirmed findings from existing studies such as Gui-Diby & Renard, 2015. We have also observed found strong evidence that the *variable capturing non-conflict countries (NonConflict)* was significantly positively related to industrialisation during the period same period. Now we consider the effect of the interaction of FDI and Non-Conflict countries dummy (*FDI $\times$ NonConflict*) on the industrialisation variable (*indust*). The sign and

level of significance of the interaction of FDI and the NonConflict dummy (*FDIxNonConflict*) is important in explaining how conflict mediates the FDI-industrialisation nexus. An evidence of positive and significant coefficients for *FDIxNonConflict*, the interaction term, suggests that FDI had positive effect on industrialisation in the non-conflict countries.

From Tables 4.10 and 4.12, *FDIxNonConflict* show positive and highly significant parameter estimates (at 1% significance level in *Models 2 to 5* and at 5% significance level in *Models 6 to 10*) in the FGLS estimator under both common AR(1) and panel-specific AR(1) scenarios. The average size of the coefficients across the models was (0.09701). The coefficients were more than three times the standard errors on average. This relationship observed for *FDIxNonConflict* in the FGLS estimator was robust to several controls, and in the Prais-Winsten's estimator under the common AR(1) specification. Here (Column 4 of Table 4.14) we observe that the coefficient for FDI was positive (0.07363) and statistically significant at a 10% significance level under Common AR(1) specification in the Prais-Winsten's estimator.. However, *FDIxNonConflict* variable had insignificant coefficients under the Panel-Specific AR(1) specification of the Prais-Winsten's estimator, and also in the Pooled OLS estimator, neither was it significant in the auxiliary regressions via the fixed effects and random effects model as shown in Table 4.14. However, as the theoretical and empirical literature suggested, the FGLS and the Prais-Winsten estimations techniques are more robust techniques for estimating models with datasets that violate the OLS assumptions than the FE, RE, and Pooled OLS techniques (Wooldridge, 2013, Greene 2012) the results above are very robust especially as Tables 4.10 to 4.13 show that estimates for *FDIxNonConflict* remained consistent to all the relevant controls across *Model 1 to Model 10*. In summary, there is sufficient evidence that conflict or civil war was important in explaining the effects of FDI on industrialisation in Africa during the period 1980 to 2015. The implication of these findings is

expatiated further.

We earlier find that FDI had a negative effect on industrialisation in Africa (the full sample); and now the interaction of FDI and non-conflict countries dummy, *FDIxConflict* had positive effects on industrialisation in Africa during the same period, and moreover the dummy for the non-conflict countries, standing alone, *NonConflict* had significant positive effects on industrialisation. These results are not contradictory; but rather help to unravel the puzzle in the FDI-industrialisation nexus. The earlier finding that FDI had a negative effect on industrialisation in Africa could be driven by the inclusion of conflict countries in full samples without controlling for the effect of conflicts. Hence, this study proposes that results of insignificant or negative relationship observed between FDI and industrialisation in Africa in previous studies was partly due to the inclusion of conflict countries in the full samples without controlling for the effects of conflicts, an important variable which explains industrialisation in Africa.

The results from this study show that in the non-conflict countries, FDI had a positive impact on industrialisation while it had a negative impact on industrialisation in the conflict countries. The results further show that *conflict countries* experienced a slower pace of industrialisation than the *non-conflict countries* during the period under 1980 to 2015. In order words, non-conflict countries experienced a faster pace of industrialisation than the conflict countries. This study therefore argues that the empirical explanation that FDI inflows did not promote industrialisation in Africa over the past three decades is inadequate. The results from this study show that during the period 1980 to 2015, FDI net inflows benefited African countries which were politically stable because they had the requisite absorptive capacities in terms of economic infrastructure, human capital, and technological

infrastructure needed to harness FDI inflows for the benefits of recipient countries, drawing insights from the absorptive capacity hypothesis. In essence, countries plagued with conflicts or civil wars were not in a position to utilise FDI net inflows to promote industrialisation as the absorptive capacity hypothesis puts forth. This is because civil wars limit the absorptive capacities of the recipient countries of FDI inflows. The theoretical and empirical literature on conflicts suggest that civil wars destroy the institutional infrastructure, human capital and financial resources need to place recipient countries in a position to benefit from FDI inflows (Durham, 2004; Agbloyor, Gyeke-Dako, Yawson & Abor, 2016).

