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The Relationship between FDI and ODA: The Case of
Zimbabwe (1980-2012)

By

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**A dissertation submitted in partial fulfillment of the requirements of the
Master of Science Degree in Economics (MSc Econ)**

2015

DEDICATION

To my son Andile-Bradley, my efforts are meant to inspire the greatness that shall be the hallmark of your existence and the world awaits your manifestation

ACKNOWLEDEMENTS

My profound gratitude is expressed to my supervisor Dr Zhou for the intellectual guidance throughout the study, Dr Kadenge's invaluable input helped in shaping the final work. The Department of Economics (University of Zimbabwe) provided the wherewithal to complete this work. My lovely wife Betty was a source of inspiration as she believed in me throughout, gave me encouragement and nudges when she thought I had stalled. Chivore, you played a crucial role as our course representative. My course mates, your being there made us a class and justified learning, thank you guys. Last but greatest of all I shall forever be greatly indebted to the giver and securer of destiny, the rock of ages the Almighty who authors possibilities, without Him I am naught.

ABSTRACT

Zimbabwe, like most developing countries is a recipient of foreign aid but the impact of this official development assistance (ODA) on foreign direct investment (FDI) has not been investigated. The study investigates the existence of a relationship between ODA and FDI over the period 1980-2012. The investigation is done within the vector auto regression (VAR) framework making use of OLS, Granger Causality, impulse response functions and variance decomposition with the hypothesis that ODA has positive relationship with FDI. We find no evidence of a relationship between ODA and FDI in Zimbabwe and there is neither correlation nor causality between these flows.

In light of these findings, Zimbabwe should make deliberate actions to create the necessary domestic and international conditions that facilitate foreign direct investment. This will include but not restricted to addressing political uncertainties, debt overhang, downside risks in agriculture, dilapidated infrastructure, and an unreliable power supply

LIST OF ACRONYMS

ACBF	Africa Capacity Building Foundation
AIDS	Acquired Immune Deficiency Syndrome
BOP	Balance of Payments
DAC	Development Assistance Committee
ESAP	Economic Structural Adjustment Program
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNU	Government of National Unity
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
IMF	International Monetary Fund
MoFED	Ministry of Finance and Economic Development
OED	Office of Economic Development
ODA	Official Development Assistance
OLS	Ordinary Least Squares
SADC	Southern Africa Development Community
STERP	Short Term Economic Recovery Program
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
VAR	Vector Auto regression
Zim Asset	Zimbabwe Agenda for Sustainable Social-Economic Transformation

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 Introduction

Poor economic growth performance of most African countries is strongly linked to lack of capital (UNCTAD, 2005). There is widespread agreement that generation of own financial resources to spearhead economic growth will remain a challenge for most African countries. Zimbabwe for example has inadequate domestic resources as reflected in the low savings, estimated at -6% of GDP (MoFED, 2013). It is therefore important for African countries to put in place measures to attract external inflows of resources. External inflows usually termed foreign capital inflows (FCIs) take three main forms: external debt, private flows (mainly foreign direct investment (FDI) and official development assistance (ODA) which include bilateral and multilateral aid, grants and concessionary loans. Theoretically, FDI and ODA have widespread recognition and are thus the focus of this study. Foreign direct investment can be defined as the net inflows of investment to acquire a lasting management interest (10 % or more of voting stock) in an enterprise operating in an economy other than that of the investor (IMF, 2009). It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital.

Development Assistance Committee (DAC) first defined ODA in 1961 as a voluntary transfer of resources from one country to another given at least *partly* with the objective of benefitting the recipient country. This definition is preferred as it shows that aid provision is beyond mere benevolence. In 1997 the USA congress justified foreign aid as a means of promoting FDI. In this study, official development assistance and foreign aid will be used interchangeably. ODA can be multilateral or bilateral, bilateral aid is undertaken by a donor country directly with a developing country while with multilateral ODA aid is pooled from various governments and such contributions lose identity when sent to recipient countries.

The notion that foreign aid and foreign direct investment are complementary sources of capital is conventional among both government and international cooperation agencies. FDI is considered as a way of achieving technological spill-over with larger contribution to growth than would national investment (Borensztein, 1998). At the Monterrey Conference in

2002 (UN meeting on International Financing for Development) and in the framework of NEPAD¹ (New Partnership for Africa's Development initiative) the concern has been expressed that more private funds should be invested in developing countries. Indeed FDI plays a fundamental role in the modern global economy. The same Monterrey Conference also underscored the importance of foreign aid, with a call for substantial increase in ODA to assist developing countries achieve the Millennium Development Goals (MDGs). FDI plays a vital role in driving economic growth through increasing productivity and has been recognized as the most central factor in enhancing economic growth and the standard of living in developing countries (Shim et al, 2002).

To achieve sustainable economic development, the major issue for developing countries is to attain adequate financial resources to break away from the vicious circle of low savings and low economic growth. Hayami and Godo (2006) reckon that for such developing countries whose investment needs exceed domestic savings capacities, capital input from abroad represents a possible option to spur growth. FDI and ODA not only represent the major sources of finance, but also provide a chance for human capital accumulation and technology transfer in recipient countries. Zimbabwe places significant importance on both inflows so much that annually, ODA analysis features in the National Budget Statements² while strategies for attracting FDI have always been a central part of government economic blueprints.

The central challenge for the majority of developing economies has been to create the necessary domestic and international conditions that facilitate inflow of foreign direct investment. Although Zimbabwe has shown signs of recovery since the formation of the GNU in 2009, the World Bank (2013f) reports that the economy remains fragile due to political uncertainties, debt distress, downside risks in agriculture, low domestic liquidity, high wages, dilapidated infrastructure, and an unreliable power supply. According to the World Economic Forum Global Competitiveness Report (2014-2015 pp 41), Zimbabwe ranks 124th. Some of the reasons given for this low competitiveness include, weak public

¹ NEPAD is a strategic framework for Africa's renewal. The programme is focused on the determination "of Africans to extricate themselves and the continent from the malaise of underdevelopment and exclusion in a globalising world" and "a call for a new relationship of partnership between Africa and the international community" (NEPAD, 2001).

² Presenting the 2015 Zimbabwe National Budget Statement, The Minister of Finance and Economic Development is quoted saying 'Mr Speaker Sir, Government remains grateful for the ODA support, targeted at food security, social services, infrastructure, value addition and beneficiation, as well as cross putting issues. The support has been timely given the challenges we face in various areas'

institutions, particularly related to corruption, government favouritism, and protection of property rights which reduce the motivation for foreign businesses to invest. ‘While tremendous efforts to improve its macroeconomic environment have been made—including the dollarization of its economy in early 2009, Zimbabwe still receives a low rank on macroeconomic environment which is characterized by high government debt, a negative savings rate, and low inflation. Weaknesses in other areas include; health, low education enrolment rates, with only every second child participating in secondary education; and formal markets that continue to function with difficulty, particularly goods and labour markets’³.

Alesina and Dollar (1998) found considerable evidence that the direction of foreign aid is dictated by political and strategic considerations, much more than economic needs and policy performance of the recipients. Colonial past and political alliances play a significant role in allocation of foreign aid while FDI flows are more responsive to economic incentives, mostly ‘good policies’ and protection of property rights in the host countries. For example, despite inefficiency, mismanagement and non-democratic tendencies, a former colony that is politically friendly to its former colonizer, will invariably receive more aid than a country with a similar poverty level, a higher policy stance, but without a past as a colony.

There however appear to be a ‘consensus’ and implicit to this convergence is the catalyzing effect ODA has on FDI. Conventional economic wisdom has thus suggested that high ODA flows will attract FDI. The effects of ODA on FDI are either direct or indirect. For the direct channel, good quality of infrastructure directly contributes to improving the investment environment. For the indirect channel, the ODA contributes to improvement in the quality of human resources. In turn, such a quality labour force enhances incomes and increases consumption and market size. All the direct and indirect impacts of ODA positively affect the investment environment to better attract FDI and vice versa.

The linkages between ODA and FDI once proved can provide a strong argument for persuading donors or social investors to invest in developing countries as a precursor to FDI inflows. ODA has been touted as providing support to create necessary infrastructure and

³ World Economic Forum The Global Competitiveness Report 2014-2015

human capital development that attract FDI. This study thus seeks to explore the relationship between ODA and FDI.

1.2 Statement of the problem

Sustaining economic growth is a top priority for the Zimbabwean government however, just like most developing countries, domestic resources are far from adequate, as the country's savings average -6% of GDP (MoFED, 2013). According to the 2015 Zimbabwe Budget Statement (pp 39), 'the disproportionate gap between the country's exports and imports has inevitably culminated in trade deficit of US\$2.9 billion for the period January-October 2014'. The above shows a scenario of two gaps, savings gap and trade gap that should be plugged using foreign capital inflows if the country is to sustain growth (Chenery and Strout, 1966). Zimbabwe is targeting an average annual growth of 6.7% over the period 2013-2018 (Zim Asset, 2013). There should therefore be deliberate effort to attract both foreign public and private capital. UNCTAD (2000) estimates that in order to reach a sustainable economic growth rate of 6% per annum, the domestic savings rate levels of Sub-Saharan Africa (SSA) have to increase to about 25% of GDP.

The two main forms of external inflows to Zimbabwe have been ODA and FDI with external debt having shrunk due to a huge debt overhang that has made the country risky to lend to. The challenge for policy makers is to maximize on the two inflows, ODA and FDI. Zimbabwe is definitely in need of both FDI and ODA, the challenges of 'donor fatigue' and waning FDI feature as significant causes of economic slowdown. In 2013 Zimbabwe received \$400 million as FDI, way lower than regional neighbours like Zambia, Mozambique and South Africa which individually received at least USD\$1billion. In the first 10 months of 2014, the country only received FDI amounting to US\$146.6 million compared to US\$311.3 million during the same period in 2013 and this by no means is a worrying trend. In 2013, ODA inflows fell short of projections with only US\$259.1million coming through from an expected US\$642.7million (Zimbabwe 2015 National Budget Statement, pp 44).

The interaction between ODA and FDI has not been straightforward to allow crafting of simple policies. Anh and Phuong Mai (2012) posit that the relationship between ODA and FDI appears to be very controversial and literature on this underlying relation remains inconclusive. This position is also shared by Carro and Larrú (2010). Despite this

inconclusivity in literature, there is widespread concurrence that good infrastructure (transport, power, ICT), and human resources, and other institutional factors are some of the attractive forces to FDI. These are usually public investments but limited federal resources constrain African governments to be able to provide for these conditions, this inability provides a link between ODA and FDI where ODA is well thought-out to enhance these conditions.

While ambiguity of the relationship between ODA and FDI will be explored later in literature review, it is worth noting that two strands of empirical outcomes are prevalent. ODA has been observed to have no effect on FDI [Harms and Lutz (2006); Kosack and Tobin (2006) and Kimura and Todo (2009)]. On the contrary Selaya and Sunesen (2012) report that ODA has a positive effect on foreign direct investment, a finding similar to Bhavan (2010) in their exploration of ODA and FDI flows into South Asian Countries.

