

Does Economic Freedom Improve FDI Inflows in Sub-Saharan Africa?

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Abstract The objective of this study is to investigate the effect of economic freedom on foreign direct investment (FDI) in Sub-Saharan Africa (SSA). To this end, we employed a panel data analysis across 41 countries over the period 2000-2020. We used a two-stage least squares (2SLS) estimation method to address potential endogeneity issues. We found that economic freedom plays a crucial role in enhancing FDI inflows in SSA. Specifically, the results suggest that certain dimensions of economic freedom, such as the size of government and the legal system and property rights. Have a positive effect on FDI inflows in SSA. Conversely, components or dimensions like sound money and regulation have a negative impact. Freedom to trade has a positive sign on FDI. Regardless, these effects are statistically insignificant. Based on these outcomes, SSA countries should prioritize consolidating public spending on infrastructure development and enhancing the quality of investments in human capital formation. Additionally, strengthening the legal framework by ensuring the rule of law and a functional justice system that effectively safeguards the rights of investors is also necessary.

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I. Introduction

The dramatic growth of foreign investment inflows and outflows worldwide is a hallmark of international economic integration. Since the mid-1990s, global inward and outward flows of foreign direct investment (FDI) have remarkably grown (Villaverde and Maza, 2015). This increase in FDI flows has been significant not only in emerging countries but also in developing countries (Asiedu, 2002; Xiao and Park, 2018). These global flows have surged from \$200 billion in the early 1990s to over \$1,430 billion in 2017 (United Nations Conference on Trade and Development (UNCTAD), 2018).

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Competition for FDI is because of its many positive impacts on the economic growth of the host country. These spillovers include productivity gains, technology and skills transfer management, job creation, improved physical and human capital formation, and increased output (Azman-Saini et al., 2010; Bannaga et al., 2013). Furthermore, FDI is considered a crucial external finance resource in Sub-Saharan Africa (henceforth, SSA) (Cleeve et al., 2015). This significant increase in global FDI inflows has prompted extensive debates in the academic community about its potential determinants over the past years (Uddin et al., 2018).

According to the eclectic paradigm theory or OLI theory¹⁾ proposed by Dunning (1988) states that multinational firms venture abroad when they possess three advantages. Firstly, they present an ownership advantage allowing them to compete with other firms. Specifically, their possession of intangible assets (e.g., technology, patents, and skilled management) allows it to retain monopoly over their competitors. Secondly, the country location advantage stems from specific benefits that a country offers (e.g., natural resource endowment, macroeconomic environment, and low labor costs). Thirdly, the internalization advantage entails firms exploring imperfections in the external market concerning transaction costs and uncertainty. However, Pajunen (2008) contends that this theory only partially explains geographic advantage, acknowledging the need to consider institutional factors when assessing a country's attractiveness as a foreign investment. Considering this, Dunning and Lundan (2008) responded to this criticism by reexamining the OLI theory by incorporating institutional factors. From this perspective, apart from the traditional determinants,²⁾ although recognized as important by foreign investors, the institutional factor is also increasingly being recognized as a fundamental determinant of FDI attraction (Bénassy-Quéré et al., 2007; Aziz, 2017).

The institutional environment incorporates property rights, licensing of new firms, intellectual property protection, taxes, corruption, political risk, and banking and financial policies. These factors may either encourage or discourage foreign investors (Henisz, 2003). Institutions that uphold political stability, the rule of law, protection of property rights, and democratic principles tend to attract FDI (Globerman and Shapiro, 2003; Asiedu, 2006; Asiedu and Lien, 2011). In contrast, factors such as corruption, political risk, and excessive regulations negatively impact FDI (Gwartney, 2009; Barassi and Zhou, 2012; Bailey, 2017), particularly Greenfield FDI ³⁾(Luu et al., 2018).