Probably, in times war, FDI inflows are misappropriated or diverted into social use and peace-keeping as opposed to growth of business in the manufacturing and industrial sectors. Also the occurrence of civil wars is deterrent to inflows of FDI. Investors prefer to invest in environments where they can have some level of certainty about the outcomes of their investments. Though the future is uncertain, conflicts increases uncertainty, and investors would not be motivated to channel their investments into 'war-prone countries' (Bannon & Collier, 2003). Moreover, upon the inception of civil wars investors who have investments in the host country are likely to move their investments entirely to other countries which are peaceful to secure their investments. Some investors who are quite optimistic may reduce the level of investments hoping for the conflicts to subside and business to be rejuvenate. However, even with these resilient investors, it is unlikely that they would want to increase their investments in civil wars are escalating. The findings on the effects of conflict provides further insights into the FDI-industrialisation nexus in Africa, and these insights could be validly extended to explain the FDI-industrialisation nexus in regions with similar conditions as African countries observed in this study.

#### 4.7.4 Income and Industrialisation

From the results of the FGLS regressions presented in Table 4.10 and Table 4.12, the variable GDP per capita ( $\ln\text{GDP}_{cp}$ ), indicative of household income shows positive coefficients statistically significant at 1% in *Models 2 to 10*, and one statistically significant at 10% in *Model 1*. Moreover, the Prais-Winsten's estimation shows similar results. For example, from Table 4.14, in  $\ln\text{GDP}_{cp}$  shows positive coefficients significant at a 5% significance level. These results show a positive relationship between GDP per capita (Household income) and industrialisation confirming the findings of earlier studies (Gui-Diby & Renard, 2015; Rowthorn & Ramaswamy, 1999).

Moreover, we observed that the square of GDP per capita ( $\ln\text{GDP}_{cpsq}$ ) had negative coefficients statistically significant at 1% in models 1 to 10 in both the main regressions. These results were robust in the Pooled OLS estimator, and in the Prais-Winsten's estimator [Common AR(1) scenario]. This finding suggests that the positive relationship between GDP per capita and industrialisation is non-linear, and it confirms industrialisation varies with level of economic development (the inverted-U hypothesis) (1957). With economic growth, per capita income or household income rises and households switch demand from unprocessed goods and agriculture raw materials to manufacturing goods. Consequently, rise in demand for manufactures drives expansion in the manufacturing sector. However, with further levels of economic growth, household switch demand from manufactures to services. Thus the evolution of industrialisation along countries' level of economic development depicts a U-shaped curve. The inverted-U hypothesis explains that there is industrialisation when there is boom in manufacturing activities at the onset of economy growth, however as services gain more importance than manufacturing in later stages of growth; there is decline in industrialisation (Clark, 1957; Kang & Lee, 2011). This is termed de-industrialisation. The positive sign from the income variable and negative sign from its squared term confirms the

existence of this non-linear relation which is a reflection of inverted U-hypothesis evident in Africa's industrialisation. This find is consistent with results obtained by Gui-Diby & Renard (2015) for Per capita income or household income and its squared term. There is a virtual shift from no industrialisation regime to industrialisation regime and then to a de-industrialisation regime along countries' economic growth trajectory.

#### **4.7.5 Financial Sector and Industrialisation**

The role of the financial sector is captured by its size, and it is proxied by the broad money supply following Gui-Diby & Renard (2015). From table 4.10, the financial sector variable (*Finsector*) shows positive and highly significant coefficients. The coefficients for (*Finsector*) were statistically significant at 1% in models 4, 5, 9 and 10. From the results obtained from the Prais-Winsten's estimations and Pooled OLS technique were insignificant as shown in Table 4.15. The general outlooks of the results show that the financial sector has a positive significant relationship with industrialisation. It thus suggests that the financial sector is important in promoting industrialisation. Countries with strong financial sectors are more likely to provide financial resources to support their industrialisation agenda.

