
FDI in Sub-Saharan Africa: The Importance of Trade Openness

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Abstract

This study explores the role of trade openness in the attraction of Foreign Direct Investment (FDI) in Sub-Saharan Africa (SSA). FDI in this region is important because it provides the required capital for investment. In addition, FDI is believed to benefit developing countries in terms of employment, transfer of knowledge and technology, productivity, and managerial skills. The presence of trade barriers as well as policy restrictions complicates the establishment of FDI in this African region. This study answers two questions. Firstly, to what extent are structural reforms with respect to trade openness conducive in the search for increased FDI flows in SSA? Secondly, under which conditions in the host country does trade openness promote FDI in SSA? The study applied the Fixed Effects estimation method to test the time series data in the period 2001–2012. The database provides information on 36 Sub-Saharan African countries. The results indicate that increased trade openness, measured by trade intensity and specific policies, has shown to be a key determinant in the attraction of FDI in this region. Besides, countries should also improve infrastructural development, as this strengthens the effect of trade openness in promoting FDI.

KEYWORDS: Foreign Direct Investment, trade openness, Sub-Saharan Africa, infrastructure development.

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1. Introduction

At the beginning of the 21st century, the United Nations (UN) has introduced the Millennium Development Goals (MDGs) with the aim of eradicating poverty in all its dimensions for the year 2015 (United Nations, 2015). World leaders from all 191 UN member states committed to this new global partnership by signing the United Nations Millennium Declaration. In order to eradicate extreme poverty and hunger, one goal was to halve the amount of people living on less than \$1.25 a day, during 1990–2015 (United Nations, 2015). On a global scale, the number of people living in extreme poverty fell from 1.9 billion in 1990 to 836 million in 2015, a decline of more than 50 per cent. From these 836 million human beings, the overwhelming majority belongs to Sub-Saharan Africa (SSA)¹ (United Nations, 2015).

This African region includes 47 countries, of which 34 are identified as the most vulnerable countries in the world (Babatunde, 2011). The vast majority of these countries are distinctively blessed with common assets such as minerals, metals, and crude oil, which may lead to an increase in economic prosperity and growth (Babatunde, 2011). On the other hand, they are struggling with corruption, unemployment, poor leadership, inadequate infrastructure, and bad policies. As a consequence, these factors impede their possibilities to achieve their full potential (Babatunde, 2011).

The United Nations Millennium Declaration (2000) indicated that an expansion in Foreign Direct Investment (FDI) would help in the fight against poverty, with all its challenges, and contributes to economic development in SSA. This is acknowledged by several studies, which suggest that it is essential to promote domestic and foreign investment in order to reduce poverty and to achieve sustainable development (Agarwal, 2001; Asiedu, 2002, 2006; Babatunde, 2011).

In 2015, global inward FDI increased by 38 per cent when compared to 2014, to reach \$1,76 trillion. This is the highest amount since the global financial crisis during 2008–2009 (UNCTAD, 2016). By contrast, foreign investment in Africa reduced to \$54 billion in 2015, a decline of 7 per cent when compared to 2014; Africa's share in global FDI reduced to 3.1 per cent, a decline of 1.5 per cent when compared to 2014. This decrease is mainly due to less foreign investment in SSA, since countries in West and Central Africa were facing lower commodity prices that discouraged FDI towards these natural-resource-based economies (UNCTAD, 2016). In addition, SSA countries are perceived as a high-risk investment because they suffer from poor infrastructure, bad economic conditions, political instability, and poor institutions (Schneider & Frey, 1985; Wheeler & Mody, 1992).

Nevertheless, attracting FDI is crucial for economic development in SSA because it provides external capital necessary for investments (Asiedu, 2002, 2006; Cleeve, 2008). In

¹ Sub-Saharan Africa (SSA) consists of all African countries that are fully or partially located south of the Sahara.

this African region, not only are the current wage levels and domestic savings incredibly low, but also the countries are isolated from international capital markets (Asiedu, 2002). Hence, in order to supplement domestic savings, external capital by means of FDI or official loans is essential. However, a restraint in official assistance² makes it imperative for SSA countries to encourage the attraction of FDI (Asiedu, 2002).

Furthermore, developing countries benefit from advantages related to FDI. For example, it has been argued that FDI could positively contribute to a host country's competitiveness, employment, technology, and management skills (Asiedu, 2002; Cleeve, 2008; Sekkat & Vezanones-Vaaroudakis, 2007). Furthermore, several studies argue that FDI contributes to economic growth (De Gregorio, 1992; Oliva & Rivera-Batiz, 2002),³ while others suggest that an increase in foreign investment does not automatically result in a higher rate of economic growth for African countries (Asiedu, 2002, 2006). These different views imply that the relationship between FDI and economic growth is doubtful, at least for SSA.

Additionally, realizing the net benefits from FDI is often complicated due to poor primary conditions of the host country. Factors that impede countries from taking advantage of FDI are related to the low level of education, poor health conditions, limited availability of human capital, low competitiveness, high barriers to trade, and the current level of technological knowledge (Kurtishi-Kastrati, 2013).

One way to improve the condition of the host country is through the removal of high barriers to trade. Improved access to global markets would allow countries to exploit their comparative advantages on a larger scale and benefit from increased international competition (Sally, 2015). In addition, trade openness adds a meaningful contribution to poverty reduction. It tends to increase employment and wage levels, leading to a higher standard of living. Moreover, the World Bank has announced that the GDP per capita growth rate increased much faster for those developing countries that removed barriers and restrictions to trade when compared with other developing countries in the early 90's (Lippoldt, 2010).

This process of globalization reaches further than solely openness to trade, given that it also includes openness to capital and the free movement of labour. However, in the desire of being able to say something more concrete and useful, the primary concern of this research is to examine the importance of trade openness in the attraction of FDI in SSA countries.

The role of trade openness as a determinant of FDI has been investigated by several studies (Asiedu 2002, 2006; Chakrabarti, 2001; Cleeve, 2008; Edwards, 1990; Wheeler & Mody, 1992). Considering the strong need for FDI in SSA, it is remarkable that there is a lack of research on the determinants of FDI concentrated on this region (Asiedu, 2006). Therefore,

² Net official development assistant (ODA) and official aid received as a share of GNP has declined from 5.5% in 2004 to 3.9% in 2011 (World Bank, 2017).

³ See De Mello (1997), Durham (2000) and De Gregorio (2003) for a literature review on the effect of FDI on economic growth.

this paper aims solely on SSA countries and examines trade openness both in terms of practice and policy. Another reason to focus primarily on Sub-Saharan Africa is because results from surveys regarding investors, imply that the determinants of FDI to SSA are significantly different from the ones that apply to FDI elsewhere in the world (Asiedu, 2002; Batra, Kaufmann & Stone, 2003). In addition, Asiedu (2006) argues that African policymakers are convinced that policy implications from Latin America or East Asia are not applicable to their country because they believe that Africa is fundamentally different relative to the rest of the world. However, African policymakers could exchange ideas with each other. By performing an empirical analysis that solely concentrates on countries within SSA, credibility among African policymakers will hopefully increase (Asiedu, 2006).

One of the objectives of this study is to examine the importance of trade openness as a determinant of FDI in Sub-Saharan Africa. However, in order to achieve economic development, merely an increase in trade openness is not enough. The host country's competitiveness and productivity determines to what extent countries exploit the full benefits of trade openness for their economy (Sally, 2015). In order to improve the trade related competitiveness, countries should implement policies and regulations that affect the host country's business climate that is determined by stable macroeconomic conditions, institutions, physical infrastructure (amongst others, roads, railways, and airports), and human capital (Sally, 2015). For this reason, the second objective of this study is to determine under which conditions in the host country, the effect of trade openness in promoting FDI improves. This is examined through the implementation of several interaction effects between specific host country features and different measures of trade openness.

This study adds to the current literature through the analysis of trade openness from a multidimensional perspective. Besides, the effect of market size, infrastructure development, political instability, availability of natural resources, and macroeconomic stability on inward FDI in SSA are examined. The conclusions and recommendations of this study ought to be of aid to policymakers in their struggle against poverty and help countries in their pursuit of economic development.

In the scope of this research, an empirical model of the determinants of FDI has been constructed and is estimated over a sample of 36 SSA countries. This paper addresses two questions. Firstly, to what extent are structural reforms with respect to trade openness conducive in the search for increased FDI flows in SSA? Secondly, under which conditions in the host country does trade openness lead to higher levels of FDI in SSA?

The remainder of this paper is organised as follows. Section 1 further includes background information and describes why trade openness is of importance. Section 2 provides the literature review. Next, Section 3 describes the data and methodology. Section 4 presents the empirical results. Finally, Section 5 concludes.

1.1 FDI in SSA

The gradient of the total FDI inflow (as a share of GDP) to Sub-Saharan Africa between 1985 and 2015 is depicted in Figure 1. The growth in 2015 is mainly caused by the surge in investment in Angola, which reported a 352 per cent increase and is considered to be the largest FDI recipient among less developed countries (UNCTAD, 2016).