Several of the most salient aspects of the institutional environment can be understood by exploring the level of economic freedom (EF) enjoyed by investors in a country (Meyer et al., 2009). EF⁴⁾ refers to the degree to which economic institutions and policies support voluntary

1) Ownership, location and internalization. As a reminder, this theory is a synthesis of different classical theories on the determinants of FDI activities abroad.

2) These include market size, exchange rate, quality of infrastructure, labor costs, return on capital, etc.

3) Greenfield investments correspond to new investments (greenfield investments). That is, the creation of new subsidiaries.

exchange, freedom of choice, protection of property rights, and freedom of competition. This encompasses the quality of institutions (QIs) through its subcomponents (e.g., judicial independence, impartial courts, protection of property rights, integrity of the legal system, and business regulations). In this context, Aziz (2017) notes that EF, as a proxy for institutional quality, has a positive impact on FDI inflows in Arab economies. He explains that economies with a business environment that protects investors and grants individuals the freedom to make production and consumption decisions are more likely to attract higher levels of FDI. EF, whether based on voluntary exchange, free trade, protection of property rights, the nature of the legal system, has played a crucial role in promoting FDI (Sayari et al., 2018). In an economically free society, individuals have the right to choose how to produce, consume, and control their property, and they are also entitled to protection for themselves and their property. Such an environment fosters productivity, encourages investment in physical capital like FDI, and provides greater opportunities for entrepreneurial activities.

In this context, like other countries in the world, SSA countries have implemented economic reforms to encourage EF (liberalization of the business environment, subsidies, infrastructure development, etc.) to stimulate more FDI. Despite the region's efforts to attract FDI, SSA performs less favorably than other regions of the world. For instance, Asia has implemented 40 investment policy measures favorable to FDI. This is compared to the 18 for Latin America and the Caribbean and 17 for Africa. Consequently, Africa's share of global FDI inflows declined from 3.6% to 2.9% over the period 2013–2019. Conversely, Asia's share increased from 28.5% to 30.8%, and Latin America and the Caribbean's share changed from 12.7% to 10.7%. However, in 2021, the share of FDI flows to Africa rebounded to 5.2% of global FDI, compared to 4.1% in 2020, primarily because of the COVID-19 pandemic. As for Asia, its share has fallen from 12.7% to 11.1%. Regardless, this region remains more attractive than Africa. When considering FDI projects of the Greenfield type, Africa's share remains considerably lower than Asia's share. Out of 905 projects in the field of Logistics and sales, Africa represents only 2%, whereas Asia accounts for 19%. Similarly, Africa's share is only 2% for R&D projects and 3% for ICT and Internet projects, while Asia's share is significantly higher at 24% and 26%, respectively (UNCTAD, 2020, 2022). Further examination of disparities among subregions of Africa reveals that North Africa performs better than the SSA. Between 2020 and 2021, the growth rate of the number of Greenfield investment project announcements was 8% in North Africa. This can be compared to 4% in Southern Africa, -10% in East Africa, -18% in West Africa, and -19% in Central Africa (UNCTAD, 2022).

UNCTAD emphasizes that the challenge for Africa, particularly for SSA countries, remains improving the business environment and enhancing Africa's capacity to absorb sustainable FDI.

4) Economic freedom is measured by: (i) size of government; (ii) legal system and property rights; (iii) sound money; (iv) freedom to trade internationally; (v) regulation of business, labor, and markets credit

Hence, Azman-Saini et al. (2010) highlight that a low level of EF can limit a firm's (or nation's) ability to absorb and internalize new technologies from multinational firms (i.e., foreign presence) to contribute to the host country's economic growth. In this regard, they suggest that developing countries, especially SSA countries, should promote freedom of economic activities to enhance their capacity to attract investment from multinational firms. Ghazalian and Amponsem (2018) also point out that the protection of property rights by a reliable legal system encourages FDI inflows in SSA. However, they argue that political and socioeconomic stability is essential to encourage multinational firms to undertake FDI in the region, considering that SSA is characterized by low FDI rates. However, Ajide and Eregha (2014) find that property rights protection had a deterrent effect on FDI inflows in the ECOWAS region. They explain that this result is not surprising as no sanctions against property rights violations exist. They add that while property rights remain in ECOWAS countries, they are weakly enforced.