While studies on pooled African countries have been done, none, to the best of our knowledge has been done to establish the relationship of ODA and FDI in Zimbabwe.

1.3 Objectives of the study

The overall objective of this study is to establish the relationship between ODA and FDI in Zimbabwe. In doing so, specific objectives are defined as follows:

1. To ascertain the effect of bilateral ODA on FDI.
2. To establish the determinants of ODA and FDI in Zimbabwe.

1.4 Research Questions

The study will be guided by the following research questions:

1. What is the effect of ODA on FDI flows?
2. What are the determinants of ODA and FDI in Zimbabwe?

1.5 Hypothesis

We put forward this hypothesis: ODA has a positive relationship with FDI.

1.6 Justification of study

According to Chauvet and Mesplé-Soms (2006) there has hardly been any study on the extent to which ODA and FDI can substitute for each other while this relationship is highly relevant in the context of Africa.

Anyanwu (2011) notes that while Africa leads as a recipient of foreign aid, being the destination of 34.3 % of global ODA from 1960-2007, FDI to Africa has only been 5.7% of global FDI flows. We recognise the importance of establishing reasons behind this scenario through investigating the relationship between the two inflows.

We believe government, bilateral and multilateral donors can make use of additional insight the study will generate. If for example ODA and FDI are complements, it would be crucial to institute measures that allow ODA to solve possible host country deficiencies such as lack of proper infrastructure as well as reform quality of human resources through health and education investment to be able to render the host country attractive to FDI.

The studies done in Africa have been cross-sectional with little attention on unique characteristics of individual economies. Ndambendia (2010) studied the long-run relationship between ODA, FDI and economic growth using panel data over the period 1980-2007 in 36 SSA countries. Asiedu et al (2009) theoretically and empirically examined the link between, FDI, foreign aid and expropriation risk in 38 low-income countries. Yasin (2005) also explored the relationship between ODA and FDI in 11 African countries.

To the best of our knowledge no study on the relationship between ODA and FDI in Zimbabwe has been done. We are convinced Zimbabwe has unique circumstances to warrant a study of its own. Cross sectional results may be of little value given the dynamic nature of the country's socio-economic space. We, thus hope to provide additional knowledge that will aid in policy position regarding aid and foreign investment.

Yoshioka and Sawada (1998) concluded that '...it may be better to employ another methodological framework such as **VAR** model for Granger causality test' after using OLS in investigating ODA and Asian FDI inflow. This admission points to possibility of improving methodology in studying the relationship between these two variables. In broader consultation with literature we make use of a methodology that will allow exploration of both correlation and causality.

The study will also contribute to the academic debate on the relationship between ODA and FDI

1.7 Outline of the Study

Chapter two provides a background to the study, defining the important terms and setting the study within context, illustrating the trends in FDI and ODA flows and the main drivers of such patterns. Zimbabwe's economic performance over the period will also be discussed. The third chapter will review both theoretical and empirical literature and place this study within body of knowledge. Chapter four outlines the econometric methodology to be used, justifying the variables and data sources. Estimations and results are presented in chapter five. Chapter six presents our findings and policy recommendations.

CHAPTER TWO

BACKGROUND TO THE STUDY

2.0 Introduction

This chapter is organised into three broad sections. The first section looks at trends and patterns of ODA and FDI flows into Sub-Saharan Africa broadly and SADC in particular. The second section provides a brief background of the Zimbabwean economy from 1980-2012. Lastly an outline of the ODA and FDI trends in Zimbabwe and the key drivers of these patterns are discussed.

2.1 ODA and FDI Flows in Sub Saharan Africa (SSA)

Mobilizing investment and official development assistance and ensuring that they contribute to sustainable economic growth and development is a priority for many African countries (World Bank, 2012). In a bid to attract more foreign capital inflows, many developing countries have liberalised their financial sectors and pursued political and economic reforms. The extent to which ODA will impact on FDI depends on a variety of characteristics of the host economy which include among others, size of the market, quality of the labour force, institutional environment, tax laws, and overall macroeconomic and political climate.

Angola has maintained high levels of FDI over the years. Oil fields and the vast mineral resource base are the pulling factors for FDI. Discovery and subsequent exploitation of natural gas in the northern parts of Mozambique has seen marked increase in FDI to a country whose mining sector was already attracting FDI.

Table 1 FDI Flows into Selected SADC Countries (US\$ Million)

Country	2006	2007	2008	2009	2010	2011	2012
Angola	9,064	9,796	16,581	13,101	9,941.6	3,023.8	6,897.8
Malawi	72	92	170	60	55.8	128.8	129.5
Mozambique	154	427	592	881	788.9	2,662.8	5,218.1
South Africa	-527	5,695	9,006	5,696	1,553	6,004.3	4,572.5
Zambia	616	1,324	939	959	1,041.4	1,108.0	1,066.0
Zimbabwe	40	69	52	60	165.9	387.0	399.5
Total	9,419	17,403	27,340	20,757	13,546.6	13,317.7	18,283.4

Source: UNCTAD (2013), FDI/TNC database (www.unctad.org/fdistatistics).

Since the 1990's, there has been a surge in capital flows from developed to developing and emerging market countries (Brazil, India, South Africa, etc). During the same period economic growth for SSA countries was impressive averaging 5% against the global average growth rate of 3.4% then (World Bank, 2013). Trade and financial liberalization policies have in most instances been linked to the remarkable growth rates as they allowed the free movement of goods and capital across borders, among other factors.

According to the UNCTAD (2012), FDI flows to SSA more than doubled from less than US\$15 billion in 2001 to an estimated US\$37 billion in 2011. The bulk of the FDI was going towards oil and mineral rich countries such as Nigeria, Angola, Ghana and Mozambique. It is important to note that the bulk of FDI coming through to developing countries has been targeted at natural resource. Anyawu (2011) cites 'a major concern' regarding FDI inflows into the African continent is that the overwhelming majority of these go into natural resource exploitation. Andres *et al* (2013) noted that Chinese FDI in Africa is widely believed to be driven by host countries' endowment of natural resources. Among the former conflict countries, Mozambique managed to attract the highest FDI inflows ahead of other countries such as Rwanda, Burundi and Sierra Leone, with FDI inflows reaching 14% of GDP in 2010.

This increase in FDI was in direct response to Mozambique's macro-economic stabilisation efforts and launch of the first wave of structural reforms in the early 1990s. The bulk of the FDI, was channelled into mega mining projects and infrastructure development (IMF, 2012). In 2013 Zimbabwe received US\$400 million as FDI lagging behind regional neighbours like Zambia, Mozambique and South Africa which individually received at least USD\$1billion. In 2011 and 2012 Zimbabwe received US\$387.0 million and US\$399.5 million, respectively. These FDI inflows into Zimbabwe were however, insignificant relative to huge FDI of around US\$37 billion and US\$43 billion that flew into the Sub-Saharan African region in 2011 and 2012 respectively (UNCTAD, 2013). Furthermore, Zimbabwe is one of the least recipients of FDI in the SADC region as indicated in figure 1 below. This has been attributed to many factors which include: low aggregate demand as a result of tight liquidity in the economy, high cost of doing business, and lack of clarity on the implementation of the indigenization laws, among others (IMF, 2012).

Official development assistance to SSA has also increased since 2001 from US\$14 billion to US\$43 billion in 2011 (OCED, 2012). The increase in ODA saw many SSA countries invest in poverty alleviation initiatives. Despite this increase in the foreign capital inflows, the growth experiences of many developing economies have not been satisfactory (Nkoro and Uko, 2012). Significant portions of the populace still live in utter poverty and this is of great concern for example countries such as Mozambique (54% of population), and Malawi (74%).

2.2 Zimbabwe Economic Background (1980 -2012)

Post independence, the Zimbabwean economy has gone through several dispensations. The current government inherited an inward-looking economy at independence that was isolated from the global economy due to economic sanctions. The first 10 years were characterised by administrative controls through a system of centralised state control (Gwenhamo, 2009). Interest rates were fixed through state mechanisms and trade of various agricultural commodities was restricted to state parastatals.

This new nation carried high hopes and together with the abundant potential the economy had, for the period 1980-1989 economic growth rates averaging 4.85% were attainable. This decade was relatively stable in terms of economic performance, although negative growth rates were recorded in 1983 and 1984. The government also ‘continued’ with inward looking policies during the same period, which were characterised by controls in the economy (Kanyenze, 2006). ODA increased from US\$160 million in 1980 to US\$260 million in 1989 while the average annual growth in ODA was 7%. The populist approach however appeared to have had a negative impact on FDI as average annual growth was -53% and six out of the 10 years during the period 1980-1989 recorded negative FDI⁴. Approvals of foreign investors’ proposals involved excessively long and tiring processes (Gwenhamo, 2009) which could also explain the low foreign investment.

Economic liberalization and reforms set in during the 1990s. The following decade, 1990-1999 was characterised by low growth rate averaging 2.14% due to policy inconsistency,

⁴ Figures computed from ODA and FDI statistics obtained from OECD and World Bank Databases

droughts, foreign currency shortages, huge budget deficits and political instability. In the period 1991-1995, the Government adopted an IMF-sponsored Economic Structural Adjustment Programme (ESAP). The main objectives of ESAP were to liberalize the economy and to reduce Government expenditure through privatization of parastatals, elimination of economic policies of control and restrictions thereby ensuring higher growth rates. The privatization programme was not fully implemented in line with the objectives of ESAP, as the government failed to meet targets set in the blueprint and there was no consensus among stakeholders. While ODA growth was largely negative in the period 1990-1999, FDI was on the increase. Over the ten year period, average annual FDI growth was 86% and much higher during ESAP years (1991-1995) in which annual growth averaged 197%. The same period recorded the highest annual FDI to date being US\$448.3 million in 1998⁵.

There is widespread consensus that ESAP did not achieve the intended objectives. According to the OED's audit the program did not reduce poverty and unemployment as its architects had hoped (World Bank, 2012)⁶. Post ESAP there was hesitancy in terms of policy implementation (Kanyenze, 2006). The Government adopted the Zimbabwe Programme for Social and Economic Transformation (ZIMPREST) in 1998, by this time the program was lagging with two years after the programme was supposed to start in 1996. Real economic growth slumped from 9.7% in 1996 to negative 3% by 1999 and the Government incurred a huge budget deficit of 23.7% of GDP as a result of the payment of unbudgeted gratuities to war veterans and the participation in the Democratic Republic of Congo (DRC) war (Kanyenze, 2006). This had a huge effect on the local currency with a massive depreciation of the Zimbabwean dollar and, for most this was the beginning of the economic and political crisis that ensued.