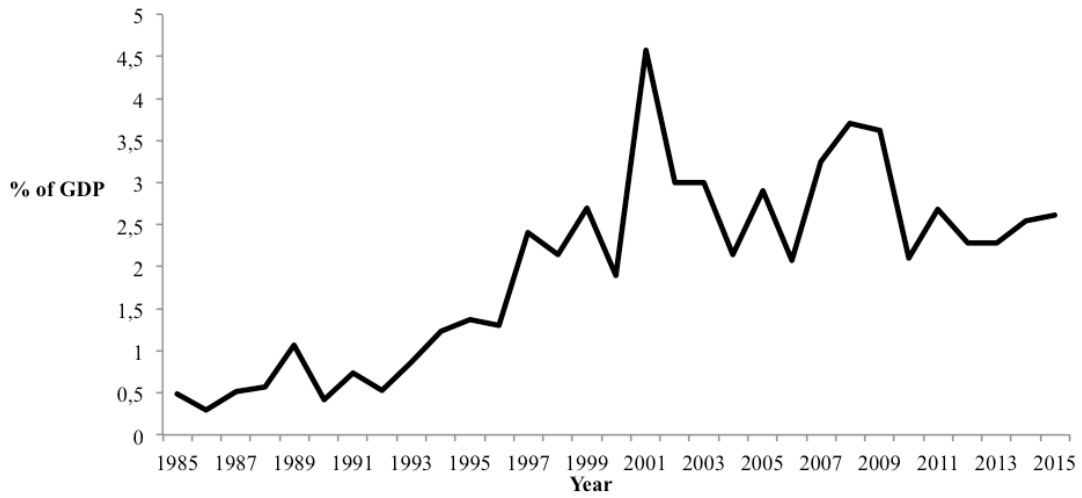
On the contrary, countries in Central Africa and West Africa had to deal with declining FDI, primarily due to low commodity prices, which continue to depress investments (UNCTAD, 2016). FDI towards these economies is mainly driven by the presence of natural resources and thus vulnerable to commodity price developments (Asiedu, 2006). The importance of commodity prices is indicated by the fact that the primary sector (i.e. mining, quarrying, and petroleum) is the second largest source of inward FDI, comprising 35% in 2012 (Figure 2). This suggests that FDI in SSA is primarily driven by an endowment component, and that countries facing a lack of natural resources, will attract very little or zero FDI (Asiedu, 2006). In order to reduce the vulnerability to commodity price developments, countries are reviewing current policies aimed at removing high barriers on FDI. For example by allowing 100 per cent foreign ownership of a given company in order to attract an increase in FDI (UNCTAD, 2016). Another reason why FDI is neglected in SSA is because MNEs prefer to locate in countries large enough to implement economies of scale required for production (Treviño & Mixon, 2004), whereas insufficient market size in SSA countries hinders this establishment (Asiedu, 2006).

It is believed that FDI encourages economic development since it generates spillovers through the transfer of knowledge, technology, and management skills (Cleeve, 2008). However, countries should be aware that some estimated benefits might be difficult to realise and vary depending on host country and condition. For example, if the host country suffers from weak economic development or when FDI leads to adverse economic and political effects. Supposed economic effects include lower employment, diminished competition in domestic markets, balance of payments deficits, and in potential, detrimental environment effects caused by FDI (Kurtishi-Kastrati, 2013).

Despite poor economic conditions in the region, growing urban consumer markets, infrastructural development, and promising trade agreements, all attracted significant FDI inflows in a number of African countries (UNCTAD, 2016). Additionally, several economic analyses have shown that most of the described economic flaws of FDI are of negligible importance (Graham & Krugman, 1995).

The top 5-investor economies by FDI stock in 2015 include the United States, United Kingdom, France, China, and South Africa, respectively. In addition, the top 5-recipients of FDI flows includes South Africa, The Republic of Congo, Mozambique, Nigeria, and Angola (UNCTAD, 2016).

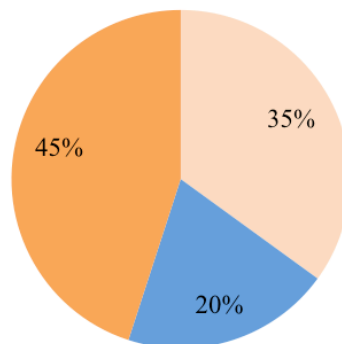
Figure 1
Total FDI Inflow to Sub-Saharan Africa between 1985 and 2015



Source: World Bank (2017a).

Figure 2
Inwards FDI stock by sector, 2012
(Percentage of total inward FDI stock in SSA)

Primary Manufacturing Services



Source: UNCTAD (2015).

1.2 The role of trade openness

Although in general trade openness is roughly translated as the presence of trade barriers, and the extent to which they are restrictive, a clear definition is lacking (David, 2008). In this current study, trade openness is best explained as the degree to which countries allow foreign investors to do business in its domestic market and participate in international trade (Lippoldt, 2010).

Countries should concern about their degree of trade openness due to several reasons. First, it is argued that trade is crucial to enable economic development in the long run and attain employment growth (Lippoldt, 2010). Second, trade promotes the establishment of economies of scale and exploitation of comparative advantages, supports knowledge transfers, and increases the range of products available for consumers (Lippoldt, 2010). In addition, trade pushes the reallocation of resources in the direction of productive firms, leading to their expansion, and outcompetes unproductive firms from the market. Increased competitiveness causes firms to optimize production, which drives productivity within the firm. A boost in productivity is in essential the key for economic progress (Lippoldt, 2010).

The interaction between trade and competitiveness is established in global value chains (GVCs), which are the primary drivers of productivity, employment, and increased international trade. GVCs include production stages dispersed on a global scale across firms in different countries (Sally, 2015). In order to benefit from GVCs, countries need to increase their competitiveness. This requires more than just opening borders to trade and foreign investment. Sally (2015) suggests that restrictions to trade, such as non-tariff barriers, need to be removed and favourable business conditions established to maintain interdependence between production processes in the global value chain. By doing so, openness to trade provides access to different imported capital goods and additional resources that incorporate advanced technology (Sally, 2015).

Increased productivity by implementing new technologies creates stronger demand for skilled workers and a decline in demand for unskilled workers (Feenstra & Hanson, 1999). Hence, the relationship of trade to employment is rather complex. Moreover, it is argued that firms that trade usually pay higher wages. Exporting firms make investment and technology decisions that improves their productivity, which increases the demand for more expensive skilled labour (Melitz, 2003). Recent studies found evidence that fierce competition in import goods drives out less productive firms. High productivity firms positively affect wages as we have seen in export-oriented firms (Stone & Cepeda, 2011).

However, in order to benefit from international trade, complementary policies are needed. Policies that strength openness in the global economy and improve domestic competitiveness (UNCTAD, 2016).

2. Literature review

This section starts with a decomposition of the term Foreign Direct Investment (FDI), followed by the motivations of multinational enterprises (MNE) to invest across borders. Next, FDI determinants will be discussed followed by the concepts of openness and its several measures. Finally, empirical evidence from previous studies concerning openness will be reviewed.

2.1 FDI definition

According to the International Monetary Fund (IMF), FDI is defined as:

“An incorporated or unincorporated enterprise in which a foreign investor owns 10 per cent or more of the ordinary shares or voting power of an incorporated enterprise or the equivalent of an unincorporated enterprise.” (Ridgeway, 2004, p.5).

In other words, Foreign Direct Investment involves a multinational enterprise (MNE) acquiring capital assets into a company/firm/enterprise located in a country that differs from the origin of the investor. In case the level of ownership is at least 10 per cent of ordinary shares, investors are authorized management and voting rights (OECD, 2009)

FDI could occur in two different forms. If the investment includes the establishment of an entirely new operation in a country different from origin, it is indicated as greenfield investment, while if the investment concerns merger and acquisitions with existing firms in a foreign company it is known as cross border mergers and acquisitions (OECD, 2009).

2.2 FDI motivations

Before an MNE decides to invest in a foreign country the costs and benefits are compared (Agarwal, 1980). Since the expenditures of investing in a foreign county, including the costs of adjusting to cultural differences and currency risks, are higher than in the domestic market it is necessary that FDI is profitable to justify the choice of investing in a foreign market instead of the home country. Therefore, some countries are more attractive to FDI than others.

In order to understand the forces driving FDI, I refer to the Eclectic Paradigm by Dunning (1981a, 1981b, 1993). This well-known concept makes a distinction between micro and macro level determinants to facilitate analysis concerning the reasons why FDI is located in a specific country. The structure of this paradigm consists of ownership, location, and internalization advantages, recognized as the OLI framework (Dunning, 1993).

First, a MNE that decides to invest in a foreign country needs to have the disposal of ownership advantages relative to local firms in the domestic market (Dunning, 1993). These advantages may relate to specific assets such as a brand name, patent or knowledge of technology, which are not available to its competitors. In addition, MNEs ability to coordinate

combined activities, including manufacturing and the distribution of products, enables them to outcompete domestic firms (Dunning, 2000). Second, the host country must have location specific advantages that favour the demand of MNEs and make the specific country more attractive to FDI when compared to other destinations. A host country's advantage may derive from a comparative advantage in terms of natural resources and availability of cheap labour, or an advantage in its transaction costs due to lower tax rates, leading to a decrease in production costs (Dunning, 2000). Third, FDI operations need to provide internationalization advantages, which imply that full control by the MNE remains preferable compared to arms-length transactions. An internalization advantage could appear when its rivals are easily copying the firm's assets. In order to protect these assets MNEs could decide to start producing within the firm instead of selecting another entry mode such as licensing, joint venture, or exports (Dunning, 1993).

Built upon this OLI paradigm, Dunning (1993) proposed several FDI motivations divided into four categories: natural resource seeking, market seeking, efficiency seeking, and strategic-asset seeking FDI. When the motivation of an MNE to invest in a foreign country is natural resource seeking, the aim is to acquire resources that are not available in the home country (i.e. natural resources), or obtainable at a lower cost, such as low-skilled labour (Dunning, 1993).