#### **4.7.6 Agriculture and Industrialisation**

The variable agriculture (*Agric*) captures the hypothesis that the priority placed on other sectors tends to affect industrialisation (which is hinged on the manufacturing or industrial sector). From the regression results in table 4.10, we observe that the variable *Agric* has negative and highly significant coefficients in all the regressions: models 1 to 10 in the main regressions as well as in the robustness analysis (see table 4.15). These results appear to show a negative relationship between agriculture and industrialisation. Gui-Diby & Renard (2015) also observed significant negative coefficients for agriculture in relation to industrialisation in most of the regressions. Is this finding empirically and theoretically sound, and what insights does it give us about Africa's Industrialisation?

From the theoretical perspective, industrialisation involves a shift from the primary industries such as agriculture, mining and fisheries into manufacturing industries for the purpose of achieving structural and economic transformation (UNECA, 2013, African Development Report, 2015). Thus boosting industrialisation implies diminishing the importance of the primary industries such as agriculture. Again, in the event that primary industries such as agriculture drive the economy largely, then via the inverse relationship, industrialisation would be at low level. And this is the challenge confronting Africa's industrialisation. There is still heavy reliance on primary industries such as agriculture (UNECA 2013, UNECA 2016). The findings from this study suggest that for African countries to boost industrialisation there is the need to re-align their economic policies from heavily relying on primary industries such as agriculture toward manufacturing and industry.

#### **4.7.7 International Trade and Industrialisation**

The variable '*IntTrade*' captures international trade in manufacturing goods and services. It was included in the model to control for the effects of international trade differences among countries. Earlier studies found that international trade differences are important in explaining differences in industrialisation among countries (Kaya, 2010; Rowthorn & Ramaswamy, 1999). This variable is constructed from the sum of manufacturing imports and exports scaled by GDP. This variable is better able to capture international trade holistically and moreover specifically given that manufacturing is the central theme in industrialisation. Earlier studies such as Gui-Diby & Renard (2015) and Kang & Lee (2011) captured international trade by its separate components, imports and exports, and observed their separate relationship with industrialisation. They also used merchandise imports and exports, however given that manufacturing is the central theme in industrialisation, manufacturing imports and exports appear more specific to the relationship under investigation (See Rowthorn & Ramaswamy, 1999). Hence this study proposes manufacturing imports and exports as measures for

international trade in the industrialisation model rather than general merchandise imports and exports as used by previous studies such as Gui-Diby & Renard (2015), and Kang & Lee (2011).

From the regression results in Table 4.10, '*IntTrade*' had positive and highly significant coefficients most of the time. The coefficients of *IntTrade* were significant at a 1% significance level in models 1 through 10 in the main regressions. The results are robust in the Common AR(1) and panel-specific AR(1) specification in the Prais-Winsten's estimator. and in the robustness analysis (see table 4.15). These results suggest a positive effect of international trade openness in manufactures on industrialisation in Africa. Countries with trade policies that promote manufacturing trade are more likely to boost industrialisation in their economies. However, the extent of the impact certainly depends on whether the country is more export oriented or import oriented. The literature describes this as trade-led industrialisation (UNECA, 2015). We expect that trade policies that promote manufacturing exports will tend to boost the growth of the local manufacturing industry and promote industrialisation. Such policies could include reduced tariffs on manufacturing exports, tax incentives to companies in the business of processing raw materials for exports.

#### **4.7.8 Investments and Industrialisation**

The variable investment (*Inv*) captures domestic investments proxied by countries' fixed capital formation. Theoretically, investments should relate positively with industrialisation because the increase in investments implies an addition to capital stock which is an input to the growth of businesses in manufacturing activities. Also increase in investment expenditure in manufactures boost productivity of industry, and also increases manufacturing employment (Rowthorn & Ramaswamy, 1999). However, Gui-Diby & Renard (2015) found strong evidence to the contrary in the African industrialisation model. They observed that investments, measured by the rate of fixed capital formation, had negative and significant

coefficients in the industrialisation model in all the regression equations. Similarly, the results from the regressions in the current study also show that investment (*Inv*) had negative and significant coefficients in relation to industrialisation (*indust*) in all the regression equations considering all relevant controls and across various estimation techniques. From Table 4.10, we observe that investments have negative coefficients statistically significant at 1% in models 1 to 10 in the main regression, and as well as highly significant coefficients in the robustness analysis (see table 4.15).