The period 1999-2008 was characterised by hyperinflation which eroded the savings in the economy thereby leaving the country with a huge savings-investment gap to finance economic growth. Between 1999 and 2008, the country experienced a severe economic down

⁵ Figures computed from ODA and FDI statistics obtained from OECD and World Bank Databases

⁶ Refer to Performance Audit Report, 'Zimbabwe Structural Adjustment Program' Report No.14751, June 1995

turn which saw the GDP plummet to the lowest level ever of US\$4,415 billion 2008 representing a 93% decline from the output of 1997 just before the decade-long economic malaise. Investor confidence was affected by the 2000 compulsory farm acquisitions resulting in the decline in FDI. Average annual FDI growth fell from 86% (1990-199) to 58% during the period 2000-2008. There is a discernible fall in FDI during the period 2000-2002 when average annual FDI growth was -72% as foreign entities disinvested from the economy in reaction to the land reform, that was viewed as disregard of property rights. ODA in the same period remained depressed as the traditional sources of aid, UK and the USA cut support. Annual growth in ODA remained negative at -2%.

In 2009, the Government of National Unity (GNU) was established and subsequently, the country dollarized through adoption of a multi currency regime. The same period saw the implementation of STERP I, a short term stabilisation program whose goals were stabilisation of the micro-economy and macro-economy. The move is widely attributed to the stabilization of inflation and also resulted in the economy recording a growth rate of 5.4%, albeit coming from a lower base (MoFED, 2010). In 2010, the economy recorded a growth of 11.4% and reached a peak of 11.9% in 2011, before slowing down to 10.6% in 2012.

The aforesaid political-economic developments had positive impact on both FDI and ODA. This period saw initiation of reengagement efforts with the international community. Average annual ODA growth was 14% over the period while annual FDI growth was 98% and for the second time since 1999, FDI exceeded US\$100 million (in 2009). The Zimbabwe Investment Authority which was established through an Act of parliament, extensively publicised the one-stop shop initiative meant to cut down on time and processes for investment appraisal.

Notwithstanding these impressive economic growth rates, the economic recovery now shows signs of fragility, as GDP growth declined from 10.6% in 2012 to 3.4% in 2013 (MoFED, 2013). This economic fragility has been attributed to many factors which include: high cost of capital, low government revenue, low aggregate demand as a result of tight liquidity in the economy, high cost of doing business, influx of cheap foreign goods, and undercapitalization of the major industries among others (IMF, 2012). Lack of clarity on the implementation of the indigenization laws has further dented prospects of increased FDI, annual FDI has stagnated at US\$400 million since 2012.

In 2013, the GoZ formulated a 5 year economic blueprint, Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimAsset). The program intends to achieve a GDP growth rate of 9.9% at the end of the five years of implementation (2018). The economic program is anchored on full exploitation and value addition of the country’s abundant resources. While FDI is taken as one of the key 9 broad assumptions for the success of ZimAsset, the blueprint provides very little in terms of ways of harnessing FDI⁷.

2.3 ODA and FDI Inflows in Zimbabwe (1980-2012)

Ever since 1980 Zimbabwe has been a recipient of both ODA and FDI however in different quantities. In the absence of domestic resources, countries look up to foreign funding (Osabuohien, 2007) and foreign funding comes through as foreign aid or FDI (Chenery and Strout, 1966). Such has been the case in Zimbabwe. As we examine the relationship between FDI and ODA in Zimbabwe, we look at the trends of these flows, drawing comparisons first and then examining the drivers of these flows.

Over the study period, ODA has been significantly higher than FDI save for 1998 when FDI reached its peak and was higher than ODA (see table 2), this trend is consistent with trends of the two flows to Africa. While Africa leads as a recipient of foreign aid benefitting 34.3 % of global ODA from 1960-2007, FDI to Africa has only been 5.7% of global FDI flows (Anyanwu, 2011). From 1987 to 1990 Zimbabwe experienced negative FDI flows likely in response to the overly restrictive policies and political destabilisation of the mid-eighties.

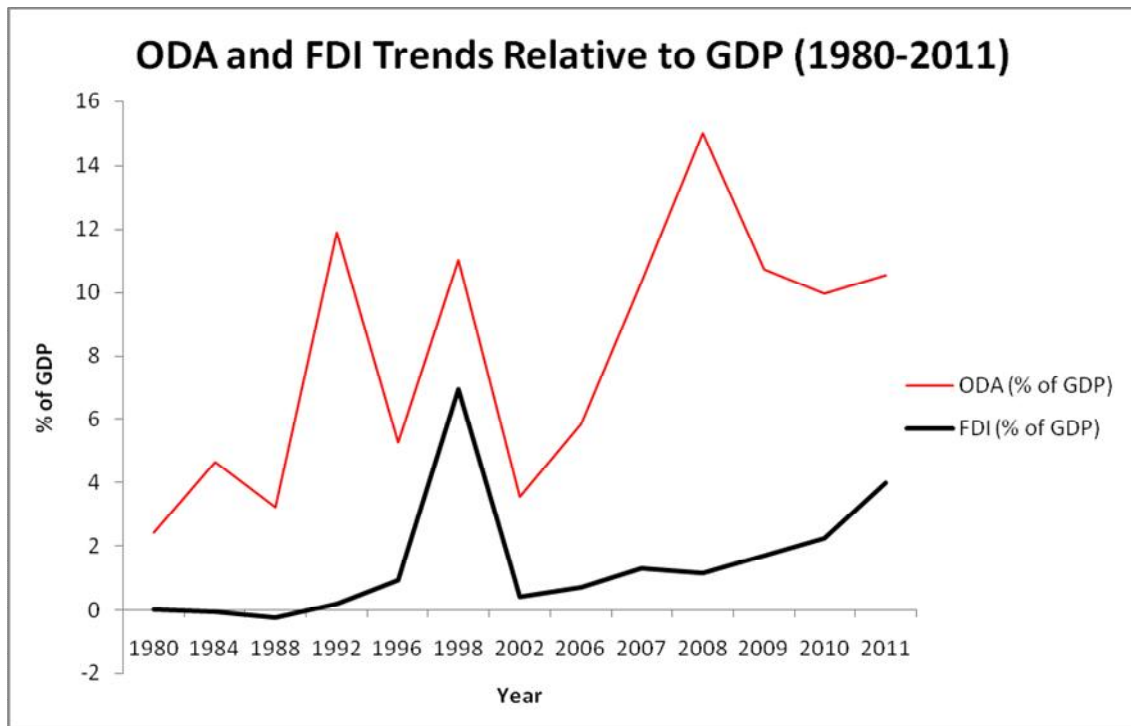
Table 2 ODA and FDI flows into Zimbabwe (1980-2012) (US\$ Million)

	1980	1985	1990	1998	2005	2010
ODA US\$	160,400,000	235,300,000	334,260,000	261,210,000	372,720,000	102,800,000
FDI US\$	1,549,690	2,848,609	(12,205,580)	448,300,000	102,800,000	165,900,0000

⁷ Refer to Zim Asset Document – Section 3.4 Overall Assumptions of the Zim Asset Plan

Figure 1 shows that ODA as a proportion of GDP has always been higher than FDI. This shows that Zimbabwe as a country has given donors reasons to support the country more than investors have found it attractive. FDI however is on a steady rise since 2002 while ODA took a sharp surge in 2008 in response to probably one of the worst humanitarian crises the country as gone through.

Figure 1:ODA and FDI Trends (% of GDP) 1980-2011



Source: World Bank Economic Indicators Database

2.3.1 Foreign Direct Investment (FDI)

At the turn of the new century, the Zimbabwean government undertook a compulsory land acquisition program. The program, propped by new property laws allowed the government to easily expropriate privately owned land for redistribution without compensating the private owners. While the Zimbabwean government argues that land reform was aimed at correcting the historically skewed access to productive resources inherited from the colonial regime, it is plausible that the resulting high expropriation risk among other factors negatively impacted on FDI flows which from an all time high of US\$448 million in 1998 dropped to a mere US\$3.8 million in 2001 and averaged less than US\$70 million annually for the next 10 years.

The 1998 surge in FDI was driven by privatisation and liberalisation (Gwenhamo, 2009). Gross domestic product and foreign direct investment were moving in the same direction over the period 1980-2013, suggesting a positive relationship. Foreign direct investment inflows have been fluctuating between US\$30.5 million in 1987 and US\$448 million recorded in 1998 (World Bank, 2013). Over the period 1980-1989 FDI levels were relatively low. This can be attributed to the inward looking economic policies that were being pursued by the Government. This was followed by a rapid increase in FDI inflows due to economic liberalization during the period 1990 -1995, in line with the growth in GDP. The trend reversed during the decade of economic decline and political instability (1998-2008) as was economic growth.

The sudden reduction in FDI flows coupled with tumbling domestic investment had depressing effects on the gross fixed capital formation which fell from a record high of 25% of GDP in 1995 to only 17% of GDP by 2005 (Gwenhamo, 2009). Foreign direct investment inflows started to increase strongly from 2009 to 2013 in line with growth in GDP, as a result of macroeconomic and political stability among other factors. The greater portion of FDI inflows were coming from China, as the western countries regarded Zimbabwe as a high risk country. In 2012 FDI inflow from China amounted to USD 287 million accounting for more than 70% of the inflow in 2012⁸.

2.3.2 Official Development Assistance (ODA)

The United Nations Millennium Declaration explicitly recognized the role of ODA in the development process and committed industrialized countries to grant more generous development assistance to developing countries (UN, 2000). In this study, official development assistance and foreign aid will be used interchangeably.

Zimbabwe benefited from ODA over the period 1980-2013. The flow of ODA ranged from US\$160 million in 1980 to US\$1.2 billion in 1992. From 1980-1988, ODA flows were relatively constant while GDP was increasing. The trend was almost the same over 1990-

⁸ UNCTAD Statistics (<http://unctadstat.unctad.org/wds/TableViewer/tableView.asp>)

1999, although there was a spike between 1992 and 1994. The increase in ODA in 1992 (US\$1.2 billion) was attributed to donor support for drought relief and grants for infrastructure development, as the country then had good relations with the western countries and donor community (Kanyenze, 2006). Multilateral and bilateral ODA to Zimbabwe decreased sharply as the economic and political crisis deepened in the period 1998-2008 this has however been reversed with ODA steadily rising since 2008 reaching a record US\$1.2 billion by 2012 (ACBF, 2010).

The bulk of ODA coming through to Zimbabwe is bilateral estimated at an average of 72% with USA, EU institutions and UK being the largest donors, the dominance of bilateral ODA renders it very volatile in the event of political standoff, and this has been observed in the case of Zimbabwe and UK.

According to DAC (2013), Zimbabwe was the fourth largest recipient of ODA from UK in the period 1991-92 but was not to be among the top 15 recipients in 2001-02 only to reappear in 2011-12 as the 13th largest recipient of ODA from UK. The surge in aid receipts in 1992 is usually linked to the infamous drought during this period as well as the numerous liberalisation reforms that came through with ESAP. Zimbabwe's relations with the UK were to take a knock due to the Fast Track Land Reform. ODA receipts fell to below US\$200 million in 2000 and were to remain like that for the next 5 years. In 2001, Zimbabwe recorded the lowest ODA ever only second to those in 1980 at independence.