If an MNE is looking for market-seeking FDI, the primary concern is to serve the host country market. Choosing for this type of FDI may be desirable due to several reasons; serving products to the needs of the local customers, saving costs associated with serving the market from distance, and to discourage competitors from entering the market by physical presence (Dunning, 1993).

Next, the main purpose of efficiency-seeking FDI is to optimize the structure of an established resource-based or market-seeking investment in such a manner that the MNE is enabled to benefit from the overarching governance of activities across borders. In addition, Dunning (1993) argues that another objective of efficiency-seeking FDI is to take advantage both of economies of scale and scope and exploit the possibilities that occur due to different consumer needs.

Finally, Dunning (1993) explains strategic-asset seeking FDI, which may be considered as separate because the objective in this case is to acquire and complement new technologies in stead of exploiting an existing ownership advantage of the firm (Dunning, 1993). This means that beforehand there is no advantage to benefit from, and that the motivation for this type of FDI is determined ex-post. The primary goal of strategic asset seeking FDI may not concern enhancing the firm's position, but rather to reduce the strength of the competitive position of its rivals (Dunning, 1993). Hence, it is argued by several

studies that strategic-asset FDI is not in accordance with the OLI paradigm (Franco, Rentocchini & Vittucci Marzetti, 2008; Meyer, 2015).

2.3 Determinants of FDI: empirical evidence

In the literature most empirical studies on the determinants of FDI use cross-country regressions to determine host country characteristics that promote or deter FDI (Asiedu, 2002; Chakrabarti, 2001; Edwards, 1990; Schneider & Frey, 1985; Tsai, 1994; Wheeler & Mody (1992).

Most of these studies explored the effect of market size, labour costs, macroeconomic stability, infrastructure development, and political instability as a determinant of FDI. The relevance of market size is indicated by variables such as GDP, GDP per capita, and GDP growth. These indicators are used to judge the financial health of the host country. Schneider and Frey (1985) suggest that an increase in GDP per capita income will increase the attraction of FDI, while the growth of GDP is less important. The host country's market size is particularly important when it allows the exploitation of economies of scale for market-seeking FDI. In addition, Wheeler and Moody (1992) found evidence that market size (measured as GDP per capita) is an important determinant of FDI for developing countries. Tsai (1994) came to a similar conclusion.

Additionally, macroeconomic instability, indicated by rate of inflation, and costs of labour decreases the attraction of Foreign Direct Investment, in particular when FDI is export-oriented (Asiedu, 2002; Babatunde, 2011; Schneider & Frey, 1985). Political instability, indicated by several risk variables, is recognized as having a strong negative effect in attracting FDI to developing countries (Edwards, 1990; Schneider & Frey, 1985). Furthermore, the development of infrastructure is mentioned as one of the key determinants in promoting FDI (Asiedu, 2002; Babatunde, 2011; Kravis & Lipsey, 1992; Wheeler & Mody, 1992). For investors it serves as an indicator of economic development, while both import and export-oriented firms benefit from good infrastructure by efficient distribution of their goods to the markets.

Next, openness of an economy is also found to have strong bearing on FDI flows (Basu & Srinivasan, 2002; Edwards, 1990; Wheeler & Mody, 1992). Both openness in terms of capital and trade seem to positively affect the attraction of FDI. For example, host countries could distinguish themselves from others by the removal of restrictions on trade and lowering tariffs on goods (Edwards, 1990; Wheeler & Mody, 1992). However, it is not as simple as one might think since trade openness is a very broad term that can be interpreted in different ways. Hence, the remainder of this section will elaborate on the explanation of trade openness, its measures, and how it is related to FDI.

2.4 Trade openness concepts

As mentioned in Section 1.2, providing a clear definition of trade openness is rather difficult. This is mainly due to the fact that openness is measured according to different approaches including openness in practice and openness in policy.

Openness in practice approaches trade openness in terms of trade flows or levels of prices (Dowrick & Golley, 2004). In this case, openness is often measured by means of the ratio of international trade including exports plus imports to GDP (commonly referred to as trade volume). A positive relation between the volume in trade and the number of FDI implies that a country, which desires a boost in FDI, should increase its trade (Asiedu, 2006). However, policymakers do not directly influence the volume of trade what makes this kind of policy recommendation not effective (Rodriguez & Rodrik, 2000).

Openness in policy includes regulations and legislation that are imposed by the government concerning barriers to trade (McCulloch, Winters, & Cirera, 2001). This openness approach is measured in multiple ways since it includes all policies that are implemented with the aim to control or restrict trade (Dowrick & Golley, 2004). Popular measures to determine openness in policy include the host country's tariffs, non-tariff barriers, or composite indices that combine different aspects of trade policy (Edwards, 1998). In contrast to openness in practice, openness in policy is controllable by the government (Asiedu, 2006).

Countries that appear to be open in terms of openness in practice may not be open in terms of policy, and the other way around (McCulloch et al., 2001). It is conceivable that trade represents a larger share of GDP for a small country when compared to a large country. Hence, in this case merely size may define a small country to be open in practice, even though it may implement several policies that increase restrictions to trade (McCulloch et al., 2001). By contrast, when a country conducts policies that minimize trade barriers, but at the same time implements an exchange rate policy that causes an increase in price fluctuations, will result in a distortion of a countries degree of openness. In order to determine the degree of a country's openness to trade, the real issue is the extent to which international trade determines the prices in the domestic market (McCulloch et al., 2001).

2.5 Trade openness measures

Several studies have examined the relationship between trade openness and the attraction of FDI (Dollar, 1992; Leamer, 1988; Sachs & Warner, 1995). Throughout the literature, several openness measures have been used. Hence, comparing results from one study to another is rather complex (Edwards, 1998). For example, for some South Korea has been indicated as a country with a semi-closed economy that suffers from high government interference, while

for others it is defined as having an outward-oriented economy (Greenaway & Nam, 1988; Wade, 1994). This implies that it is important to consider which measure(s) to apply in order to determine a country's degree of trade openness. In his paper, Edwards (1998) evaluates a number of measures that have widely been used in the literature, which are summarized in Table 1 (McCulloch et al., 2001, p. 14).

The sum of total trade as a ratio of GDP, known as the trade dependency ratio, is frequently used to measure the openness of an economy. It is a popular measure due to the fact that data is readily available for many countries, which facilitates the comparability of different studies as it is commonly used (David, 2008). However, this measure has some limitations. The geographical location and the size of the domestic market might be correlated with a country's trade intensity. This implies that this measure in potential suffers from a significant country bias, which in effect could lead to unreliable results (Nunnenkamp, 2002).

As an alternative measure, Edwards (1998) discusses the use of growth rate of exports, tariff averages and collected tariff rates. However, these measures are prone to underestimate the true degree of trade restrictions, while serious measurement difficulties appear when there are both tariffs and quantitative restrictions. Next, Edwards (1998) describes several composite indices that strive to combine different aspects of trade policy and openness into a single index. A well-known index is the Sachs and Warner (1995) measure of openness, which is constructed as a binary dummy variable. The value (0 or 1) of this variable is dependent on several conditions of the host country, such as the average tariff rates, non-tariff barriers, black market premium rate, and type of economic system (Dowrick & Golley, 2004). However, an obvious deficiency of this measure is its binary character since it is plausible that the effects of trade openness accrue over time and not instantaneously (David, 2008). Hence, a continuous measure would be more appropriate in describing the establishment of trade openness.

According to Edwards (1998), composite indices such as the World Bank's outward orientation index obtained from the World Development Report, and the Heritage Foundation index are classified as most reliable. This is mainly due to their multidimensional character, which is in line with the policies imposed by the government (Taylor, 2000). The purpose of both indices is to combine factors that represent openness in terms of practice by means of several tariffs, and involve openness in policy by including several perceived distortions of trade in terms of non-tariff barriers. Taylor (2000) suggests that the availability of time series for these multidimensional openness measures could simplify research on the relationship between government policy and the attraction of FDI.

In addition to the discussion about the different openness measures, there are several endogeneity issues when it comes to the usage of these measures (Edwards, 1998; Rodrik, 1995). It is argued that countries that have attracted FDI in previous years are assumed to

have fewer restrictions on trade, while more open countries are likely more economically developed. These developments could lead to reverse causality, which needs to be taken into account.

Table 1 Measures of openness

<i>Measure</i>	<i>Definition</i>	<i>Approach</i>
Trade dependency ratio	The ratio of international trade (exports plus imports) to GDP	Practice
Growth rate of exports	The growth rate of exports over a specific period	Practice
Tariff averages	A simple or trade-weighted average of tariff levels	Practice
Collected tariff ratios	The ratio of tariff revenues to imports	Practice
Coverage of quantitative restrictions	The percentage of goods covered by quantitative restrictions	Practice
Black market premium	The black market premium for foreign exchange, a proxy for the overall degree of external sector distortions	Practice
Heritage Foundation index	An index of trade policy that classifies countries into five categories according to the level of tariffs and other (perceived) distortions	Policy
IMF Index of trade restrictiveness	A composite index of restrictions on a scale of 0 to 10	Policy
Trade bias index	The extent to which policy increases the ratio of importable goods' prices relative to exportable goods' prices compared to the same ratio in world markets.	Policy
The World Bank's outward orientation index	An index that classifies countries into four categories depending on their perceived degree of openness	Policy
Sachs and Warner index	A composite index that uses several trade-related indicators: tariffs, quota coverage, black market premium, social organization and the existence of export marketing boards	Policy
Leamer's openness index	An index that estimates the difference between the actual trade flows and those that would be expected from a theoretical trade model	Policy

Source: McCulloch et al., (2001, p. 14)

2.6 Trade openness and FDI: empirical evidence

Several studies have examined the relationship between trade openness and FDI in developing countries (Asiedu, 2002, 2006; Chakrabarti, 2001; Edwards, 1990; Taylor, 2000;

Wheeler & Mody, 1992). An overview of these studies is reported in Table 2, with the majority using the trade dependency ratio as measure of openness.