Gui-Diby & Renard, 2015 indicate that the negative impact of investments could be explained through the light of economic policy and natural resources. Following Corden & Neary (1982), and Botta (2010), Gui-Diby & Renard (2015) explained that it could be that the investments in Africa are directed more to the natural resource sector rather than to the manufacturing and industrial sectors. Therefore increase in investments tends to decrease industrialisation (that is de-industrialisation). This explanation ties with the earlier finding for agriculture. Agriculture was found to be negatively related to industrialisation. This phenomenon could mean that African economies place priority on (place more investments in) the non-manufacturing sectors such as natural resource sectors, hence the investments are unable to promote industrialisation. Investments could promote industrialisation when the investments are channelled to the manufacturing and industrial sectors-the sectors attracting the investments matter. Rowthorn & Ramaswamy (1999) confirmed that investments positively affect industrialisation in OECD countries.

## CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Introduction

This chapter presents a summary of key findings from the analysis of results and discussions. It also presents the conclusions that could be drawn from the study, and recommendations from the study, relevant to policy, practice and future research.

### 5.2 Summary of Findings

This section contains the summary of the major findings from the study. The study essentially sought to examine the FDI-industrialisation nexus using a more recent dataset, and then to examine the role of conflicts in the FDI-industrialisation nexus. This variable, though often neglected, is of importance in studies on Africa because several African countries have experienced conflicts or civil wars over the past three decades (Collier, 1999; Bannon & Collier, 2003; Collier, Hoefler & Rhooner, 2009).

On the effect of FDI on industrialisation, the preliminary results from the main regressions and robustness analyses show that FDI had a negative significant impact on industrialisation in Africa during the period 1980 to 2015. Gui-Diby & Renard (2015) also found that FDI insignificant effect on industrialisation in Africa over the period 1980 to 2009. This prima facie empirical evidence is a paradox in the FDI-industrialisation nexus because theoretically and from practioners' point of view FDI inflows provide additional resources that could catalyse industrialisation (Markusen & Venables, 1999; Ozturk, 2007).

Given this preliminary finding, the next objective was to ascertain whether the variable conflict could be a significant determinant of industrialisation in Africa. On the effect of conflict on industrialisation, from the main regressions and robustness analysis the dummy variable for non-conflict countries (*NonConflict*) had positive coefficients which were highly

significant. The observed coefficients for *NonConflict* were robust in the Prais-Winsten estimator and Pooled OLS estimator. These results suggest that first; conflict is a significant variable in explaining industrialisation in Africa; and that the level of industrialisation was relatively higher in the non-conflict countries than in the conflict countries. In other words, by implication, the level of industrialisation was relatively lower in the conflict countries than in the non-conflict countries. From the literature on conflicts, the effects of conflicts are pervasive and enduring into the long term (Collier, 1999; Bannon & Collier, 2003). Hence conflict countries suffer economic and social disadvantages that impede their ability to match non-conflict countries on economic and financial performance indicators, and for that matter industrialisation. This is to say that though the level of industrialisation in Africa is generally low, countries which have experienced civil wars have relatively lower levels of industrialisation than those countries which have not experienced civil war.

We now extended the analysis from the independent effects of FDI and conflict on industrialisation to the interactive effect of FDI and conflict on industrialisation. This analysis follows the initial predisposition that conflict could play a significant role in explaining the relationship between FDI and industrialisation in Africa, or put differently, the FDI-industrialisation nexus.

In the main regressions and robustness analysis, *FDIxNonConflict*, the interaction term, had positive coefficients statistically significant at a 1% significance level in models 2 through 4, and at a 5% significance level in models 6 through 10. These results indicate that indeed conflict plays a significant role in explaining the relationship between FDI and industrialisation in Africa. The results suggest that in non-conflict countries, FDI had a significant positive effect on industrialisation in Africa. Meanwhile, it was earlier found that FDI had a negative effect on industrialisation in Africa (the full sample). These results are not contradictory; they demonstrate that the general finding that FDI had a negative effect on

industrialisation was driven by the conflict countries present in the full sample. This study therefore argues that FDI inflows benefits African countries which are politically stable, and that it is inadequate to conclude that FDI do not promote industrialisation in Africa per the findings of existing studies such as that of Gui-Diby & Renard (2015). Beyond the existing studies, in contributing to explaining the paradox in the FDI-industrialisation nexus, this study established that in the non-conflict countries in, FDI had a positive effect on Industrialisation. Theoretically, conflict countries lack the required absorptive capacity in terms of institutional and infrastructural capacity to help them benefit from FDI (Agbloyor, Gyeke-Dako, Yawson & Abor, 2016; Durham, 2004).