ODA inflows increased by 28% from US\$478 million in 2007 to US\$612 million in the following year and this is attributable to the monumental humanitarian crisis that affected the country with widespread food shortages as well as the epidemic Cholera outbreak which was declared a national emergency and saw various organisations mobilise resources through a consolidated appeal.

However, since 2009 ODA inflows have improved reaching US\$736 million in 2009, as economic growth started to increase. However, most of the ODA inflows were not coming through the Treasury. It was being channelled through the non-Governmental Organizations (NGOs), programmes (health and education sectors) and projects (irrigation construction and rehabilitation) because of political impasse between the donor community and the

government. ‘Official Development Assistance focussed on humanitarian and social programmes in agriculture, health, education, social protection and governance sectors’⁹.

Health spending accounts for over a quarter of aid to Zimbabwe with nearly half of this supporting HIV/AIDS programmes funded largely by the US and the Global Fund. A fifth of the received aid is humanitarian assistance, almost 90% of which goes to emergency food aid or emergency and distress relief. Governance and security combined form the third largest funded sector.

2.4 Conclusion

This chapter has shown that Zimbabwe is a recipient of both FDI and ODA. Foreign aid has been significantly higher than foreign investment and moving in the same direction post 2009.

FDI appears to be stabilising around annual flows of US\$400 million in the last four years. This figure is however significantly lower than other countries in the region, for example Zimbabwe only received 2% of the more than US\$20 billion that came through into SADC (UNCTAD, 2013).

Zimbabwe continues to receive aid from traditional sources (USA, UK and EU), bilateral ODA constitutes 75% of the ODA flows. This suggests importance of relations between Zimbabwe and the donor countries. Most of the aid coming through is targeted to social and humanitarian programs with no allocation for infrastructure which is touted to be crucial in attracting FDI.

Prior to 2009 both flows were negatively affected by perceived governance problems. The land reform in 2002 and disputed election of 2002 which show that political environment is a critical determinant of both FDI and ODA flows. This position is affirmed by sharp upsurge of the two flows following the GNU in 2009 that brought about both political and economic

⁹ 2014 Zimbabwe National Budget Statement

stability. Nevertheless, the observed patterns in absolute ODA and FDI flows are not sufficient to draw a conclusion on the relationship between the two and there is need for empirical analysis to ascertain the relationship of ODA and FDI.

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

The chapter provides a discussion of the relevant literature, both theoretical and empirical. Major theories on ODA and FDI are reviewed to provide understanding of the theoretical underpinnings of ODA and FDI flows. The section on empirical review looks at the studies that have been done, their findings, methodologies and contributions made to ODA and FDI literature. Lastly, in conclusion, a synthesis of existing literature is provided and an attempt is made to place this current study in broad literature bringing out the gaps it will address.

3.1 Theoretical Literature Review

While there appear to be no explicit theory that explains the relationship between ODA and FDI, there are theories that explain the movement of ODA and FDI flows. These theories explain why ODA is provided and to which country and why Multinational Companies invest abroad (FDI) and the host country characteristics that influence this flow.

3.1.1 Production Cycle Theory of Vernon (1996)

The production cycle theory developed by Vernon in 1996 was initially used to explain certain types of FDI made by US companies in Europe after the Second World War. Vernon postulates four stages of production cycle: innovation, growth, maturity and decline. According to theory, firms in developed countries create new innovative products for local consumption and export surplus in order to serve the foreign markets. In the second stage exports increase. In the third stage, maturity stage, competition arises in the foreign markets as foreign companies begin to imitate the products. If conditions are favourable, the firm will set up foreign subsidiaries there to face the increased competition and may also set subsidiaries in less developed countries to have access to cheaper labour costs to enhance its competitiveness (Latorre, 2008).

The production cycle theory thus explains FDI as a reaction to the threat of losing market as a product matures, and as search of cheaper factor costs to be able to fight competition. FDI flows are therefore expected from developed countries to developing countries as products

evolve from being innovative to being mass produced. While plausible in explaining some types of FDI the following shortcomings are identified; some firms may engage in several stages simultaneously rather than in the expected sequence. FDI in natural resources such as gas, oil and minerals may not follow the four stages posited by Vernon. It is important to note that the bulk of FDI coming through to developing countries has been targeted at natural resources as Anyawu (2011) cites 'a major concern' regarding FDI inflows into African continent is that the overwhelming majority of these go into natural resource exploitation. Andres *et al* (2013) noted that Chinese FDI in Africa is widely believed to be driven by host countries' endowment of natural resources.

The theory however brings out pertinent economic considerations for FDI flow such as the labour costs in the recipient country, with FDI preferring low labour cost countries to remain competitive.

3.1.2 'OLI' Framework (The Eclectic Theory) by Dunning

Dunning (1993) provides an explanation of conditions for firms to invest in foreign countries (FDI). He provided a triad of conditions necessary for a firm to invest abroad (Latorre, 2008). These three conditions constitute the basis of the eclectic or OLI paradigm where OLI is an acronym for 'ownership, location and internalisation', these conditions are advantage conditions.

1. 'O' Ownership Advantages

This refers to the intangible assets, which are, at least for a while exclusive possessions of the company. The sources of ownership advantages are identified as; firstly, monopoly advantages in the form of privileged access to markets, patent, trademarks and secondly, technology broadly defined as all forms of innovation activities and thirdly economies of size through access to finance as well as ability to produce large scale.

2. 'L' Location Advantages

Location advantages of different countries are key factors to determine who will become the host countries for activities of the transnational corporations (FDI). Location advantages are broadly classified as:

Social Advantages/‘Psychic’ or Cultural Distance - these include ‘distance’ between the home and foreign countries, cultural diversity, laws, business culture

Host-government policies – considers issues like tariff and tax regimes, economic incentives, subsidies, political stability, rule of law, property rights, etc

Economic factors - consideration given to factors such transportations costs, labour costs, telecommunication infrastructure, market size, etc.

3. ‘I’ Internalisation

Internalisation is a firm’s inherent flexibility and capacity to produce and market through its internal subsidiaries. These advantages allow firms to do it using their own systems rather than use of ‘arms-length’ arrangements such as leasing, franchising and joint ventures.

According to the OLI paradigm, developing countries like Zimbabwe can position themselves through enhancing location advantages, through formulation of policies which are attractive to investment, respecting property rights. Public investment in key infrastructure such as transport and communication networks is crucial to courting FDI. While developing countries could finance these on their own, there is scope for ODA to assist in improving location advantages through infrastructure and human capital development. ODA can be used to buttress or develop institutions and policies in developing countries. More specifically, ODA funds can be used to support those areas considered important to investors in determining investment decisions (Vitalis, 2001).

Relevant policy issues in Zimbabwe may include labour laws which for years have been thought to be skewed towards workers and against companies and the recent enactment of indigenisation law will be some of the ‘location’ considerations that foreign investors consider before channelling FDI to Zimbabwe.

3.1.3 2-Gap Model

McKinnon (1964), Chenery and Strout (1966), Finlady (1973) and others applied the *Harrod-Domar* growth model to show that foreign capital can raise the growth rate by raising the availability of capital for production.

Essentially, the two-gap model is based on the gap between a country's own provision of resources and its absorptive capacity. These two gaps are known as the Saving gap and Foreign Exchange gap. Whichever of the two gaps is binding (or is larger) will constrain the amount of investment and capital formation, which can be undertaken.

The model states that developing countries experience two gaps (the saving gap and foreign currency gap), which need to be filled by foreign capital therefore FDI and ODA flows come in to fill the gaps. Chenery and Strout (1966) argued that foreign aid or official development assistance act as a supplement for domestic savings in many developing countries.

These gaps are very apparent in Zimbabwe, savings for example are estimated at -6% of GDP (MoFED, 2013), trade gap has no sign of reduction, according to the 2015 Zimbabwe Budget Statement, 'the disproportionate gap between the country's exports and imports has inevitably culminated in trade deficit of US\$2.9 billion for the period January-October 2014'. This therefore shows need for foreign capital inflows which can take the form of FDI or ODA. Its simplicity and ease of explanation explains why even today, desk officers at the World Bank still use it to project the external financing needs of countries and why the models still belong to the standard tool box of regional Development Banks and the IMF (Easterly, 1999).

3.1.4 'Poverty Trap theory'

This theory essentially says poor countries are entangled in a vicious circle of low savings and hence low investment (Sachs, 2001). This situation then calls for foreign aid to assist these countries on the path of economic growth. Under certain conditions an economy may find itself in a 'poverty trap'. This is a stable equilibrium but at a low level of wealth and it cannot get out of the low level equilibrium (sometimes called a 'low-level attractor') without a potentially large inflow of external assistance. The existence of such poverty traps has

striking implications for development policy. For one thing, small amount of external aid may do little but a large expansion of aid may well catapult large numbers of people¹⁰.

There are two canonical mechanisms that result in poverty traps: low savings and low levels of productivity. Low productivity is a result of low levels of technology. Nurske (1953) explained the vicious circle of poverty through the following chain of causality: low incomes in underdeveloped countries result in low savings and low savings in turn result in low investment which inevitably results in low production. Low production will generate low income and low income creates low demand for goods and services. With low demand (limited market) there will be no inducement for investment.

These theoretical explanations of poverty traps call for high levels of aid to ‘jump start’ sustainable growth process in what has been termed ‘the big push theory’¹¹.

3.2 Empirical Literature Review

According to the literature surveyed, the first analysis on the relationship of ODA and FDI was by Papanek in 1973. While the purpose of his article was the relation between savings, foreign capital flows and economic growth, the author does pay attention to the correlation between aid and foreign private investment. Papanek’s results indicate that there is no correlation between official aid and private flows.

Most of the literature we surveyed agrees on the fact that ODA, and especially multilateral ODA, does not have a significant effect on FDI (Papanek, 1973; Rodrik, 1995; Tuman and Emmer, 1997; Caselli and Feyrer, 2007; Kosack and Tobin: 2006). The only exception being when ODA flows to inputs that are FDI-complementary (Kapfer *et al*, 2007; Kimura, 2007 and Selaya and Sunesen, 2008) and/or the recipient enjoys a certain degree of financial market development and good governance (Karakaplan *et al*, 2005). Carro and Larrú (2010) report no relation between ODA and FDI.

¹⁰ World Bank Research Archives @ <http://econ.worldbank.org>

¹¹ Kraay, A and Raddatz, C., (2007) : Poverty traps, aid and growth, Journal of Development Economics

ODA does not seem to really contribute to promoting FDI in Africa and cannot substitute for each other, Chauvet and Mesplé-Somps (2006). Reddy and Miniou (2006) noted that it is plausible to imagine that a country may receive greater aid if it possesses lower growth (after controlling for initial income and other factors) as it is perceived that it 'needs' supplemental resources due to its perceived inability to achieve the same growth rates as other countries through domestic savings or receipts of FDI. They employed GMM in their study that covered period 1978-2001. With most data being annual, they could not employ time series. Though Zimbabwe was part of the group of SSA countries studied we feel, the period investigated excludes episode of vital socio-economic and political occurrences that would influence both ODA and FDI. Linked to this were findings by Fuchs *et al* (2012) who disputed that foreign direct investment (FDI) in developing host countries replaces ODA.