In the paper of Edwards (1990) the role of increased FDI as source of additional private capital is explored. He examined the determinants of the cross-country distribution of the OECD FDI into less developed countries during the period 1971–1981. Edwards (1990) argues that implementing policies that drive the economy in the direction of increased openness, improve host country's competitiveness, and reduce governance interference, will result in an increase of FDI.

In the paper of Wheeler and Mody (1992), a multidimensional measure of openness is applied in their analysis of international investment location decisions. They define openness as the degree to which producers in the host country market are exposed to international competition. The set of indices that characterizes the degree of openness include several factors of government intervention such as, import/export restrictions, exchange controls, and the risk of expropriation. However, Wheeler and Mody (1992) found no evidence that the degree of openness significantly improves the attraction of FDI.

Taylor (2000) examined the role of host country's openness for a mixture of 37 developed and developing countries. As a measure of openness he used survey results from the Global Competitiveness Report for 1993. He found evidence that trade openness is positively related to the number of FDI. In addition, Taylor (2000) examined three other measures of openness including the non-tariff barrier coverage ratio and several tariff rates. However, these additional measures showed an insignificant effect to FDI.

In his sensitivity analysis, Chakrabarti (2001) systematically evaluated the robustness of the (partial) correlation between the level of FDI and explanatory variables that have widely been examined by other cross-section studies. The data used for this analysis is for the year 1994 and involves 135 countries. In the case of openness, measured by the trade dependency ratio, Chakrabarti (2001) argues that a country's openness to trade is positively correlated with the number of FDI. As a policy recommendation an increase in international trade is suggested, however, this kind policy recommendation is not constructive.

Next, Asiedu (2002) examined the relationship between trade openness and FDI between 1988-1997 across 70 developing countries, of which 35 are located in Sub-Saharan Africa. Estimated by OLS, the results indicate that a host country's openness is important in promoting FDI to developing countries. However, non-SSA countries benefit more from an increase in openness when compared to SSA countries (Asiedu, 2002). It is suggested that the geographical location of SSA countries plays a role in the decrease of FDI, as countries in this region are perceived as risky. Nevertheless, to increase FDI in SSA, countries should remove trade barriers and restrictions to liberalize their trade regimes (Asiedu, 2002).

In another paper of Asiedu (2006), the purpose is to reveal policies that cause FDI to increase in Sub-Saharan Africa. This time, Asiedu (2006) performed a panel data analysis for 22 countries in the period 1984-2000. As measure of openness in policy she used data from the International Country Risk Guide (ICRG). In particular, Asiedu (2006) examined the country's attitude to foreign investment by means of risk to operations, taxation, labour costs, and repatriation of profits. The results suggest that improving the attitude in favour of FDI contributes to higher inflows of FDI.

Table 2 Literature overview

<i>Reference</i>	<i>Sample</i>	<i>Openness Measure</i>	<i>Effect on FDI</i>
Asiedu (2002)	Developing countries	Trade dependency	Positive
Asiedu (2006)	Sub-Saharan Africa	ICRG Investment Profile	Positive
Chakrabarti (2001)	Developed/Developing countries	Trade dependency	Positive
Edwards (1990)	Developing countries	Trade dependency	Positive
Kravis & Lipsey (1982)	Developed/Developing countries	Trade dependency	Positive
Taylor (2000)	Developed/Developing countries	Multidimensional index	Positive
Wheeler & Mody (1992)	Developed/Developing countries	Multidimensional index	Insignificant

2.7 Relation openness and FDI

From the studies mentioned in Table 2, the majority found a positive relationship between trade openness and FDI. However, none of them distinguishes the effect of trade openness to the different types of FDI. Yet, several papers argue that the impact of a country's openness is dependent on the motivation of the MNE to invest in a foreign country (Asiedu, 2002; Dunning, 1993; Markusen & Maskus, 2002).

When the primary goal is resource-seeking FDI, where goods are produced in the host country but sold somewhere else, MNEs benefit from a decrease in trade barriers and restrictions with respect to lower tariffs and transaction costs, since they are export-oriented (Navaretti & Venables, 2004). On the other hand, the main objective of market-seeking FDI is to supply local markets, which means that goods are produced and sold in the host country. As a consequence, when MNEs decide to serve the local market by means of an affiliate, an increase in trade barriers and restrictions (which means a decrease in openness), is likely to have a positive effect on the number of FDI (Asiedu, 2002). The main reason for this positive

relationship is because MNEs that locate production within the destination market are allowed to avoid tariffs by the host country, which is known as tariff jumping (Hwang & Mai, 2002). Additionally, several studies examined the effect of transaction costs, tariffs and non-tariff barriers on the choice of supplying the host country market through exports or local affiliates. They all conclude that affiliate production is more appealing relative to exports when trade barriers are clearly present (Navaretti & Venables, 2004).

These overall findings imply that the relationship between trade openness and FDI is quite complicated. Hence, an ideal approach would be to analyse the effect of trade openness for each type of FDI separately (Asiedu, 2002). Unfortunately, disaggregated data are not available for most countries in Sub-Saharan Africa. Therefore, this study examines the importance of trade openness in the attraction of *total* FDI flows to SSA.

Subsequently, the common perception is that FDI in SSA is dominated by the availability of natural resources (i.e. resource-seeking FDI) (Asiedu, 2002, 2006). Therefore, a positive relationship between trade openness and foreign investment is expected in this African region. Thus, if a country in SSA is willing to increase its trade volume (i.e. being more open in terms of practice) and/or willing to imply policies that stimulate trade openness (i.e. being more open in terms of policy), it is likely to attract increasing flows of FDI when compared to SSA countries that refrain from international trade or conduct policies that hinders trade openness. This is translated into the first hypothesis:

Hypothesis 1: A higher degree of trade openness encourages the attraction of FDI in Sub-Saharan Africa.

Additionally, this study examines under which circumstances in the host country trade openness promotes FDI through the implementation of several interaction effects. The emphasis is on the interaction between infrastructure development and the availability of natural resources in relation to trade openness. The development of infrastructure encourages trade by the presence of roads, railways, ports, and airports, while the availability of natural resources generates a competitive advantage. Exporting raw materials to foreign countries is facilitated by means of openness to trade. This results in two additional hypotheses:

Hypothesis 2a: An increase in infrastructure development positively affects trade openness in the attraction of FDI.

Hypothesis 2b: An increase in the availability of natural resources positively affects trade openness in the attraction of FDI.

3. Data and methodology

This section starts with a description of the applied data followed by a discussion of the methodology and the explanatory variables. Finally, the estimation strategy is explained.

3.1 Data description

The analysis in this study covers 36 SSA countries over the period 2001–2012. The dependent variable is the net inflow of FDI as a share of GDP. Different data sources have been used in order to obtain the most adequate statistics of the variables; see Table 3 for an overview of the descriptive statistics. The countries in the sample and the explanatory variables included in the analysis are selected based on data availability. For instance, data on factors such as trade policies, tax legislation, and ease of doing business, are not directly obtainable for countries in Sub-Saharan Africa. This could be a reason why previous studies included only a few African countries. Nevertheless, I attempted to involve as many SSA countries as possible in combination with a sufficient amount of control and explanatory variables.

The majority of the data is obtained from sources including the United Nations Conference on Trade and Development (UNCTAD), World Development Indicators (WDI), Africa Development Indicators (ADI), and the International Country Risk Guide (ICRG). UNCTAD has provided the data with regards to the dependent variable. This organisation provides access to a wide range of national and international collected data, regarding a lengthy period of time across all countries in the world (UNCTAD, 2016).

The detailed database of the World Development Indicators (WDI), published by the World Bank, is used for most of the variables in the analysis. The WDI primarily provides data of development indicators such as GDP, inflation, and trade, which have been collected from international sources. It includes the most temporary and accurate data available, including national, regional and global statistics (World Bank, 2017a). WDI provides data from 800 indicators covering more than 150 economies. In addition to the WDI, the World Bank also publishes the Africa Development Indicators (ADI), which includes a collection of data consisting of more than 1,200 development indicators in Sub-Saharan Africa (World Bank, 2017b). In this study ADI provided the data for the variable of infrastructure development, measured as the number of telephone subscribers per 1,000 people.

Next, the International Country Risk Guide (ICRG), published by the Political Risk Services, is used to collect the statistics for the political risk variable and the ICRG Investment Profile index. The ICRG provides financial, political, and economic risk ratings for 140 countries on a monthly basis, and has been used by institutional investors, multinational corporations, banks, foreign exchange traders, and shipping concerns (Howell, 2011).

Furthermore, the Heritage Foundation is used to obtain the data regarding the Economic Freedom Index as a measure of policy openness. For over more than two decades this index has delivered useful analysis in a straightforward format. The Economic Freedom Index covers 12 freedom indicators for 186 economies (Miller, Kim, and Holmes, 2015). The index evaluates countries on different factors of economic freedom, divided into four categories, based on statistics retrieved from the International Monetary Fund and the World Bank. The fundamental aspects that determine economic freedom are known as the government size, regulatory efficiency, rule of law, and open markets (Miller et al., 2015). In the scope of this research, the main focus is on open markets.