This research aims to determine the effect of EF on FDI inflows in SSA. Our work differs from these few works in several ways. First, in our estimation technique—in addition to use the fixed-effects model—we complement the work of Ghazalian and Amponsem (2018) and Ajide and Eregha (2014) by employing the two-stage least squares (2SLS) estimation method to correct endogeneity issues, for instance, double causality (a high level of FDI may push a government to improve the degree of EF). Second, we control for certain variables. Ghazalian and Amponsem (2018) include both inflation and the sound money dimension (measured by the inflation rate) in their regressions. However, these two variables may be highly correlated, posing a multicollinearity problem. The same applies to the variables economic growth and economic growth rate per capita (a proxy of the host country's market size). Third, the spatial dimension, in fact, the Ghazalian and Amponsem (2018) study, includes only a few SSA countries (33). In contrast, Ajide and Eregha (2014) focus on the ECOWAS community. This investigation focuses only on 41 SSA countries over the period 2000-2020.

The rest of the paper is organized as follows. Section 2 reviews both the theoretical and empirical literature between EF and FDI inflows. Section 3 describes stylized facts in SSA. In Section 4, we present the methodology, the empirical specification, and the data. Section 5 shows the discussion of the main results. Finally, Section 6 concludes the study.

II. Literature Review

The relationship between EF and FDI inflows can be complex, considering the specificity of each dimension of the index. To achieve this goal, we will explore the theoretical and empirical connections between each component and FDI in this subsection ⁵).

A. Theoretical review

1. Size of government and FDI

FDI decision is primarily influenced by the attractiveness of economic growth in a given country (Pajunen, 2008). Hence, government size can influence FDI inflows by enhancing its ability to regulate economic growth and increase its public policies' effectiveness (Uddin et al., 2018). The positive impact of government spending on inward FDI can be even more significant in emerging countries, where the marginal benefit of such spending in attracting foreign investment and stimulating economic growth is higher. Government can improve economic growth by providing public goods (Holmes Jr et al., 2013), such as by building infrastructures.

2. Legal system and property rights⁶⁾ and FDI

The presence of a reliable legal system based on the rule of law, protecting property rights, remains crucial for attracting FDI in any country. Bailey (2017) emphasizes that when citizens respect the rule of law and the legal system ensures contract enforcement and property rights protection, it encourages FDI. Conversely, if a government fails to uphold a strong legal system and protect property rights, multinational firms lose incentive to engage in productive or entrepreneurial activities in such an environment. The rule of law enhances private investment security, allowing multinational firms to reap the benefits of their investments. Xu et al. (2016) define private property rights as rules and regulations protecting firms from government and powerful groups' influence, while contract enforcement safeguards firms and individuals from mutual exploitation. The origin of the legal framework also plays a vital role in explaining why some countries attract more FDI. La Porta et al. (1997, 1998) highlight that two sources of legal system exist worldwide: *civil* and common law. They state that the quality of the legal system or the quality of the application of the law and the respect of the legal norms are higher in the countries of common law tradition than in the countries of the civil law tradition.

3. Sound money and FDI

Macroeconomic stability, particularly price stability, significantly impacts FDI. Low inflation signals domestic economic stability, encouraging FDI (Boateng et al., 2015). Investors fear that an uncertain macroeconomic environment compromises their return on investment. High inflation rates in host countries create uncertainty, making long-term planning for pricing and

5) The Index of Economic Freedom covers five dimensions: (i) size of government; (ii) legal system and property rights; (iii) sound money; (iv) freedom to trade internationally; and (v) regulation of business, labor and credit markets.

6) The key elements of a legal system comprise the rule of law, security of property rights, an independent and impartial judiciary, and impartial and effective law enforcement (Gwartney et al., 2020).

profit expectations challenging, leading to reduced FDI inflows (Reece and Sam, 2012).