On the one hand, FDI may reduce the need for aid, while on the other it could be associated with more ODA if FDI is officially supported through aid provision. Kosack and Tobin (2006) found that aid and FDI are unrelated in world's poorer countries, further emphasizing that foreign aid flow in developing countries mainly in the form of supporting government budget, humanitarian activities and human capital development: it makes sense that foreign aid is unlikely to crowd out private investment. They continued to argue that the relationship between FDI and ODA is ambiguous. They employed OLS which only captures correlation but does not explore the existence of causality.

Hoeffler and Outram (2008) estimate that approximately half of the value of aid is determined by donor specific efforts such as colonial history and geographical ties while recipient need accounts for 36% and donor self interests for about 16 percent and recipient merit (measured by growth, democracy and human rights), account for only two percent of the predicted. This illustrates that public investment, (ODA) decisions reflect very little of the economic merit considerations taken into account by private investors (FDI).

Partially agreeing with these results, Harms and Lutz (2006) suggest that the effect of official aid on private foreign investment (FDI plus portfolio equity flows) is negligible unless the recipient country bears a high regulatory burden. They argued that once we control for regulatory burden in the host country, aid works as a complement to FDI and surprisingly the catalyzing effect of foreign aid is stronger in countries that are characterised by unfavourable institutional environments. Harms and Lutz (2006) also notes that ODA encourages rent-

seeking behaviour, which leads to a decrease in the factor productivity in the country and may discourage FDI inflows. They made use of GMM estimation techniques

Furthermore, Asiedu and Villamil (2002) argue that foreign aid reduces default risk thereby promoting foreign private capital. While their analysis does not specifically target FDI, it does suggest that ODA would have a positive effect on FDI in those countries where enforcement is inadequate.

Ali and Isse (2006), in analyzing the determinants of foreign aid, find that FDI has a negative and significant relation to ODA. The argument used by the authors to explain this result is that FDI encourages certain types of institutions and incentives that are not compatible with “overly managed” ODA.

Private capital flows are influenced by the enforceability of contracts, rule of law and ‘economic liberty’ and they are not sensitive to political democracy *per se*. In contrast, ODA funds respond more to the presence of democratic institutions. There is no mutual dependence of private flows and bilateral aid *ceteris paribus*, private flows go to the higher income developing countries, probably because they have large markets.

Boone (1996) brought out another dimension to the discussion citing what they termed ‘macro-micro paradox’ wherein aid is found to have average effects that are ‘roughly zero’ in macroeconomic studies but to have positive effects in microeconomic studies such as project assessments.

Using a data set of donor-recipient pairs, Kimura (2007) distinguishes three effects of ODA on FDI flows; a positive infrastructure effect, a negative rent-seeking effect and a positive “vanguard” effect. The latter refers to the positive effect that aid flowing from a specific donor to a particular recipient has on FDI flows from the donor (home-country) to the recipient (host-country). The negative rent-seeking effect is a result of bloated public expenditure and excessive ‘monitoring’ by government of donor funded programs.

Asiedu *et al* (2009), having theoretically and empirically examined the link between FDI, foreign aid and expropriation risk in 38 low-income countries suggest that under certain conditions foreign aid mitigates the risk of FDI in the receiving countries. Bhavan (2010) concludes that aid into South Asian countries attract FDI into the region.

Regarding bilateral aid, Yasin (2005) finds, for 11 African countries, that bilateral ODA does exert a positive influence on attracting FDI flows. By the same token, Blaise (2005) finds that Japanese ODA to China does attract FDI flows. Following Dunning's OLI framework, Blaise sustains that bilateral ODA affects location choices.

Anh and Phuong (2012) argue that ODA flow depends on extent of the needs of the recipient as well as the ability to effectively use the assistance so there is little focus on the locational advantages economically when the recipient country is compared to other countries. On the other hand the objective of FDI is seeking benefits for the company – so there is bound to be interest in locational advantages (market size, resource endowment, etc). Anh and Phuong investigated the impacts of ODA on FDI with specific interest on establishing whether the composition of ODA matters. Their study focused on four South East Asian countries. Making use of OLS, fixed effects, random effects and GMM, Anh and Phuong (2012) split ODA into aid invested in physical capital and aid invested in complementary factors. Anh and Phuong (2012) recognise lagged FDI, inflation, GDP, BOP, HDI, domestic savings as significant determinants of FDI flows.

Carro and Larrú (2010) suggest that the absence of a distinct relationship between ODA and FDI might be a result of the empirical analyses in which only aggregated ODA data that combines countries is used. The two explored the relationship between ODA and FDI both stocks and flows for Argentina and Brazil using OLS and found no systematic relationship between ODA and FDI. They however found that aid from Japan to Brazil appeared to be correlated with FDI from the same country supporting the 'vanguard effect' advanced earlier by Kimura and Todo (2007). Their work also extended into exploring the volatility and cyclical aspects of the capital flow.

There are other studies that point to positive relationship between ODA and FDI. Youn (2008) found that net ODA of the recipient countries is strongly associated with FDI flows. ODA is taken as an indicator of development activities hence activities financed by official development assistance likely promote physical infrastructure and also indicates the terms with international institutions that increase confidence of foreign investors, therefore FDI flows are likely to increase to the country involved.

Karakaplan *et al* (2005) found out that aid has a negative direct effect on FDI and that both good governance and financial market development significantly improve the impact of aid

on subsequent flows of FDI. Working on a hypothesis that countries that receive aid become likely to receive FDI Karakaplan *et al* (2005), using panel data concluded that this happens in cases of good governance and financial development and not necessarily otherwise. They made use of GDP, inflation, trade openness, GDP, population and lagged FDI as relevant determinants of FDI. Karakaplan *et al* (2005) employed generalised method of moments (GMM) in testing the unbalanced panel data. Below is a model employed by Karakaplan *et al*

$$sFDI_{it} = \alpha_0 + \alpha_1(MA3sODA)_{it} + \alpha_2(MA3sFDI)_{i(t-1)} + \alpha_3(MA3lnGDPpc)_{it} + \alpha_4(MA3D)_{it} + \alpha_5(\sigma 5D)_{it} + \alpha_6(MA3lnREER)_{it} + \alpha_7(MA3open)_{it} + \alpha_8(MA3grGDP)_{it}$$

where: sFDI stands for the share of FDI in GDP; all MA3 terms indicate moving averages over the past 3 years; sODA is the share of Overseas Development Agency records of aid; lnGDPpc is the logarithm of per capita GDP in US dollars; D is the loss in the real value of money; $\sigma 5D$ is the variation in D over the past 5 years; lnREER is the logarithm of real effective exchange rate; open is the measure of openness calculated as the share of trade in GDP; and finally, grGDP is the growth in real GDP.

The panel data used was over 97 countries which did not allow sufficient investigation of single countries. Their work however managed to control for other factors such as inflation, real effective exchange rate and financial market development. This allowed greater explanatory power on the variables under study.

Bhavhan (2011) concluded that if aid for a particular country is structured for infrastructure development such as education, health, transport and telecommunication, that country will be able to improve its pulling capacity towards FDI. Thus foreign aid will be able to promote growth and economic development by serving as a complementary flow. Making use of panel data for South Asian economies, Bhavhan decomposed ODA into physical and human capital employing fixed effects (FE) model. They found out that ODA in human capital causes FDI in Bangladesh, Sri Lanka and India. The research however had a relatively shorter period covering 1995 to 2007 due to non-availability for sectoral data as they made use of the seven forms of ODA as classified by OCED. This 13-year period would not allow use of time series in the investigation.

3.3 Conclusion

The reviewed empirical studies appear to indicate that there are three distinct possibilities regarding the impact of ODA on FDI: (i) a positive effect that is more significant in bilateral

ODA allocated to infrastructures and that could be intentional (vanguard effect) suggested by Kimura and Todo (2007), (ii) a negative substitution effect created by the crowding out of private investment, and (iii) a neutral effect that suggests that ODA flows do not have any impact on private foreign investment.

While there is consensus on the positive relationship between ODA and infrastructure and FDI, according to the World Bank (2006), ODA in infrastructure does not contribute significantly to the total funds for infrastructure investment. Hein, (2004) reports that in fact, ODA in developing countries is usually not an important source of financing infrastructure investment in low- and middle-income countries. Convinced by the World Bank observation and the ODA sectoral allocation in Zimbabwe, we do not disaggregate ODA into infrastructure ODA and other ODA like what other studies did. ODA support for infrastructure in Zimbabwe has been very insignificant for the past 15 years, we thus realise there will be data gaps for many years in the time series. Official Development Assistance focussed on humanitarian and social programmes in agriculture, health, education, social protection and governance sectors¹². Assistance in these social sectors is, theoretically expected to attract FDI via the indirect mechanism.

Despite considerable research in South Asia and Sub-Sahara Africa very little has be done for SADC and Zimbabwe in particular. We will thus draw guidance from the theoretical and empirical literature above to establish the relationship between ODA and FDI in Zimbabwe making use of the VAR model. Yoshioka and Sawada (1998) concluded that ‘....it may be better to employ another methodological framework such as **VAR** model for Granger causality test’ after using OLS in investigating ODA and Asian FDI inflow.

¹² 2014 Zimbabwe National Budget Statement

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter provides an outline of the estimation techniques employed in this study. The chapter is organised into three distinct sections. The first part specifies the empirical model employed, in the second section, justification is provided for the variables used and sources for the data used. The specific estimation procedures are discussed in the third section.

4.1 Model Specification

Our empirical model borrows heavily from the work of Karakaplan *et al* (2005), Yasin (2005), Bhavan (2010), and Asiedu *et al* (2009). While the bulk of our variables are informed by conventional economic theory, past empirical work played a pivotal role on selection of these.

We have also taken heed of recommendations by Yoshioka and Sawada (1998) to make use of vector auto regression model (VAR) so as to explore the possible causality between ODA and FDI. We are however, cognisant of the limitations of VAR, chief amongst them being the complications that arise from increasing variables as it increases VAR parameters which increase as the square of number of variables. We make use of two simultaneous equations in the model in which FDI is explained by its lagged values as well as lagged values of other endogenous variables. In the other equation we explain ODA by its lagged values as well as the past values of other endogenous variables.

$$\log FDI = \beta_0 + \beta \log FDI_{t-1} + \beta \log ODA + \beta \log ODA_{t-1} + \beta \log TOP + \beta \log TOP_{t-1} + \beta \log GDP + \beta \log GDP_{t-1} + \beta \log POP + \beta \log POP_{t-1} + \varepsilon_t \dots\dots\dots(1)$$

$$\log ODA = \alpha_0 + \alpha \log ODA_{t-1} + \alpha \log FDI + \alpha \log FDI_{t-1} + \alpha \log POP + \alpha \log POP_{t-1} + \alpha \log GDP + \alpha \log GDP_{t-1} + \alpha \log LE + \alpha \log LT_{t-1} + \varepsilon_t \dots\dots\dots(2)$$

where *FDI* is foreign direct investment, *ODA* is official development assistance, *POP* is the population of the country, *TOP* is trade openness, *LE* is life expectancy as a proxy for the health of the country's labour force. *GDP* is gross domestic product, *log* is natural logarithm, *t*, is time period and ε is the error term. β_0, \dots, β_i are the partial elasticities of the explanatory variables.