Besides the data sources used, Table 3 also indicates the mean, standard deviation, minimum and maximum values. The average inward FDI flow in the country sample is 5.57% of GDP, while the minimum value is -4%, and the maximum value 86%. These values vary considerably. A negative value implies disinvestment,⁴ while other countries are overwhelmed with foreign investment. The top 5 countries receiving the most FDI between 2001-2012 are Liberia, Angola, Chad, Mauritania, and Mozambique. See Table 4 in the Appendix for an overview of the country sample, and Table 5 for the correlations between all variables.

⁴ Disinvestment involves the selling or liquidating of an asset or subsidiary by an organization or a government (Ray, 2010).

Table 3 Descriptive statistics 2001–2012

<i>Variables</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min.</i>	<i>Max.</i>	<i>Source</i>
Dependent variable					
FDI flow as % of GDP	5.569	8.40	-4.0196	85.96	UNCTAD
Market size					
GDP (ln)	22.757	1.38	20.319	26.723	WDI
GDP per capita	6.756	1.16	4.7116	10.032	WDI
GDP growth (%)	5.028	5.94	-30.145	63.379	WDI
Urban population (%)	37.79	16.185	8.461	86.367	WDI
Macroeconomic stability					
Inflation rate (%)	11.021	32.60	-35.836	431.69	WDI
Availability Natural Resources					
Natural resources rents (%)	13.99	13.71	0.00369	61.513	WDI
Infrastructural Development					
Telephones per 1,000 pop. (ln)	4.90	1.46	0.744	7.493	ADI
Trade openness measures					
Trade dependency	79.43	44.035	20.964	351.10	WDI
Heritage Foundation index	50.74	10.370	18.266	82.67	Heritage Foundation
ICRG Investment Profile index	7.41	1.821	1	11.5	ICRG
Political instability					
ICRG Political risk rating	4.74	0.7890303	2.8576	6.583	ICRG
Conflict area	2.30	1.09716	1	4	WGI
<i>N</i>	538				

Table 5 Correlation matrix

<i>Variables</i>	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Inward FDI flow as % of GDP	1.00												
(2) GDP (ln)	-0.13**	1.00											
(3) GDP per capita (ln)	0.07	0.24**	1.00										
(4) GDP growth (%)	0.11**	0.14**	0.05	1.00									
(5) Urban population (%)	0.16**	-0.00	0.56**	-0.10*	1.00								
(6) Inflation rate (%)	0.05	0.09*	-0.08	-0.20**	-0.07	1.00							
(7) Telephone subscribers (ln)	0.11**	0.17**	0.68**	-0.05	0.46**	-0.15**	1.00						
(8) Natural resource rents (%)	0.33**	0.17**	0.00	0.13**	0.13**	0.04	-0.02	1.00					
(9) Conflict area	-0.05	0.32**	-0.47**	0.02	-0.35**	0.13*	-0.35**	0.38**	1.00				
(10) Political risk rating	-0.01	-0.07	0.44**	0.12*	0.20**	-0.24**	0.24**	-0.34**	0.82**	1.00			
(11) Trade dependency	0.43**	-0.18**	0.45**	0.21**	0.31**	-0.01	0.33**	0.23**	-0.17**	0.04	1.00		
(12) Heritage Foundation index	-0.11*	0.18**	0.21**	-0.02	0.02	-0.22**	0.23**	-0.37**	-0.37**	0.60**	-0.12*	1.00	
(13) ICRG Investment Profile index	-0.08	0.11*	0.43**	0.13*	0.15**	-0.35**	0.21**	-0.22**	-0.51**	0.75**	-0.08	0.59**	1.00

Note: * p < 0.05, ** p < 0.01

3.2 Methodology

The collected data for this research includes yearly observations over 36 SSA countries in the period between 2001-2012. The appropriate statistical estimation method is a panel data regression analysis. By performing such type of analysis, it is possible to conduct meaningful empirical research even when the data suffers from missing values or limitations in terms of time frame (Wooldridge, 2010). In addition, panel data models can easily adjust for time-invariant unobservable effects and have large dimensions of data. Furthermore, since the same individual countries are observed over time, this typically increases the efficiency when compared to cross-section data, collected at a particular point of time (Wooldridge, 2010). Panel data includes multiple estimation methods such as pooled OLS, Random Effects, Fixed Effects, and the First Differenced Estimator.

In order to determine which model fits the data best a Breusch-Pagan Lagrange multiplier (LM) test will be performed to decide whether to use a simple OLS regression or the Random Effects model (Breusch & Pagan, 1980). The null hypothesis in the LM test states that variance across individuals is zero, which means no significant difference across units (no panel effect) (Breusch & Pagan, 1980). When the null hypothesis is rejected, the Random Effects estimator is consistent.

Additionally, the Hausman test will be applied to choose between Random Effects and Fixed Effects (Hausman, 1978). This test evaluates if the individual effects are uncorrelated with other variables in the regression model (Hausman, 1978). When the null hypothesis is rejected, the Fixed Effects model is more appropriate compared to Random Effects, which is inconsistent. The outcome of both tests will be discussed in the results section.

3.2.1 Description of explanatory variables

The variables of interest in this analysis include the different measures of trade openness. In order to determine under which circumstances trade openness stimulates FDI, the interaction effects between the development of infrastructure and availability of natural resources in relation to trade openness are examined. Besides, other determinants of FDI are examined as control variables and are divided by category: market size, macroeconomic stability, infrastructure development, political instability, and natural resources availability.

3.2.2 Trade openness measures

The majority of empirical studies measured trade openness by means of the ratio of exports and imports to GDP, known as the trade dependency ratio (Asiedu, 2002; Chakrabarti, 2001;

Edwards, 1990). In spite of its limitations, this measure is useful for this current analysis due to adequate availability of the data. The trade dependency ratio measures openness in terms of practice. Additionally, two policy measures of openness are included in the model: the Heritage Foundation index and the ICRG Investment Profile index. This is in accordance with earlier studies of Edwards (1998) and Taylor (2000), who showed that the best performing measures are multidimensional.

The Heritage Economic Freedom index is measured based on twelve quantitative and qualitative aspects, clustered into four categories of economic freedom: rule of law, government size, regulatory efficiency, and open markets (Miller et al., 2015). In the scope of this research, only the open markets score is included in this measure, which is determined by trade freedom, investment freedom, and financial freedom. Trade freedom covers the reducing of tariff and non-tariff barriers; investment freedom includes restrictions on access to foreign exchange; and financial freedom represents the interference in the financial sector and dependence from government control (Miller et al., 2015). Averaging these three economic freedom indicators derives a country's score of open markets. Since open markets will likely increase the attraction of FDI, a positive coefficient for this measure is expected.

The ICRG Investment Profile index, published by the PRS Group, is an assessment of host countries factors that affect risk to investment (Howell, 2011). This component is part of the larger ICRG Political Risk Rating index, and has been used as a separate measure of policy openness by Asiedu (2006). In particular, this measure evaluates host country factors that affect risk to investment that are not included by other economic, financial, and political risk indicators. The subcomponents of this measure include contract viability/expropriation, profits repatriation, and payment delays (Howell, 2011). A country's risk rating is assigned by the sum of these three subcomponents, where for each the maximum score is four points and the minimum score is zero points. Since a higher score implies lower risk, the expectation is that the estimated coefficient of the ICRG Investment Profile index is positive.

3.2.3 Infrastructure development

Infrastructure development is important for developing countries since it contributes to the establishment of investments and thereby encourages FDI (Asiedu, 2006). A popular measure of infrastructure development is the number of telephones per 1,000 persons. Based on this measure, several studies found a positive relation between infrastructure development and the attraction of FDI (Asiedu, 2002, 2006; Babatunde, 2011; Schneider and Frey, 1985).

However, a complete measure of infrastructure development should include both the availability and reliability of infrastructure (Asiedu, 2002). Unfortunately, data on the

reliability of infrastructure are hardly available for most countries in the sample. Therefore, I use telephone subscribers (mobile phones and fixed phones) per 1,000 persons to measure infrastructure development. The hypothesis is that an improvement in the development of infrastructure will positively affect the attraction of FDI.

In addition, infrastructural development in terms of roads, railways, ports and airports, is likely to enhance the effect of trade openness. This is tested by means of an interaction effect between the number of telephones per 1,000 persons and the different openness measures.

3.2.4 Market size

The variables GDP, GDP growth, GDP per capita, and urban population serve as control variables. The size of the host country's domestic market is indicated by GDP. It is expected that larger domestic markets increase the number of FDI. In addition, the potential of the host country's domestic market is indicated by the annual growth rate of GDP (Asiedu, 2002). Countries facing a high rate of annual growth in GDP may foster economic development that could attract FDI. Hence, a positive relationship is expected. Next, GDP per capita captures a country's purchasing power that is comparable on a global scale. Higher purchasing power implies a higher standard of living, which could lead to an increase in FDI. Finally, urban population refers to people living in urban areas as a percentage of the total population (World Bank, 2017b). Urban areas such as cities provide a more favourable environment for FDI due to the fact that cities generate employment and income, and offer education, health care and other services (World Bank, 2017b). For this reason a positive coefficient for urban population is expected.

3.2.5 Macroeconomic stability

As is standard in the literature, the macroeconomic stability of a country is indicated by means of the inflation rate (Asiedu, 2002). Hyperinflation is not rare in Africa, with Zimbabwe as primary example with a yearly inflation rate of 11.2 million percentage points in 2008.⁵ The rate of inflation could indicate how reliable the government in a country is. A high rate of inflation results in a decrease in the currency. Hence, a negative coefficient of inflation is expected since increased inflation would deter FDI.