4. Freedom to trade internationally⁷⁾ and FDI

The impact of trade policy liberalization on FDI depends on the nature of the FDI strategy. The literature has identified two types of strategies: *horizontal*⁸⁾ (*market-seeking* strategy) and *vertical* (cost minimization and *resource-seeking* strategy, hence the term *resource-seeking*). Thus, when trade policy is protectionist (i.e., involving high tariff or non-tariff barriers), firms adopt the horizontal strategy. This strategy involves producing and serving the local market by setting up subsidiaries to avoid protectionist policies ⁹⁾(Markusen and Venables, 1995). This choice is justified by trade tariffs generally inducing high import costs, providing an advantage for firms established in this market.

The vertical strategy involves firms deciding to relocate some or all of their production abroad to exploit low production costs rather than serving the local market. This form of FDI is often motivated by labor input endowments, particularly in terms of wage costs, in host countries, especially developing regions like SSA or by these countries' geographical proximity. This type of FDI mainly occurs when firms opt to fragment their production activities into different parts and locations, based on factor costs in those locations (Kinda, 2013). This is why firms aim to locate in more open countries (i.e., countries with low labor costs), low levels of tariffs and low transportation costs (Helpman, 1984).

5. Regulation and FDI

Government regulation refers to regulation of business, labor, and credit markets. Much of the literature has focused on labor market regulation.¹⁰⁾ In a theoretical model, Haaland et al. (2003) demonstrate a trade-off between FDI motivation and labor market flexibility. They conclude that country with more flexible labor markets (i.e., with lower severance payments) should attract FDI more easily. Similarly, foreign investors are rational agents who minimize their production costs. They aim to locate in countries with low production costs, especially labor costs. A high unemployment rate prompts people to impose higher value on their current or potential job. This encourages them to work harder for lower pay. Hence, labor availability

7) Freedom to trade with the rest of the world refers to tariff measures on international trade, regulatory trade barriers, and controls on international capital markets.

8) This type of investment corresponds much more to the flow of FDI from Northern countries to Northern countries. These have relatively the same level of development. Inversely, the vertical strategy is identified with the flow of FDI from Northern to Southern countries. This is because southern countries have low labor costs and abundant natural resources.

9) Bypass effect of protectionist policies is known as *tariff jumping*.

10) Labor market regulation refers to the rules and regulations governing the operation of labor markets. This includes employment protection legislation (EPL), union activities, and minimum wage legislation. These various measures constitute the institutions of the labor market (Mina, 2020).

stimulates FDI inflows (Boateng et al., 2015).

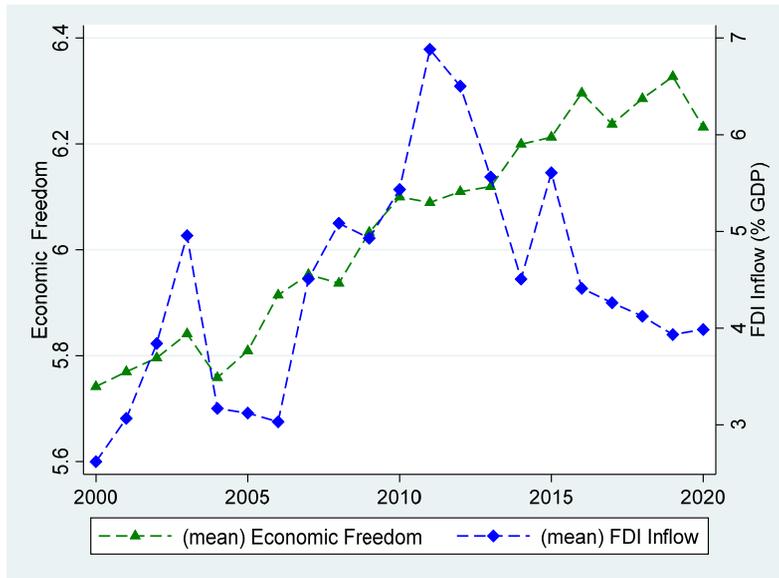
Excessive red tape or long delays in obtaining permits through government regulation can greatly increase corruption, transaction costs, and thus discourage foreign investors. Kaufmann (1997) highlights that the costs of corruption include not only the payment of bribes to the government in exchange for services but also the time and effort that multinational firms must spend dealing with corrupt officials. Consequently, Luu et al. (2018) claim that corruption can negatively affect *Greenfield* foreign investments. They explain that establishing a new entity or subsidiary often involves complex bureaucratic procedures. This involves obtaining licenses, permits, government contracts, or customs clearance; bribes paid to public officials to obtain these documents can significantly increase the cost of the investment.