4.2 Description and Justification of Variables

4.2.1 Foreign Direct Investment (FDI)

FDI is the dependant variable in equation 1 while and explanatory variable in the ODA function, equation 2. FDI is both a stock and flow variable but we make use of FDI net inflows measured as actual in US\$. We make use of secondary data for net FDI obtained from UNCTAD databases.

4.2.2 Gross Domestic Product (GDP)

GDP is used as a proxy for the market size of a host country. GDP is considered an important determinant of FDI and consistently significant in empirical work. The theoretical linkage emanates from the fact that larger market allows firms to benefit from economies of scale that arise from low distribution costs and bulk-buying of inputs among other thing (Gwenhamo, 2010). We expect a positive and significant relationship between GDP and FDI.

4.2.3 Official Development Assistance (ODA)

Official Development Assistance (ODA) more commonly known as foreign aid consists of resource transfers from the public sector, in the form of grants and loans at concessional financial terms, to developing countries (Moreira, 2005). By characterization, ODA includes: capital projects, food aid, emergency relief, peace keeping efforts and technical cooperation (Ali, Malwanda and Suliman, 1999). We make use of ODA disbursements as captured in the World Bank Indicators Database. Others studies have made use of ODA commitments but we have observed significant variations between commitment and disbursements. Based on both direct and indirect catalytic effects of ODA on FDI we expect a positive and significant relationship.

4.2.4 Inflation (INF)

We make use of inflation as a proxy for economic stability, an important determinant of investment. Asiedu (2002) and Kamara (2013) make use of inflation as a measure of macroeconomic stability. While the consumer price index (CPI) is commonly used for measuring inflation we make use of inflation data measured using GDP deflator. Use of CPI present challenges due to either missing data or abnormally huge inflation figures which were

ignored by multilateral databases like World Bank Indicators. To ensure completeness we thus make use of inflation measured by GDP deflator for which data for the study period is available on World Bank databases. We expect a negative relationship between inflation and FDI.

4.2.5 Trade Openness (TOP)

Trade openness refers to the degree to which countries or economies allow or have trade with other economies (Atique et al. 2004). This variable captures the impact of trade openness on FDI flows. Several proxies have been used to proxy the degree of openness and these include the ratio of exports to manufacturing output, ratio of world price to domestic price indices and the sum of exports and imports as a ratio of GDP (Atique et al. 2004). This study therefore adopts the ratio proposed by Atique et al. (2004), which is calculated as:

$$TOP = \frac{real\ exports + real\ imports}{realGDP} \times 100$$

Asiedu (2002) posits that the impact of openness on FDI depends on the type of investment. When investments are market-seeking, trade restriction (and therefore less openness) can have a positive impact on FDI. It is widely argued that FDI and openness of the economy are positively related (Anh and Phuong, 2012). In this respect, trade openness is expected to have a positive effect on FDI and the coefficient of TOP is expected to be positive.

4.3 Estimation Procedure

4.3.1 Test for Stationarity

When regressing a time series variable on another time series variable, one often obtains a very high R-squared (in excess of 90%) even though there is no meaningful relationship between the two variables, showing spurious or nonsensical regression. This problem often arises from non-stationary time series. We use the Augmented Dickey-Fuller test to investigate the stationarity properties of the time series used in the study.

4.3.2 Cointegration Analysis

After checking for unit root the test for cointegration can be performed. Cointegration means that despite being individually non-stationary, a linear combination of two or more time

series can be stationary. Cointegration analysis considered if results from unit root tests confirm that the variables are non-stationary in their levels. Cointegration test explore the long run equilibrium properties by hypothesising that residual obtained by regression is stationary, if the integration is of order zero, $I(0)$ it means that there is co-integration between the variable. We make use of the Engle-Granger (EG) test.

4.3.3 Granger Causality Test

After testing for cointegration we perform the Granger causality test only if there is cointegration between FDI and ODA. Granger-Causality statics examine whether lagged values of one variable helps to predict another variable. We make use of the Wald test, which follows the Chi-square distribution in exploring the causal relationship. Similar test is employed by, Bhavan (2010), and Gwenhamo (2009). We make use of the Schwarz Criterion in determining optimal lag length.

4.3.4 Impulse Response

Impulse response functions are used to trace the effect of a one standard deviation shock to one of the innovations on current and future values of endogenous variables. Impulse response is considered more informative than VAR regression coefficients.

4.3.5 Diagnostic Tests

Diagnostic testing also called specification is undertaken to check the validity of the model we use. We employ the Jarque-Bera normality test to test for normality in the study. The null hypothesis was that the residuals are normally distributed with the alternative being that residuals are not normally distributed. For a p-value of the Jarque-Bera statistic that is less than 5% (0.05) we reject the null hypothesis and accept the alternative that is residuals are not normally distributed.

Heteroscedasticity was tested using the Breusch-Pagan-Godfrey test. Heteroscedasticity is a term used to describe the situation when the variance of the residual from a model is not constant. When the variance of the residuals is constant, it is homoscedasticity. If the p-value is less than 0.05, we reject the null hypothesis that there is homoscedasticity and accept the alternative that the residuals are heteroscedastic.

4.4 Data Sources

We make use of secondary data for the study period, 1980-2012. Data for GDP, population, life expectancy, inflation and literacy rate are taken from the World Development Indicators, an online database of country statistics administered by World Bank. Data for FDI and ODA is obtained from UNCTAD and OECD-DAC databases respectively.

4.5 Conclusion

The chapter has set a foundation for the next chapter which presents actual results based on the afore-mentioned estimation techniques. Expected relationship and relevance of the various variables provided will be tested in the subsequent chapter.

CHAPTER FIVE

ESTIMATION, PRESENTATION AND INTERPRETATION OF RESULTS

5.0 Introduction

The chapter presents the findings of the study based on the methodology outlined earlier. We present the empirical results of the various estimations undertaken. We begin by description of the data, then proceed to give correlation and stationarity test results before concluding by estimating the VAR model together with the standard VAR estimations; Granger Causality, impulse response and variance decomposition

5.1 Data Description

Table 3 presents the descriptive statistics for the explanatory variables to be used in the VAR model. The number of observations for each variable is 34. Because of the existence of negative observations in FDI we abandoned the use of logarithms. The descriptive results generally suggest that the time series is normally distributed as evidenced by the small difference between the mean and median. The observed maximum and minimum values suggests the absence of outliers. The mean is close to the median for all the variables.

Table 3: Descriptive Statistics

	DFDI	DODA	DTOP	GDP	POP
Mean	138,000,000	17,904,516	56.59176	0.092174	11,229,665
Median	78,006,600	-5,930,000.	28.64000	-0.022922	11,846,110
Maximum	3.740000,000	400,000,000	811.8758	1.029381	13,358,738
Minimum	2,130,000,000	2,930,000,000	-507.9590	-0.371117	7,572.126.
Std. Dev.	1,110,000,000	118,000,000	239.0640	0.337281	1,739,522.
Skewness	0.722245	0.685704	0.631337	1.355715	-0.734200
Kurtosis	5.288660	6.009506	5.088753	4.575897	2.213469
Jarque-Bera	9.460836	14.12810	7.694764	12.70394	3.584155
Probability	0.008823	0.000855	0.021336	0.001743	0.166614
Sum	428,000,000	555,000,000	1,754.345	2.857381	348,000,000
Sum Sq. Dev.	3.68E+19	4.17E+17	1,714.547.	3.412753	9.08E+13
Observations	33	33	33	33	33

5.1 Stationarity Test Results

To avoid running a spurious regression all the variables were tested for stationarity using the Augmented-Dickey Fuller (ADF) Test using the Schwarz Information criterion for optimal lag selection. The null hypothesis is that the time series are non-stationary. Decision to reject the null hypothesis is made when the estimated ADF test statistic is greater than the critical value at a given level of significance.

Table 4: Results of Unit Root Stationarity Tests

Variable	Levels	First Difference	Order of Integration
FDI	0.041615	-3.327171	I(1)
ODA	0.555815	-3.309396	I(1)
TOP	0.871325	-3.206762	I(1)
INF	-0.917318	-4.530793	I(1)
GDP	-2.884062		I(0)
POP	-11.954418		I(0)
CRITICAL VALUES			
1% level	-2.6423	-2.6453	
5% level	-1.9526	-1.9530	

5.2 Correlation Results

We conducted correlation tests to investigate if they are any variables that are highly correlated. Table 5 shows the results in the form of a correlation matrix. A correlation coefficient that is greater than 0.8 shows that variables are highly correlated. We find no correlation coefficient that is greater than 0.8 for this reason the data presents no challenges for multicollinearity.

Table 5: Correlation Matrix of Differenced Variables

	DFDI	DLE	DODA	DTOP	GDP	POP
DFDI	1.000000					
DLE	0.331130	1.000000				
DODA	-0.127954	0.283992	1.000000			
DTOP	0.509548	0.278172	-0.187105	1.000000		
GDP	-0.168237	0.253634	0.718491	-0.204887	1.000000	
POP	0.181200	0.136427	0.003862	0.183259	-0.023185	1.000000

5.3 VAR Estimation

5.3.1 Empirical Result of Unrestricted VAR model

VAR model equations generated from estimation

$$\text{Equation: DFDI} = C(1)*DFDI(-1) + C(2)*DFDI(-2) + C(3)*DODA(-1) + C(4)*DODA(-2) + C(5)*DTOP(-1) + C(6)*DTOP(-2) + C(7)*GDP(-1) + C(8)*GDP(-2) + C(9)*POP(-1) + C(10)*POP(-2) + C(11)$$

$$\text{Equation: DODA} = C(12)*DFDI(-1) + C(13)*DFDI(-2) + C(14)*DODA(-1) + C(15)*DODA(-2) + C(16)*DTOP(-1) + C(17)*DTOP(-2) + C(18)*GDP(-1) + C(19)*GDP(-2) + C(20)*POP(-1) + C(21)*POP(-2) + C(22)$$

C- Coefficient of independent variables

All the variables in Foreign Direct Investment and official development assistance equations in the VAR model are insignificant both in lag one and lag two. These findings are consistent with Carro and Larru (2010) who reported the absence of a distinct relationship. Kosack and Tobin (2006) also found no relationship between ODA and FDI.