⁵ A possible explanation could be that the government is printing money in response to a shortage of GDP, which causes a disruption in balance between money supply and GDP.

3.2.6 Political instability

In SSA countries political instability is a common problem for decades. Since the early 1960s, when most African countries became independent, the amount of coups increased substantially. The rise in political turmoil has significantly contributed to economic stagnation (Mbaku, 1988). In this study, two measures of political instability will be employed: the ICRG Political Risk Rating and the WGI Conflict indicator. Political instability and political risk are used interchangeably. The Political Risk Rating consists of 12 weighted variables including both political and social components (Howell, 2011). The index is determined by an assessment of a country's investment profile, internal and external conflict, corruption, law and order, ethnic tensions, bureaucratic quality, religious/ethnic tensions, democratic accountability, socio-economic conditions, and the influence of the military in politics (Howell, 2011). The main purpose of this index is to provide a measure to evaluate the political stability of countries in a comparative way. A higher score indicates lower risk, and vice versa. The expectation is that the ICRG Political Risk Rating is positively correlated with FDI.

The WGI Conflict variable indicates on a scale of 1–4 whether a country is part of a conflict zone. This indicator is part of the Worldwide Governance Indicators (WGI) project. This project reports governance indicators for about 200 countries in the period 1996–2016 including six components of governance: government effectiveness, political stability and absence of violence, voice and accountability, control of corruption, rule of law, and regulatory quality (Kaufmann, Kraay & Mastruzzi, 2011). A higher score indicates higher intensity of the conflict. Therefore, I expect WGI Conflict to be negatively correlated with FDI.

3.2.7 Availability natural resources

It is widely believed that FDI to SSA is mostly driven by the availability of natural resources (Asiedu, 2006). As a consequence, countries that are not endowed with natural resources will likely attract decreasing flows of FDI, regardless from any policies. In order to control for this perception, the natural resources rents (as share of GDP) variable is included in the model. The total resources rents of a country include the sum of oil, coal (hard and soft), forest, mineral, and natural gas (World Bank, 2017b). Assuming that the perception holds, a positive coefficient is expected.

In addition, the interaction effect between the availability of natural resources and trade openness is examined. The expectation is that for countries endowed with natural resources, openness to (international) trade enhances the attraction of FDI.

3.3 Estimation strategy

The analysis starts with an estimation of the baseline model that includes all variables except the measures of openness and interaction terms. Second, the openness measures are separately added to the regression to indicate the effect of each measure apart. Next, two interaction effects are included in the model to determine whether infrastructure development or the availability of natural resources positively affects trade openness in promoting FDI. Finally, I check whether the results hold by the implementation of different robustness checks.

4. Results

As mentioned in the methodology section, a Breusch-Pagan Lagrange multiplier (LM) test and a Hausman test are performed in order to determine the applicable estimation method for this analysis. The results of these tests are reported in Table 6 in the Appendix. In both cases, the results suggest to reject the null hypothesis at a 1% significant level. Therefore, the LM test implies that the Random Effects estimation method is more appropriate when compared to OLS, while the Hausman test result implies that the Fixed Effects model is preferred since the Random Effects model proves to be inconsistent. Therefore, the applicable estimation method in this study is the Fixed Effects model. This model explores the relationship between predictor and outcome variables within an entity, in this case a country, and analyses the impact of variables that vary over time (i.e. GDP, trade, and policies) (Torres-Reyna, 2007).

The main regression results can be found in Table 7. The first specification shows the baseline model, including all control variables, where GDP, GDP growth (%), Urban population (%), Infrastructure development (ln), Natural resource rents (%), and WGI Conflict are significant. Regarding the signs, GDP has a negative sign where a positive sign was expected. This means that countries with a higher GDP attract less FDI. An explanation for this development could be that prosperous countries are more independent of foreign investments because of a greater degree of self-control. Nevertheless, the annual growth rate of GDP has a positive coefficient. A plausible explanation for this could be that the potential of the host country's domestic market is leading in promoting FDI when compared to the size of the domestic market.

In addition, the ratio of people living in urban areas has, as expected, a positive effect on the attractiveness of FDI. An explanation for this development could be that in urban areas such as cities, towns, conurbations or suburbs, the required working conditions and facilities, as well as employment opportunities, are present. Next, the coefficient of inflation is positive but statistically insignificant. The total natural resources rents variable shows a negative sign where a positive correlation was expected. According the literature, the availability of natural resources would attract FDI, however, in the applied country sample the opposite is true. Countries with increased natural resources rents (as share of GDP) discourage foreign investors. From all variables examined, the development of infrastructure seems to be the most essential determinant in promoting FDI according to its strong significant positive sign in specification 1, 2, and 4.

In the second specification trade dependency is included, of which the coefficient is highly significant and has a positive sign. Thus, an increase in the volume of trade, defined as the sum of exports and imports relative to GDP, will increase the inflow of FDI. This supports

the first hypothesis, which states that increased trade openness by means of a high trade volume attracts a higher number of foreign direct investments. This result is in accordance with the findings of Chakrabarti (2001), Asiedu (2002), and Edwards (1990), but in contrary to Anyanwu, (2011) and Ayanwale (2007). Furthermore, this specification indicates that GDP is still significant but negative and the annual growth rate of GDP is positive and statistically significant in promoting FDI, while the effect of WGI Conflict becomes insignificant.

Table 7 Fixed Effects Estimation Results
Dependent variable: FDI inflow as % of GDP

VARIABLES	Baseline	Trade Dependency	The Heritage Foundation index	ICRG Investment Profile index
GDP (ln)	-12.045*** (3.366)	-8.684** (3.644)	-10.542*** (3.610)	-9.559*** (3.151)
GDP growth (%)	0.158** (0.066)	0.152** (0.068)	0.133** (0.066)	-0.010 (0.067)
Urban population (%)	0.858*** (0.288)	0.723** (0.295)	0.986*** (0.280)	0.018 (0.290)
Inflation rate (%)	0.016 (0.013)	0.016 (0.013)	0.006 (0.013)	0.009 (0.011)
Natural resource rents (%)	-0.196*** (0.057)	-0.260*** (0.061)	-0.168*** (0.055)	0.016 (0.064)
Telephone subscribers (ln)	1.704*** (0.622)	1.432** (0.629)	0.706 (0.669)	2.632*** (0.594)
Conflict area	-1.323** (0.656)	-1.107 (0.680)	-0.644 (0.626)	-1.383** (0.606)
<i>Openness measure</i>				
Trade dependency		0.050*** (0.019)		
The Heritage Foundation index			0.137** (0.058)	
ICRG Investment Profile index				0.291 (0.476)
Constant	244.497*** (73.837)	169.636** (79.624)	201.225** (79.012)	214.058*** (70.606)
Number of country	35	35	34	28
Number of observations	333	324	305	263
Adjusted R-squared	0.0189	0.0404	-0.0148	0.0500

Notes: t statistics are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Next, the Heritage Foundation index is added to the model. This openness measure has a positive effect on FDI and is statistically significant at a 5% level. Therefore, openness in terms of policy related to trade, investment, and financial freedom, increases the attraction of FDI. In particular, countries that implement policies with the aim of reducing tariff and non-tariff barriers, removing restrictions on access to foreign exchange, and decrease the

dependence from government control and interference in the financial sector, encourage multinational enterprises to invest in these countries. This supports hypothesis 1; increased trade openness by means of implementing policies that reduce trade barriers and restrictions, promotes the attraction of FDI.

Finally, the fourth regression includes the ICRG Investment Profile index. The number of countries in the sample with regards to this openness measure is decreasing compared to other specifications. Because of inadequate data availability, only 28 countries are included in this regression. Perhaps for this reason, the positive effect of the host country's investment profile is insignificant. Therefore, I found no evidence that trade openness with respect to policies that affect risk to operations, labour costs, taxation, and repatriation of profits, is important in promoting FDI for the countries in the sample. This means that hypothesis 1 is rejected for these specific policies.

4.1 Interaction effects

The results of the interaction between infrastructure development and the different trade openness measures can be found in Table 8. The first specification includes the interaction effect of trade dependency and infrastructure development. The coefficient shows a positive and significant effect at the 10% level. This suggests that the effect of trade openness on the attraction of FDI increases with an improvement in infrastructural development. This is in line with hypothesis 2a. A possible reason for this could be that when a country invests in the development of infrastructure including transport (i.e. roads, railways, airports), communications and logistical systems, the more likely it is for a country to increase trade, and the more appealing they are to attract multinational enterprises. This result is consistent with Babatunde (2011), who came to a similar conclusion for countries in SSA.

Next, the second specification includes the interaction of the Heritage Foundation index and infrastructure development. Again, the coefficient shows a positive and significant result at the 10% level. Hence, it is plausible that the effect of trade openness (in terms of policy) on promoting FDI enhances with an increase in infrastructural development. Also in this case, it is likely that the more a country spends on infrastructure, the more effective policy reforms with respect to trade freedom, financial freedom, and investment freedom are in promoting FDI.

Finally, the third specification includes the interaction of the ICRG Investment Profile index and infrastructure development. However, this result shows a negative but insignificant coefficient. Hence, I found no evidence that the interaction between trade

openness in terms of taxation, repatriation of profits, labour costs, and risk to operations, and infrastructural development affect each other in the attraction of FDI.

Therefore, the overall results indicate that, conditional on which policy to implement, an increase in infrastructure development positively affects trade openness in the attraction of FDI. Hence, I found partial support for hypothesis 2a.