On the role of the financial sector, it was found that the financial sector had a positive relationship with industrialisation, and this relationship is significant in both the main regressions and the robustness analysis. It thus suggests that a vibrant financial sector is important in promoting industrialisation.

On the role of international trade, the results from both the main regressions and robustness analysis show a positive effect of openness to manufacturing trade or liberalisation of manufacturing trade on industrialisation. Countries with policies that promote manufacturing trade are more likely to boost their industrialisation. This implies that countries that are more open or liberal to manufacturing trade on the international front, with especially export orientation are likely to experience higher levels of industrialisation. This is termed trade-led industrialisation (UNECA, 2015).

On the role of agriculture, the results from both the main regressions and the robustness analysis show a negative link between agriculture and industrialisation. The regressions of Gui-Diby & Renard (2015) also show a negative significant relationship between agriculture and industrialisation. This result suggests that in the event that agriculture largely drives an

economy, then via the inverse relationship, such an economy might not industrialise. UNECA (2013) noted that Africa's industrialisation is challenged by countries' heavy reliance on primary industries, such as Agriculture (UNECA, 2013).

On the effect of household income, the results show a positive relationship between GDP per capita (household income) and industrialisation as found by related studies such as Gui-Diby & Renard, 2015; Kaya, 2010). The square of the GDP per capita is negatively related with industrialisation. This reveals a non-linear relationship between the stages of economic development, as measured by per capita national income (household income), and the industrialisation, measured by manufacturing value-added. It also confirms the inverted-U hypothesis in industrialisation literature as proposed by Clark (1957). In essence the level of industrialisation increases with the level of economic growth up to a point, then at higher levels of economic growth, countries tend to experience a decline in industrialisation-this is termed de-industrialisation (Kaya, 2010; Kang & Lee, 2011; Gui-Diby & Renard, 2015)

The results show a negative significant effect on investments on industrialisation. This finding deviates from expectation because investment amounts to capital accumulation, and this should promote industrialisation (Kaya, 2010; Kang & Lee, 2011). However Gui-Diby & Renard (2015) obtained similar results for investments, and they explained that investments in Africa seemed to be directed to non-manufacturing sectors such as the natural resource sectors. Increasing investments in non-manufacturing sectors may not necessarily promote industrialisation.

Services sector productivity (*Service*) had no significant effect on industrialisation in most of the regressions (Table 4.10 to Table 4.13) except under the auxiliary regressions with fixed effects and random effects techniques (Table 4.14). Government interventions and regulations had no significant effect on industrialisation in African countries during the period 1980 to

2015 as indicated by the results (Table 4.10 to Table 4.14) Africa. Domestic investments (Inv) did not promote industrialisation in African countries during the period 1980 to 2015; the investment variable (Inv) showed negative and highly significant coefficients in most of the regressions (Table 4.10 to Table 4.13). Manufacturing trade openness show positive effect on industrialisation with positive and significant coefficients in most of the regressions (Table 4.10 to Table 4.14). Thus countries more open for manufacturing trade experienced higher levels of industrialisation during the sample period.

### **5.3 Conclusions**

The purpose of this research was to examine the effect of conflicts and FDI on industrialisation using a sample of 48 African countries over the period 1980 to 2015. The study began by verifying the empirical relationship between FDI and Industrialisation by adapting the industrialisation model of Gui-Diby & Renard (2015). Gui-Diby & Renard (2015) observed that FDI did not have a significant effect on industrialisation in Africa across the period 1980 to 2009. This study advanced the work of Gui-Diby & Renard (2015) by incorporating into the industrialisation model, an important but previously omitted variable, conflict. The motivation for considering the potential role of conflicts stem from the fact that over the past three decades, the African region experienced numerous incidences of civil wars which produced severe adverse effects on countries involved (Collier, 1999; Bannon & Collier, 2003; Elbadawi & Sambanis, 2000). Extant literature suggests that civil wars significantly negatively affect economic development in countries that engage in it, and these adverse effects are pervasive and endure into the long term (Bannon & Collier, 2003; Collier, Hoefler & Rhooner, 2009). Thus conflicts could affect their industrialisation.