5.3.2 Granger Causality

Granger Causality test is used to establish if lagged values of one variable can help in predicting another variable. It explores the causal relationship between variables. Our results show that official development assistance does not Granger cause foreign direct investment with a p-value of 0.93292 therefore we fail to reject the null hypothesis. There is also no causal relationship between FDI and the other variables: trade openness, population and gross domestic product. The test was done variables lagged to the second lag as provided by the Schwarz Information Criterion.

5.3.3 Variance Decomposition

We adopt a ten-year forecasting horizon in the variance decomposition. The Cholesky decomposition method is applied to the stationary series of the variables in the order DFDI, DODA, DTOP, GDP and POP. Tables 6 and 7 show that in year 1 DFDI own shocks will account for all the fluctuation observed, in the short run, 3-year horizon and long run, 10-year horizon shocks on ODA will account for a significant part of the fluctuation making aid the only important of the other endogenous variables. *We report the complete results for variance decompositions of DFDI and DODA (our variables of interest) in Appendix 8.*

On the other the impact of shocks in foreign direct investment is observed in the period of occurrence though it remains relatively insignificant through both short- and long-run horizons. The effect of shocks in official development assistance appears to lend credence to the ‘vanguard’ theory where some foreign aid is given to protect investment of home firms in recipient countries. The ‘vanguard’ effect was observed by Kimura and Todo (2007) in their study of Japanese ODA and FDI flows.

Table 6: Variance Decomposition of DFDI

Period	S.E.	DFDI	DODA	DTOP	GDP	POP
1	1,090,000,000	100.0000	0.000000	0.000000	0.000000	000000
3	1,360,000,000	66.92595	18.51286	8.085581	6.204751	0.270859
10	1,440,000,000	61.70460	22.74362	8.719741	6.359857	0.472177

Table 7: Variance Decomposition of DODA

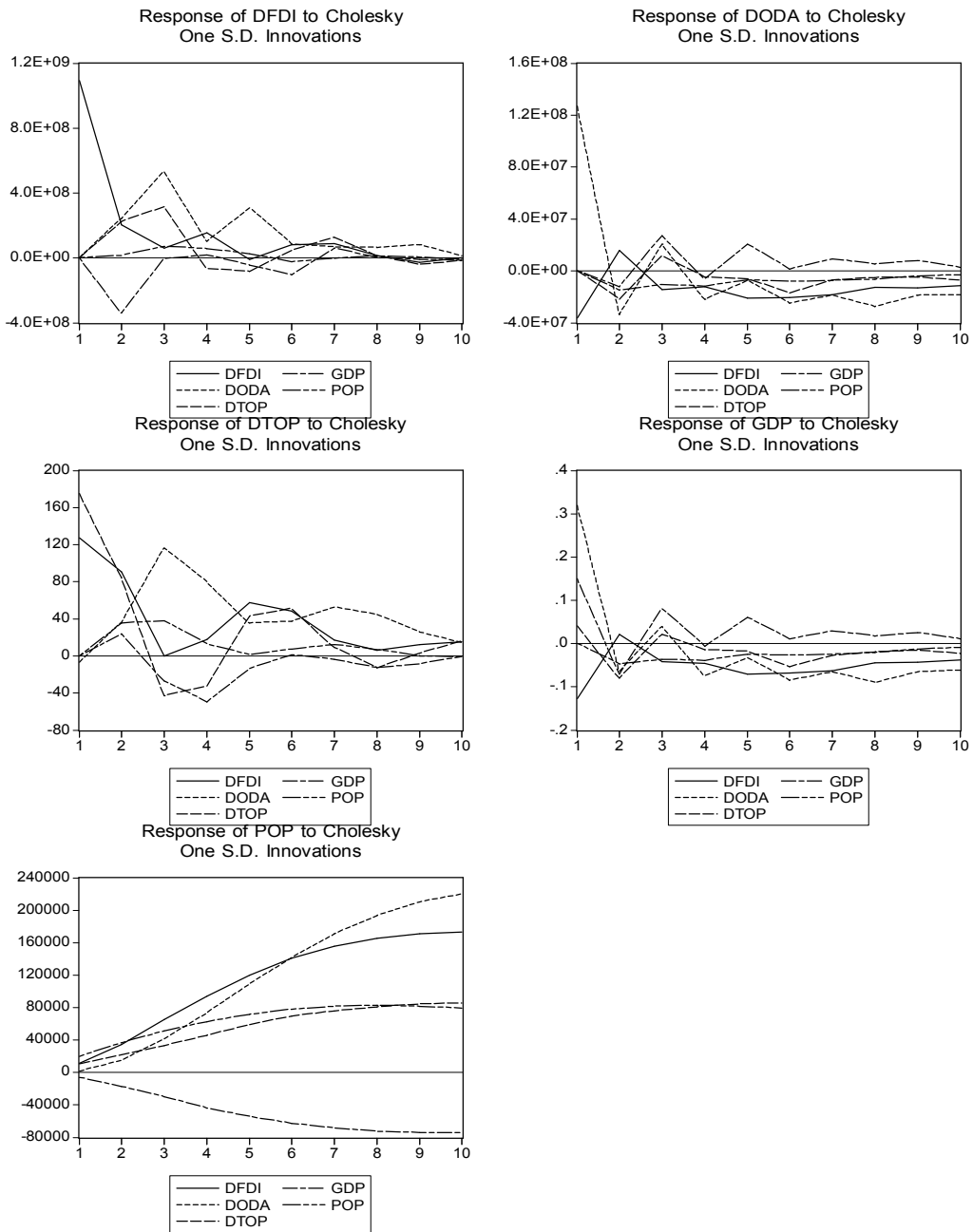
Period	S.E.	DFDI	DODA	DTOP	GDP	POP
1	132.000,000	7.629737	92.37026	0.000000	0.000000	0.000000
3	146.000,000	8.420648	83.01149	2.907493	4.141737	1.518632
10	166,000,000	13.05479	74.79126	4.088350	5.530428	2.535170

Openness of the economy, national output and population do not have significant effect on the decomposition of forecast error of foreign investment and foreign aid.

5.3.4 Impulse Responses

The nature of VAR models is such that all variables are endogenous. In such a model, a shock in the innovation/error term of any of the equation can be transmitted throughout the system. Through impulse response functions it is possible to investigate the response of one endogenous variable to an impulse in another variable within the VAR model.

Figure 2 Impulse Response Function



The impulse response function of FDI does not show any impact from changes in the VAR model errors.

5.4 Diagnostic Test Results

The VAR model satisfied the stability condition with no root lying outside the unit circle as shown in results of the stability check below. There is no violation of the of the normal distribution assumption with the joint Jarque-Bera statistic of 19.56906 and a probability of 0.0636 we therefore fail to reject the null hypothesis that residues are multivariate normal.

VAR Stability Check

Roots of Characteristic Polynomial
 Endogenous variables: DFDI DODA DTOP GDP POP
 Lag specification: 1 2

Root	Modulus
0.957726	0.957726
0.817917 - 0.191154i	0.839957
0.817917 + 0.191154i	0.839957
0.138431 + 0.744971i	0.757723
0.138431 - 0.744971i	0.757723
-0.664932	0.664932
-0.242998 + 0.456243i	0.516919
-0.242998 - 0.456243i	0.516919
-0.053393 + 0.313415i	0.317930
-0.053393 - 0.313415i	0.317930

No root lies outside the unit circle.
 VAR satisfies the stability condition.

Residual Normality Results

VAR Residual Normality Tests
 Orthogonalization: Cholesky (Lutkepohl)
 H0: residuals are multivariate normal
 Sample: 1980-2012
 Included observations: 30

Component	Jarque-Bera	df	Prob.
1	3.254895	2	0.1964
2	2.510057	2	0.2851
3	5.194368	2	0.0745
4	2.824913	2	0.2435
5	5.784822	2	0.0554
Joint	19.56906	10	0.0336

5.5 Conclusion

As we had set out to investigate the relationship between ODA and FDI our hypothesis being: there is a positive relationship between ODA and FDI we report that our findings show no apparent relationship between ODA and FDI. Having employed Granger Causality test, OLS, impulse response and variance decomposition have observed no apparent relationship between the variables. ODA appears to marginally impact FDI through shocks as seen through variance decomposition. The other variables; population, trade openness and the gross domestic production also appear not to have any significant relationship with ODA and FDI. These findings are however not new as Heoffler and Outram (2008) and (Harms and Lutz, 2006) have made similar conclusions.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

6.0 Introduction

In this chapter we provide a summary of the findings from the study and conclusions drawn from our findings. We also proffer policy recommendations informed by our findings. We conclude by acknowledging the limitations of our study suggesting areas for further study.

6.1 Conclusions

The study focused on investigating the relationship between ODA and FDI within the VAR framework. Our investigation looked at ODA and FDI flows rather than stocks. All the variables were non-stationary in levels but becoming stationary in first difference.

The study shows no relationship between ODA and FDI as well as with the other variables within our model, population, trade openness and gross domestic product. In line with the estimations performed, there is no correlation between ODA and FDI neither did we observe causality between the two variable. We also realised that shocks in either of the two variables weakly impacts on the other as we have learnt through variance decomposition.

We conclude that private funds (foreign direct investment) do not always follow public funds (ODA) and vice-versa. This conclusion is consistent with Anh and Phuong (2012) who noted that investment and ‘donations’ decisions are made based on different rationale. Foreign firms seek locational advantages when investing abroad while multilateral and bilateral is largely based on needs of the recipient country.

6.2 Policy Recommendations

Based on reviewed literature and our findings in which FDI and ODA flows are independent we suggest deliberate policy intervention to attract FDI since our results could not confirm the catalytic effect of ODA on FDI.

The bulk of the literature we reviewed linked ODA to FDI indirectly through stimulation of social, economic and political reforms. We therefore propose that enhancing attractiveness as a destination of FDI should be a priority driven from within.¹³

One area that could address investor reluctance has to do with policy consistency. The country has several policies that are in disharmony but the inconsistency also emanates from varied pronouncements by government officials in a scenario of ‘podium policies’. That lack of clarity can be deterrent to investors given that some level of ‘certainty’ is desirable for most investors.

Investors all over the world place a premium on property rights as a means to secure their investment. As a country, Zimbabwe is perceived risky in this regard. Investor decisions are based on return and risk therefore increasing the risk factor may place the country even beyond the most risk tolerant investors. We propose affirmation of property rights beginning with bilateral and multilateral investment agreements, that way the good intent of the government will be broadcasted faster.

There are a number of foreign investors that make use of direct or indirect referrals with international financial institutions (IFIs). This is both time and cost effective given the level of expertise in these organisations in gathering specific-country knowledge that could be useful in making investment decisions. Fostering good working relations with IFIs is a good way to ‘signal’ competitiveness as destination for investment.

6.3 Study Limitations and Areas for Further Research

This study was carried out at a global level making use of annual inflows of ODA and FDI into the whole nation regardless of the sectoral allocation. In future there could be value in investigating the relationship ODA and FDI within a particular specific sector, this focus can generate additional information on possible sectors in which FDI is responsive to ODA.