Table 8 Fixed Effects Estimation Results: Interaction Effects
Dependent variable: FDI inflow as % of GDP

VARIABLES	Trade Dependency Ratio	The Heritage Foundation index	ICRG Investment Profile index
GDP (ln)	-8.786** (3.628)	-11.413*** (3.633)	-8.832*** (3.321)
GDP growth (%)	0.152** (0.068)	0.161** (0.068)	-0.012 (0.067)
Urban population (%)	0.710** (0.294)	0.980*** (0.279)	0.049 (0.294)
Inflation rate (%)	0.017 (0.013)	0.001 (0.013)	0.012 (0.012)
Natural resource rents (%)	-0.283*** (0.062)	-0.171*** (0.055)	0.015 (0.064)
Telephone subscribers (ln)	0.384 (0.844)	-1.471 (1.441)	3.348*** (1.185)
Conflict area	-1.046 (0.677)	-0.738 (0.626)	-1.340** (0.610)
Trade dependency	-0.034 (0.049)		
Telephone subscribers * Trade dependency	0.017* (0.009)		
The Heritage Foundation index		-0.106 (0.154)	
Telephone subscribers * Heritage Foundation index		0.045* (0.026)	
ICRG Investment Profile index			0.880 (0.967)
Telephone subscribers * ICRG Investment Profile index			-0.120 (0.171)
Constant	177.532** (79.394)	233.419*** (80.961)	192.346** (77.202)
Number of country	35	34	28
Number of observations	324	305	263
Adjusted R-squared	0.0487	-0.00748	0.0478

Notes: t statistics are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Subsequently, Table 9 shows the regression results of the interaction between the availability of natural resources and different trade openness measures. The result of the first specification includes the effect of trade dependency, which shows a highly significant, but negative

coefficient. This suggests that the impact of trade openness declines when the total natural resources rents increases. A plausible explanation for this could be that the more a country depends on the availability of natural resources, the less involvement of foreign investors is desired when extracting profits.

Table 9 Fixed Effects Estimation Results: Interaction Effects
Dependent variable: FDI inflow as % of GDP

VARIABLES	Trade Dependency Ratio	The Heritage Foundation index	ICRG Investment Profile index
GDP (ln)	-9.583*** (3.571)	-10.003*** (3.624)	-9.808*** (3.054)
GDP growth (%)	0.133** (0.067)	0.144** (0.067)	0.023 (0.066)
Urban population (%)	0.656** (0.289)	1.038*** (0.282)	-0.242 (0.288)
Inflation rate (%)	0.016 (0.013)	0.006 (0.013)	0.010 (0.011)
Natural resource rents (%)	0.076 (0.108)	0.104 (0.201)	-0.808*** (0.217)
Telephone subscribers (ln)	1.478** (0.616)	0.559 (0.676)	2.826*** (0.578)
Conflict area	-1.008 (0.665)	-0.661 (0.625)	-1.227** (0.589)
Trade dependency	0.155*** (0.034)		
Natural rents * Trade dependency	-0.004*** (0.001)		
Heritage Foundation index		0.187*** (0.068)	
Natural rents * Heritage Foundation index		-0.006 (0.004)	
ICRG Investment Profile index			-1.290** (0.610)
Natural rents * ICRG Investment Profile index			0.113*** (0.029)
Constant	184.165** (77.964)	184.787** (79.728)	240.471*** (68.753)
Number of country	36	35	28
Number of observations	324	305	263
Adjusted R-squared	0.0823	-0.0110	0.108

Notes: t statistics are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

The second specification includes the interaction between the Heritage Foundation index and availability of natural resources. The result shows a negative but insignificant coefficient. Therefore, implementing policies related to market openness (trade freedom, investment

freedom, financial freedom) in countries with an increase in availability of natural resources do not influence the attraction of FDI for the countries in the sample.

However, the third specification shows a positive and significant result of the interaction between ICRG Investment Profile index and availability of natural resources. This implies that implementing policies that affect risk to investment improves in countries with an increase in availability of natural resources in promoting FDI. One reason for this development could be that when a country is more dependent on its total natural resources rents, the more important are legislations in terms of risk to operations, repatriation of profits, labour costs, and taxation, in attracting foreign investment. In other words, evidence suggests that foreign investors seem to prefer countries endowed with natural resources as long as the host country's legislation is adequate. The overall results indicate that hypothesis 2b is rejected in terms of trade dependency and for policies with regards to open markets, while this hypothesis is accepted when policies that affect risk to investment are involved.

In order to provide clarity, the findings with regard to all hypotheses tested are reported in Table 10 below.

Table 10 Hypotheses Results

Hypothesis/Measure	Trade Dependency Ratio	The Heritage Foundation index	The ICRG Investment Profile index
Hypothesis 1	Supported	Supported	Insignificant result
Hypothesis 2a	Supported	Supported	Insignificant result
Hypothesis 2b	Rejected	Insignificant result	Supported

4.2 Robustness checks

As a first robustness check, I included the ICRG Political Risk Rating in the model instead of the WGI Conflict area variable. Table 5 indicates that these variables are highly correlated (0.82), which could lead to perfect collinearity when they are both included in the model. However, none of the openness measures are significant in this adjusted regression model and thus do not affect FDI for the countries in the sample (see Table 11 in the Appendix). Additionally, it is likely that this regression model is now subject to multicollinearity. This is due to the fact that the ICRG Political Risk Rating is highly correlated both with the Heritage Foundation index (0.60) and the ICRG Investment Profile index (0.75). In the latter case, this makes sense, because the ICRG Investment Profile index is part of the overarching ICRG Political Risk Rating.

Next, an alternative measure of trade openness is examined. It includes the composite measure Restrictions on Trade and Investment, published by the Fraser Institute. This measure consists of factors including taxes on international trade, exchange controls and regulatory trade barriers (i.e. amongst others tariffs, quotas, and license fees). The index score ranges from 0 to 10, where a higher rating implies fewer restrictions. Table 12 in the Appendix reports the fixed effects estimation results, which indicate a statistically insignificant but positive coefficient. This implies this measure of policy openness does not affect the inflow of FDI for the countries concerned. Nevertheless, the result of the interaction between this alternative measure and telephone subscribers is statistically significant at 10% level. Hence, this evidence suggests that infrastructure development stimulates the effect of this openness measure in attracting FDI.

As a final robustness check, the dependent variable has been changed to GDP growth (%); see Table 13 in the Appendix for the estimation results. FDI as a share of GDP has a positive and significant coefficient in specifications 1–3. This implies that when countries increase the number of FDI, GDP growth increases. This positive relationship is in line with the findings of De Gregorio (1992). Additionally, with regards to the openness measures, the trade dependency ratio shows a positive and significant coefficient. It is likely that an increase in a country's trade volume will lead to GDP growth. However, the Heritage Foundation index shows a positive but insignificant effect, while the ICRG Investment Profile index includes a negative but significant result. Furthermore, evidence suggests that macroeconomic stability seems to most important for GDP growth, as the coefficient of inflation rate (%) is highly significant and negative in all specifications. Finally, infrastructure development seems to be less important in realizing GDP growth when compared to the attraction of FDI.

5. Conclusion

This study has examined the importance of trade openness in the attraction of FDI in Sub-Saharan Africa using empirical evidence from 36 countries. The role of trade openness has been studied from a multidimensional perspective, which means that both concepts of trade openness are explored in their relation to FDI inflows. Trade openness in practice is measured by the trade dependency ratio, while the Heritage Foundation index and the ICRG Investment Profile index measured trade openness in terms of policy.

The results indicate that there is a highly significant positive relationship between the trade dependency ratio and inflow of FDI in the country sample. In addition, the result for the Heritage Foundation index indicates a statistically significant effect and is positively correlated with the attraction of FDI, while the ICRG Investment Profile index turned out to be insignificant for the country sample. Therefore, solely openness in terms of policies related to trade, investment, and financial freedom, positively affects the attraction of FDI, while policies related to taxation, risk to operations, labour costs and repatriation of profits, do not affect inward FDI for the countries in the sample. Additionally, as an alternative measure of policy openness, Restrictions on Trade and Investment, has been examined. However, the results for this policy measure also indicate a statistically insignificant effect.

In addition, this study further examined the effect of market size, macroeconomic stability, infrastructure development, political instability, and the availability of natural resources, on the attraction of FDI. Evidence suggests that regarding the market size, the potential of the host country's domestic market, captured by GDP growth, is more important for promoting FDI than the size of the market, indicated by GDP. Furthermore, countries of which the majority of people live in urban areas attract more FDI. Besides, countries in conflict zones discourage FDI, while macroeconomic stability shows a statistically insignificant effect. Surprisingly, the availability of natural resources strongly decreases the inflow of FDI for the countries in the sample. From all estimated factors, evidence suggests that the availability of infrastructural development is the most essential determinant in promoting FDI.

Second objective of this study is to examine under which circumstances of the host country, the effect of trade openness on FDI improves through the implementation of several interaction terms. The results indicate a positive and statistically significant effect for the interaction between the trade dependency ratio and infrastructural development in the attraction of FDI. While from both policy measures, only the interaction effect between the Heritage Foundation index and infrastructural development denotes a positive and statistically significant relationship. Additionally, the interaction between the trade dependency ratio and

the availability of natural resources negatively affects the inflow of FDI, while the interaction between the ICRG Investment Profile index and the availability of natural resource indicates a positive and significant relationship.

Finally, this study contributes to the discussion about the effect of FDI on economic growth in SSA countries by changing the dependent variable to GDP growth. The results indicate that FDI stimulates GDP growth for the countries in the sample. In addition, evidence suggests that trade openness in practice positively affects GDP growth.