B. Empirical review

Some empirical studies have explored the relationship between the dimensions of the index of EF and FDI. Yuan et al. (2010) studied the relationship between government size and FDI in a panel of 81 countries. They reveal that increasing government size positively affects FDI, especially in developing countries. To attract FDI, developing countries should focus on increasing government consumption spending and developing infrastructure to foster a favorable business climate for foreign investors, facilitating rapid and healthy economic development. In a study of 49 African countries, Bokpin et al. (2017) investigated how the interaction between the legal system and other institutions impacts FDI attraction. Their findings indicate that the source of the legal system (both common law and civil law) deters FDI flows, while institutions alone may not suffice to attract the desired volume of FDI. Okafor et al. (2015) suggest that inflation negatively impacts FDI in Southern, West, and East Africa. Ali et al. (2010) find that high tariff barriers discourage FDI, especially in manufacturing. Finally, Mina (2020) argues that flexible labor market policies encourage inward FDI in the MENA region.

III. Stylized Facts

Figure 1 presents the average trend of EF and net FDI inflows over the period 2000-2020 in SSA. Throughout the study period, the average trend of EF (green curve) shows a continuous upward trajectory. For FDI, this is different. Indeed, the rate of change in FDI inflows (blue curve) is somewhat cyclical. The region experienced its highest peak in 2011 with a rate of 6.88% but has since witnessed a significant slowdown, leading to a considerable decline in FDI inflows, notably in 2006 at 3.03%.

Figure 1. Average trend between EF and FDI inflows in SSA

(Source) Fraser Institute data (Gwartney et al., 2020) and UNCTAD.

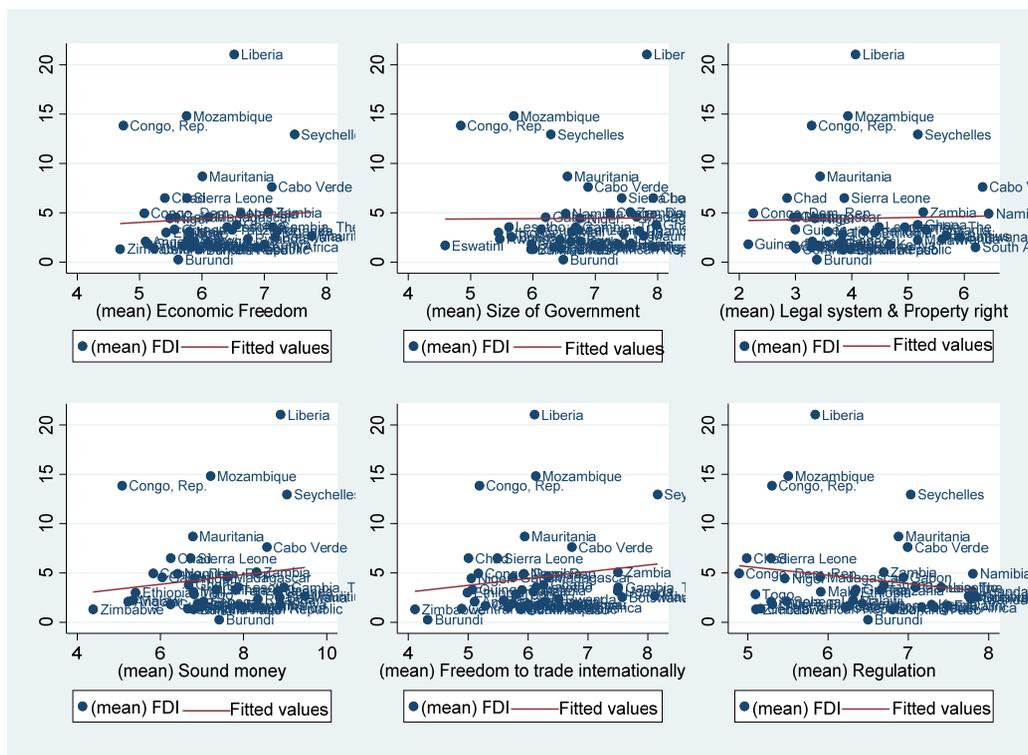
Figure 2 displays the average correlations between EF, its five components, and FDI over the period 2000-2020.