No study has however explored the conflict effects in the industrialisation literature. The first objective of this study was therefore to ascertain the impact of FDI on industrialisation in African countries across the period 1980 to 2015. The second objective was to examine the

impact of conflicts on industrialisation in Africa. Basically, the study sought to establish whether conflict is a significant variable to explaining industrialisation in Africa. The final objective was to examine the role of conflict in explaining the relationship between FDI and industrialisation in Africa. The priori expectation was that conflicts could have negative effect on industrialisation, and thus industrialisation should be lower in conflict countries than in non-conflict countries. The other expectation or hypothesis was that in non-conflict countries, FDI should have a positive effect on industrialisation.

Due to the presence of heteroscedasticity and autocorrelation in the data, the empirical relations were estimated using the FGLS estimation as the main estimation techniques (Gui-Diby & Renard, 2015, Green, 2011), and the Prais-Winsten's estimation techniques and the Pooled OLS technique was employed as the robustness check techniques. Results were also reported for auxiliary regressions performed on the complete model via the panel fixed effects and random effects approach techniques for comparative purposes.

An important finding from the study was that the preliminary evidence of a negative significant effect of FDI net inflows on industrialisation in Africa, could be further explained by effects of conflicts. Gui-Diby & Renard (2015) established that FDI did not have a significant effect on industrialisation in Africa over the period 1980 to 2009. Kaya (2010) also observed that FDI inflows had insignificant or negative effect on industrialisation in developing countries, including Sub-Saharan Africa using multiple estimation techniques on an unbalanced panel of 64 developing countries across the world during the period 1980 to 2003. Similarly, the preliminary or prima facie evidence from the results of the current study suggested a negative significant effect of FDI net inflows on industrialisation in Africa during the period, 1980 to 2015. However, further analysis seeking to account for the effects of conflicts, produced findings which helped to unravel the puzzle.

To account for the effect of conflicts, the current study classified countries into conflict and non-conflict countries based on relevant and reliable data from multiple sources. A dummy variable was constructed to capture non-conflict countries. This variable takes the value of one (1) for those countries which did not experience civil wars during the period under study, and zero (0) for those countries which experienced civil wars during the same period. The potential role of conflicts in the FDI-industrialisation nexus was explored by constructing a variable which captured the joint effect of FDI and the non-conflict countries dummy on industrialisation. The results were subject to rigorous econometric diagnostics, step-wise inclusion of relevant control variables, and empirical estimations across multiple techniques to ensure results were valid and reliable. Findings from further analysis suggested that FDI had positive significant effects on industrialisation in the non-conflict countries during the period 1980 to 2015. Thus the presence of conflict countries in the full sample contributed to the observed negative effect of FDI on industrialisation.

The results from the conflict estimations show that conflicts had negative significant effects on industrialisation in Africa during the period 1980 to 2015. Industrialisation was lower in countries which experienced civil wars than their counterparts which did not experienced civil wars. From the literature, it was established that conflicts destroy the absorptive capacities of countries hence conflict countries are unable to benefit from FDI inflows because they lack the pre-requisite capacity (absorptive capacity). Therefore for countries to benefit from FDI in terms of boosting industrialisation, they should endeavour to eschew conflicts or civil wars.

Another important finding from the study is that agriculture was had negative significant relationship with industrialisation most of the time, and across multiple estimation techniques. This finding suggests that promoting agriculture productivity might not promote industrialisation. Agriculture and industry are competing sectors, hence a when more resources are channelled to the agriculture sector, then less resources would be available for

competing sectors such as manufacturing or industry. The literature established that most African countries are still agrarian economies. This result empirically shed light on why industrialisation in Africa is generally low.

In response to research hypotheses, sufficient evidence has been found to show the hypotheses were confirmed and those were rejected:

1. *Ho: FDI has a positive effect on industrialisation in Africa.*

This hypothesis was partly confirmed. The study found that FDI had a positive significant effect on industrialisation in the non-conflict countries.