¹³ The Global Competitiveness Report 2014-2015

If data can be obtained, investigation of FDI and ODA from main investing and donor countries can assist to understand from which countries do these flow together.

We also realise the overly restrictive data set we worked on, the number of observations in our model was highly constrained. From 1980 to 2012, taking annual observations for the variables in the model we only had 33 observations per variable and that will in a great way limit the degrees of freedom in the estimation when one then takes into account the variables and the lags. If one can find data to increase the number of observations, the quality of the estimation would be greatly improved.

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APPENDICES

Appendix 1: Descriptive Statistics

Date : 04/24/15 Time 13:03

Sample: 1980 2012

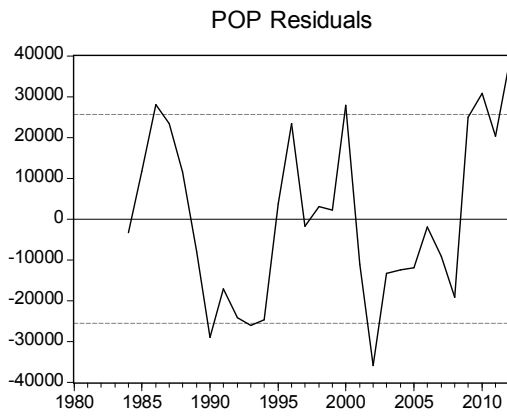
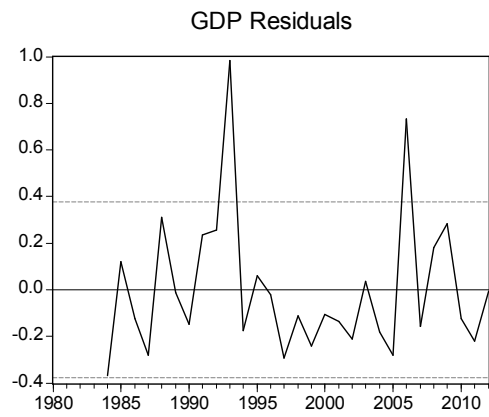
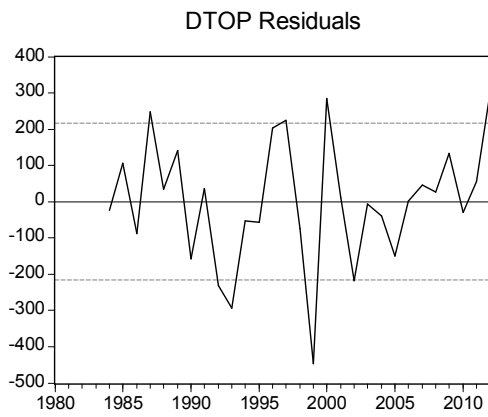
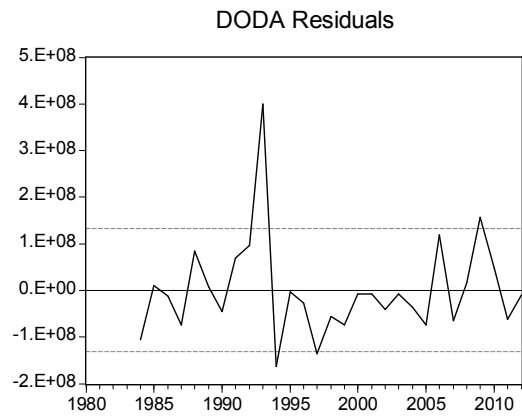
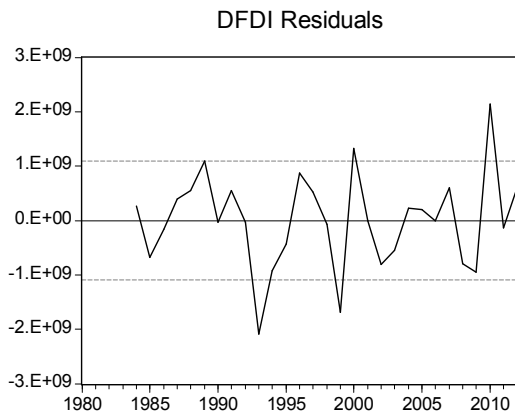
	DFDI	DODA	DTOP	GDP	POP
Mean	1.38E+08	17904516	56.59176	0.092174	11229665
Median	78006600	-5930000.	28.64000	-0.022922	11846110
Maximum	3.74E+09	4.00E+08	811.8758	1.029381	13358738
Minimum	-2.13E+09	-2.93E+08	-507.9590	-0.371117	7572126.
Std. Dev.	1.11E+09	1.18E+08	239.0640	0.337281	1739522.
Skewness	0.722245	0.685704	0.631337	1.355715	-0.734200
Kurtosis	5.288660	6.009506	5.088753	4.575897	2.213469
Jarque-Bera	9.460836	14.12810	7.694764	12.70394	3.584155
Probability	0.008823	0.000855	0.021336	0.001743	0.166614

Sum	4.28E+09	5.55E+08	1754.345	2.857381	3.48E+08
Sum Sq. Dev.	3.68E+19	4.17E+17	1714547.	3.412753	9.08E+13
Observations	33	33	33	33	33

Appendix 2: Correlation Matrix of Differenced Variables

	DFDI	DLE	DODA	DTOP	GDP	POP
DFDI	1.000000					
DLE	0.331130	1.000000				
DODA	-0.127954	0.283992	1.000000			
DTOP	0.509548	0.278172	-0.187105	1.000000		
GDP	-0.168237	0.253634	0.718491	-0.204887	1.000000	
POP	0.181200	0.136427	0.003862	0.183259	-0.023185	1.000000

Appendix 3: Residual graphs



Appendix 4: VAR Stability Check

Roots of Characteristic Polynomial
Endogenous variables: DFDI DODA DTOP GDP POP
Exogenous variables: C
Lag specification: 1 2
Date: 04/24/15 Time: 11:35

Root	Modulus
0.957726	0.957726
0.817917 - 0.191154i	0.839957
0.817917 + 0.191154i	0.839957
0.138431 + 0.744971i	0.757723
0.138431 - 0.744971i	0.757723
-0.664932	0.664932
-0.242998 + 0.456243i	0.516919
-0.242998 - 0.456243i	0.516919
-0.053393 + 0.313415i	0.317930
-0.053393 - 0.313415i	0.317930

No root lies outside the unit circle.
VAR satisfies the stability condition.

Appendix 5: Granger Causality Results

Pairwise Granger Causality Tests

Date: 04/24/15 Time: 11:41

Sample: 1980 2012

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability
DODA does not Granger Cause DFDI	30	0.00722	0.93292
DFDI does not Granger Cause DODA		0.06860	0.79538
GDP does not Granger Cause DFDI	30	0.09876	0.75574
DFDI does not Granger Cause GDP		0.00032	0.98578
DTOP does not Granger Cause DFDI	30	1.27315	0.26910
DFDI does not Granger Cause DTOP		0.35787	0.55468
POP does not Granger Cause DFDI	30	0.75464	0.39267
DFDI does not Granger Cause POP		3.47097	0.07337

Appendix 6: Residual Correlation Matrix

	DFDI	DODA	DTOP	GDP	POP
DFDI	1.000000				
DODA	-0.276220	1.000000			
DTOP	0.587420	-0.193619	1.000000		
GDP	-0.337754	0.906474	-0.137427	1.000000	
POP	0.433508	-0.055727	0.579215	-0.144795	1.000000

Appendix 7: Residual Normality Results

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
H0: residuals are multivariate normal
Date: 04/24/15 Time: 12:02
Sample: 1980 2012
Included observations: 30

Component	Jarque-Bera	df	Prob.
1	3.254895	2	0.1964
2	2.510057	2	0.2851
3	5.194368	2	0.0745
4	2.824913	2	0.2435
5	5.784822	2	0.0554
Joint	19.56906	10	0.0336

Appendix 8: Variance Decomposition

Variance Decomposition of DFDI

Period	S.E.	DFDI	DODA	DTOP	GDP	POP
1	1.09E+09	100.0000	0.000000	0.000000	0.000000	0.000000
2	1.21E+09	84.68189	4.017454	3.416869	7.871732	0.012052
3	1.36E+09	66.92595	18.51286	8.085581	6.204751	0.270859
4	1.38E+09	66.68869	18.66245	8.120243	6.083999	0.444612
5	1.41E+09	63.20032	22.44966	8.033403	5.865288	0.451332
6	1.42E+09	62.67410	22.51596	8.027828	6.310363	0.471752
7	1.44E+09	62.08935	22.37437	8.682239	6.388838	0.465203
8	1.44E+09	61.96585	22.52167	8.668575	6.375159	0.468748
9	1.44E+09	61.72632	22.74527	8.709602	6.350892	0.467919
10	1.44E+09	61.70460	22.74362	8.719741	6.359857	0.472177

Variance Decomposition of DODA

Period	S.E.	DFDI	DODA	DTOP	GDP	POP
1	1.32E+08	7.629737	92.37026	0.000000	0.000000	0.000000
2	1.40E+08	8.027250	87.64906	2.457158	0.767602	1.098930
3	1.46E+08	8.420648	83.01149	2.907493	4.141737	1.518632
4	1.49E+08	8.804136	82.07160	2.896839	4.152768	2.074662
5	1.52E+08	10.29600	78.75936	2.932001	5.815148	2.197482
6	1.56E+08	11.40173	76.77047	3.972996	5.490311	2.364492
7	1.59E+08	12.34239	75.50299	4.024909	5.625080	2.504626
8	1.62E+08	12.46987	75.47322	3.973770	5.518609	2.564529
9	1.64E+08	12.83629	75.03003	3.962537	5.614499	2.556646
10	1.66E+08	13.05479	74.79126	4.088350	5.530428	2.535170

Appendix 9: Unrestricted VAR Results

	Coefficient	Std. Error	t-Statistic	Prob.
C(3)	7.615481	4.745159	1.604895	0.1120
C(1)	-0.032475	0.232760	-0.139521	0.8893
C(2)	-0.161468	0.214803	-0.751701	0.4542
C(4)	6.559290	5.165107	1.269923	0.2074
C(5)	1762311.	1333764.	1.321307	0.1897
C(6)	1065445.	1245900.	0.855161	0.3947
C(7)	-2.23E+09	1.68E+09	-1.324245	0.1888
C(8)	-7.55E+08	1.81E+09	-0.416776	0.6778
C(9)	677.1490	4713.257	0.143669	0.8861
C(10)	-531.9096	4426.786	-0.120157	0.9046
C(12)	0.016015	0.028094	0.570061	0.5701
C(13)	0.010642	0.025927	0.410463	0.6824
C(16)	-54182.28	160984.9	-0.336567	0.7372
C(18)	-1.14E+08	2.03E+08	-0.559801	0.5770
C(19)	1.18E+08	2.19E+08	0.540326	0.5903
C(20)	-750.1312	568.8888	-1.318590	0.1907
C(11)	-1.71E+09	4.36E+09	-0.392731	0.6954
C(21)	706.6976	534.3118	1.322631	0.1893