5.1 Policy implications

The overall findings in this study give reason to believe that trade openness is a key determinant in the attraction of FDI in Sub-Saharan Africa. However, the conclusions drawn about openness in terms of policy are not fully robust. Therefore it is important to provide a careful policy recommendation. From this study, it is clear that an increase in the volume of trade, in terms of exports and imports, promotes the attraction of foreign investors in SSA. However, increasing the volume of trade as a policy recommendation is not effective, since policymakers do not directly influence the degree of trade.

As a consequence, this study also considered measures of openness in terms of policy, which can be directly controlled by policymakers. The results in this study suggest that through the implementation of policies aimed at decreasing tariff and non-tariff barriers, restrictions on accessibility to foreign exchange, and less government interference, the number of FDI will increase. However, this study found no evidence that implementing policies with regards to labour costs, taxation, risk to operations, and repatriation of profits, result in the attraction of FDI. Therefore, SSA countries that are willing to implement policies with the aim of increasing trade openness to attract FDI should be aware to carefully consider which policies to put into effect.

In addition, the common perception that FDI in Sub-Saharan Africa is dominated by the availability of natural resources does not hold for the countries in the sample. As a consequence, this suggests that other determinants such as GDP growth and infrastructure development are more important for the establishment of FDI in these specific countries. This implies that countries, which are lacking natural resources, do not have to despair in their desire for FDI.

Furthermore, evidence from the interaction effects suggests that countries in Sub-Saharan Africa should not only worry about policies and structural reforms that, in potential, enhance trade openness, but also realise that through improving infrastructure development, the transformation of trade openness into opportunities accelerates. These opportunities,

powered by FDI spillovers, could help eradicate poverty through increased employment and wages, leading to a higher standard of living, and improve sustainable development by the introduction of new technologies, leading to higher productivity. Although these opportunities may differ for each host country and condition, FDI seems to encourage economic growth. As a result, countries in Sub-Saharan Africa cannot go wrong increasing trade openness.

5.2 Limitations

As with any study, there are also some limitations in this study. First of all, due to inadequate data availability for countries in SSA, not all countries that belong to this region have been used in the sample. In addition, some independent variables were missing over the period 2001–2012, which reduced the data set for each model differently. However, this problem applies to multiple studies that investigate countries in this region. Another limitation caused by poor data availability is the absence of additional trade related variables, such as trade costs or taxes on international trade, which are important for determining trade openness. Furthermore, this study measured trade openness in practice solely by the trade dependency ratio, where other measures are also available.

Second limitation stems from the dependent variable, the total inward flow of FDI as a share of GDP. As indicated by several studies, the determinants of FDI might differ for each motivation of the MNE. Therefore, an ideal approach would be to analyse the determinants for each type of FDI separately. Unfortunately, disaggregated data needed for such an analysis were insufficient for most SSA countries. Thus, additional studies are needed to explain in more detail the determinants for each type of FDI.

Finally, this study suffers from a limitation caused by the high correlation between the ICRG Political Risk Rating and both measures of openness in policy. Therefore, I was unable to distinguish how political risk affects the relation between openness in policy and promoting FDI in Sub-Saharan Africa. It is plausible that the effect of political risk is associated with openness in policy. Hence, this interaction is interesting to investigate for further studies.

To sum up, recommendations for future research are to examine openness in practice through other measures, include extra trade related control variables, and, perhaps most challenging regarding the limited possibilities, analyse the determinants for each type of FDI in Sub-Saharan Africa through disaggregated data.

6. References

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7. Appendices

Table 4 List of 36 SSA Countries

Angola	Ethiopia	Mauritania	Sudan
Benin	Gabon	Mauritius	Tanzania
Botswana	Gambia, The	Mozambique	Togo
Burkina Faso	Ghana	Namibia	Uganda
Cabo Verde	Guinea	Nigeria	Zambia
Cameroon	Kenya	Rwanda	Zimbabwe
Chad	Liberia	Senegal	
Congo, Dem. Rep.	Madagascar	Seychelles	
Congo, Rep.	Malawi	Sierra Leone	
Côte d'Ivoire	Mali	South Africa	

Table 6 Test Results

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

FDI_Uncstad[country,t] = Xb + u[country] + e[country,t]

Estimated results:

	Var	sd = sqrt(Var)
FDI_Unc~d	40.26728	6.34565
e	21.46865	4.633427
u	10.65462	3.264142

Test: Var(u) = 0

chibar2(01) = 30.93
 Prob > chibar2 = 0.0000

. hausman fe re, sigmamore

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
GDPln	-12.04509	-1.998747	-10.04634	3.512396
GDPgrowth	.1576546	.1664091	-.0087545	.016399
urban_pop	.8579624	.0605835	.7973789	.2991991
inflation~e	.0163951	.0106343	.0057609	.0079516
natural_re~s	-.1960165	.0004141	-.1964306	.0416628
infra	1.703617	.9116211	.7919961	.5832964
wgi_conflict	-1.323084	.1305184	-1.453602	.4473199

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 39.95
 Prob>chi2 = 0.0000

Table 11 Fixed Effects Estimation Results: Robustness Check
Variable of interest: Political Risk Variable

VARIABLES	Baseline	Trade Dependency	Heritage Foundation index	ICRG Investment Profile index
GDP (ln)	-14.548*** (2.891)	-13.360*** (3.157)	-0.559 (2.420)	-14.815*** (2.906)
GDP growth (%)	-0.034 (0.068)	-0.029 (0.072)	-0.042 (0.054)	-0.026 (0.069)
Urban population (%)	-0.481 (0.294)	-0.511* (0.304)	-0.372 (0.226)	-0.490* (0.295)
Inflation rate (%)	0.022** (0.009)	0.023** (0.009)	0.000 (0.009)	0.023** (0.009)
Natural resource rents (%)	-0.066 (0.067)	-0.095 (0.074)	0.123** (0.053)	-0.064 (0.067)
Telephone subscribers (ln)	3.634*** (0.546)	3.549*** (0.570)	1.416*** (0.447)	3.677*** (0.548)
ICRG Political Risk Rating	1.003 (1.178)	0.861 (1.219)	-0.828 (0.949)	0.328 (1.385)
Trade dependency		0.014 (0.020)		
Heritage Foundation index			0.077 (0.049)	
ICRG Investment Profile index				0.546 (0.589)
Constant	339.439*** (64.363)	313.470*** (69.964)	23.130 (53.801)	344.793*** (64.637)
Number of country	31	31	30	31
Number of observations	320	310	291	320
Adjusted R-squared	0.0460	0.0395	0.0307	0.0455

Notes: t statistics are in parentheses.

*** p<0.01, ** p<0.05, * p<0.

Table 12 Fixed Effects Estimation Results: Robustness Check
Alternative measure: Restrictions to trade & investment

VARIABLES	Alternative Measure	Interaction Effect 1	Interaction Effect 2
GDP (ln)	-8.230** (3.865)	-10.706*** (4.080)	-8.240** (3.872)
GDP growth (%)	0.128* (0.066)	0.111* (0.067)	0.130* (0.067)
Urban population (%)	0.869*** (0.309)	0.828*** (0.308)	0.842*** (0.315)
Inflation rate (%)	0.012 (0.013)	0.007 (0.013)	0.012 (0.013)
Natural resources rents (%)	-0.232*** (0.063)	-0.229*** (0.063)	-0.361 (0.288)
Telephone subscribers (ln)	0.781 (0.739)	-3.025 (2.218)	0.827 (0.747)
Conflict area	-0.304 (0.666)	-0.484 (0.670)	-0.317 (0.667)
Alternative measure	1.045 (0.703)	-2.160 (1.896)	0.807 (0.874)
Alternative measure*Telephone subscribers (ln)		0.672* (0.369)	
Alternative measure*Natural rents			0.022 (0.048)
Constant	154.629* (87.654)	232.222** (97.097)	157.149* (87.972)
Number of country	31	31	31
Number of observations	275	275	275
Adjusted R-squared	-0.00566	0.00409	-0.00903

Notes: t statistics are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 13 Fixed Effects Estimation Results: Robustness Check

Dependent variable: GDP growth (%)

VARIABLES	Baseline	Trade Dependency Ratio	The Heritage Foundation index	ICRG Investment Profile index
FDI as % of GDP	0.124** (0.051)	0.115** (0.051)	0.114** (0.057)	-0.010 (0.066)
GDP (ln)	6.093** (3.026)	3.712 (3.185)	5.659* (3.375)	1.808 (3.180)
Urban population (%)	-0.196 (0.258)	-0.084 (0.258)	-0.308 (0.264)	-0.428 (0.286)
Inflation rate (%)	-0.076*** (0.011)	-0.077*** (0.011)	-0.072*** (0.011)	-0.063*** (0.010)
Natural resources rents (%)	0.050 (0.051)	0.071 (0.055)	0.061 (0.052)	0.011 (0.063)
Telephone subscribers (ln)	-0.962* (0.555)	-1.002* (0.548)	-0.649 (0.619)	0.488 (0.613)
Conflict area	-0.644 (0.584)	-0.925 (0.590)	-0.872 (0.577)	-0.949 (0.604)
Trade dependency		0.034** (0.017)		
Heritage Foundation index			0.068 (0.054)	
ICRG Investment Profile index				-1.002** (0.467)
Constant	-121.448* (66.259)	-72.846 (69.494)	-112.119 (73.644)	-12.418 (71.311)
Number of country	35	35	34	28
Number of observations	333	324	305	263
Adjusted R-squared	0.0527	0.0782	0.0661	0.105

Notes: t statistics are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1