*Ha: FDI has a negative effect on industrialisation in Africa.*

This hypothesis was also partly confirmed. It was found that in the conflict countries, FDI had a negative significant effect on industrialisation. Extant literature explains that conflict countries lack the absorptive capacity to benefit from FDI.

2. *Ho: Conflicts have a significant effect on industrialisation in Africa.*

This hypothesis was confirmed. The study found strong evidence that countries which suffered from conflicts had lower levels and slower pace of industrialisation; whereas the non-conflict experienced higher levels and faster pace of industrialisation during the period under study.

*Ha: Conflicts have an insignificant effect on industrialisation in Africa.*

This hypothesis was rejected since the study found robust evidence that conflicts had significant effects on industrialisation in the African region during the period 1980 to 2015.

3. *Ho: Conflict is an important variable in explaining the FDI-Industrialisation nexus in Africa.*

This hypothesis was confirmed. The study found sufficient evidence that conflict was important in explaining the puzzle in the FDI-Industrialisation nexus in Africa. The study found that during the period 1980 to 2015, FDI had significant positive effects on industrialisation in the non-conflict countries; whereas it FDI had a negative significant effects on industrialisation in the conflict countries during the same period.

*Ha: Conflict is insignificant in explaining the FDI-industrialisation nexus in Africa.*

This hypothesis was rejected since the study found strong evidence to the contrary.

Does inward FDI have a positive or negative effect on Industrialisation in Africa? The study found strong evidence that inward FDI had a significant positive effect on industrialisation in African countries not plagued with civil wars during the period 1980 to 2015; but negative effect on those countries which were plagued with conflicts within the same period. With regards to the question, whether conflicts have a significant effect on industrialisation in Africa, the findings provided strong evidence that non-conflict countries experienced higher levels and faster pace on industrialisation than the conflict countries during the period 1980 to 2015. The study concludes that conflict is important in explaining differences in the levels and pace of industrialisation in African countries. The study further concludes that conflict is important in explaining the ‘paradox’ of insignificant or negative relationship between FDI and industrialisation in Africa observed in empirical studies.

#### **5.4 Recommendations**

The findings from the study have implications for policy, practice and further research. On the strands of policy and practice, since the study found evidence that conflict countries experienced lower levels and slower pace of industrialisation, African countries should place

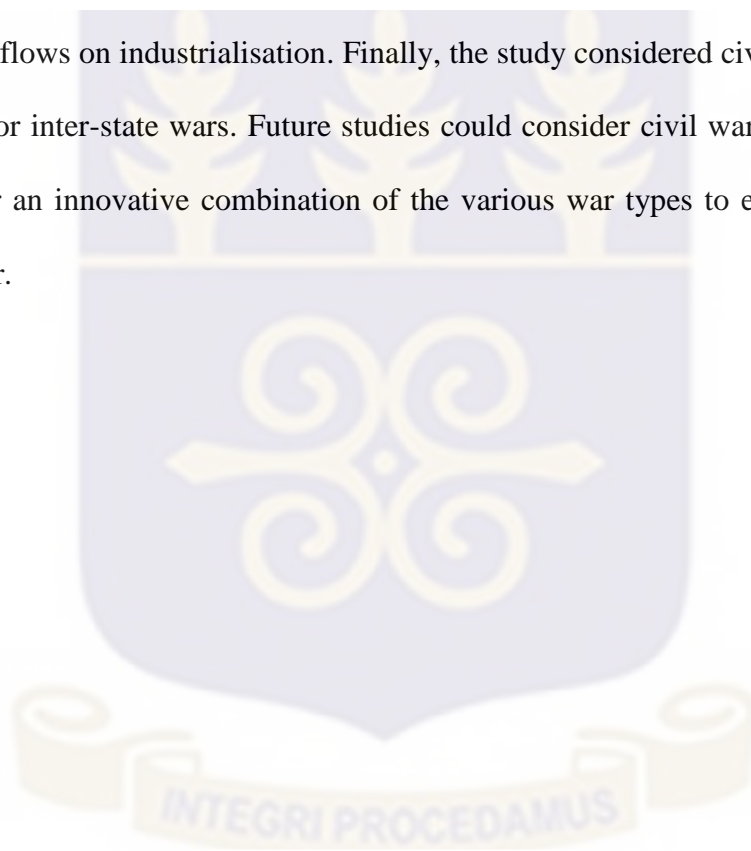
more priority on peaceful resolution of conflicts. The civil wars have are destructive effects on countries. There should be concerted from governments and all stakeholders to eschew civil wars, and all forms of violence which could exacerbate into civil wars.

The study found strong evidence of a negative relationship between agriculture productivity and industrialisation. The findings suggested that agrarian economies would experience lower levels and slower pace of industrialisation and it is therefore recommended that policy makers in the African region should re-align economic policies toward promoting investments in manufacturing and industry to promote industrialisation in the region. Furthermore, industrial policies should aim at transforming agrarian economies to industrial economies in the medium to the long-term by directing resources toward the manufacturing and industrial sectors. The current study found sufficient evidence that the financial sector is important in explaining industrialisation in Africa; hence it is recommended that African countries should keep eagle eyes on their financial sectors and make them strong and resilient as they strive to boost industrialisation in the region. Large and strong financial sectors can promote industrialisation through provision of timely financial resources to investors in the manufacturing and industrial sectors.

On the implications for research, the study made a key contribution to literature by exploring the conflict dynamics and the FDI-industrialisation nexus. Previous studies have not considered the conflict dynamics to explaining industrialisation. The findings establish that conflict is an important variable that explain industrialisation in the African region. From the stylised facts, we observe notable differences between the performance of conflict and non-conflict countries on key economic and financial performance indicators.

The study recommends that future research in the African region could control for the effects of conflicts since the current study found evidence that clustering conflict and non-conflict

countries as one sample might lead to misleading conclusions. Within the scope of current study, the definition of *'non-conflict countries'*, assumes that a country has not experienced any civil war across the study period; all countries which experienced any incidence of civil war within the study period, were classified under *'conflict countries'*. Future research could investigate whether countries which were once in conflicts, but have stopped and do not go into conflicts in subsequent periods are able to experience positive impacts of FDI inflows on industrialisation. For such a study, it might be interesting to establish on average how long it takes conflict countries to recover and regain absorptive capacity to experience positive effects of FDI inflows on industrialisation. Finally, the study considered civil wars as opposed to international or inter-state wars. Future studies could consider civil wars and international wars together or an innovative combination of the various war types to explore the conflict dynamics further.



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## APPENDIX I

### NOTES ON DEFINITION OF TERMS

*Note 1: Manufacturing refers to industries belonging to ISIC divisions 15-37. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.*

*Source: International Standard Industrial Classification (ISIC), revision 3.*

*Note 2: Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. Source:*

*International Standard Industrial Classification (ISIC), revision 3.*

*Note 3: Services correspond to ISIC divisions 50-99 and they include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. Source: International Standard Industrial Classification (ISIC), revision 3.*

*Note 4: Industry corresponds to ISIC divisions 10-45 and includes manufacturing (ISIC divisions 15-37). It comprises value added in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water, and gas. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. Source: International Standard Industrial Classification (ISIC), revision 3.*

**FORMULAE FOR MEASUREMENT OF CONFLICT RATES AND DEFINITIONS**

1. *Proportion of conflict countries = Number of conflict countries divided by Total number of countries under consideration expressed as a percentage.*
2. *Rate of active civil wars per decade = Number of conflict countries which experienced civil wars within a decade divided by the total number of conflict countries during the period under study expressed as a percentage.*
3. *Increase or decrease in rate of active civil wars per decade (change in rate of active civil wars per decade = Rate of active civil wars in present decade (present period) minus rate of active civil wars in previous decade (base period) expressed as a percentage.*
4. *Conflict countries = countries which experienced civil wars or violent conflicts which resulted in the death of at least 1000 persons per year during the period under study*
5. *Non-conflict countries = countries which did not experience civil wars or violent conflict which resulted in the death of at least 1000 persons per year during the period under study.*
6. *Civil war = organised military combat, or violent conflicts through ethnic, racial or political routes occurring within a country or a state which results in the death of at least 1000 persons per year.*
7. *Period of active civil war = the period of years which civil war is in active session in a country.*
8. *Aftermath of civil war (Post-Conflict Period) = the period of years after an active civil war, that is, the period of years beyond the end of an episode of civil war.*