In the simple regression, the fit line suggests a lack of correlation between EF and FDI. This is because the coefficient is positive but small and insignificant (i.e., $\rho = 0.025$) (Appendix Table A1). The value of the coefficient of determination ($R^2 = 0.0002$) also confirms the absence of relationship. In Figure 2, we find that the size of government and legal system of property rights show no significant correlation with FDI inflows, with correlation coefficients and determination coefficients of 0.047, 0.033 and 0.009, 0.001, respectively. This remains true for the sound money. On the other hand, freedom to trade with the rest of the world exhibits a weak positive correlation with FDI inflows, as indicated by the correlation coefficient of 0.069 and coefficient of determination $R^2 = 0.0047$. Empirical studies that find that easing restrictions on trade stimulates FDI inflows support this result. Regulation, for instance, is negatively correlated to FDI inflows. The coefficient value is -0.065, while the R^2 value is 0.0115. In the conduct of business, heavy administrative procedures may partially describe the negative effect of regulation on FDI inflows. In developing countries, obtaining a permit to start a business can be challenging due to administrative delays and bureaucratic costs, potentially discouraging foreign investors.

However, this is only a bivariate relationship, and drawing conclusive meaning from it would be imprudent. In fact, the correlation analysis uses the ordinary least squares estimation method.

However, in panel data this method is inconsistent for multiple reasons. For example, many variables are omitted, which may bias the estimates. Moreover, the analysis does not account for heterogeneity, time-invariant country-specific effects, time-specific effects, and endogeneity issues. To address these concerns, a robust estimation method will be used in the following section to correct the aforementioned problems.

Figure 2. Average correlation between EF and the five index components and FDI



(Source) Fraser Institute data (Gwarty et al., 2020) and UNCTAD.

IV. Methodology and Data

This section will discuss the methodological approach to illustrate the empirical link between EF and FDI inflows in SSA over 2000-2020¹¹⁾.

11) The study period was dictated by the availability of data from 2000 to 2020. Annual data are available from 2000 onwards, as before this date data were produced every 5 years. The last available year in the database was 2020. Because of data availability problems, we needed to remove some countries from our database. In this respect, our database, which had 48 countries after the exclusion of certain countries, now includes only 41 countries. Using panel data offers the advantage of both cross-sectional (individual dimension) and time series

A. Specification of the empirical model

Building on work of Bengoa and Sanchez-Robles (2003), we expanded their model by disaggregating the index of EF and introducing macroeconomic control variables. We specified our empirical model as follows:

$$FDI = f(EF_{it}, X_{it}) \quad (1)$$

FDI denotes the net FDI inflows (as a percentage of GDP); *EF_{it}* is the index of Economic Freedom; *X_{it}* is the vector of control variables. *i* denotes the individual dimension (countries) and *t* denotes the time dimension (year).

Considering the index components and control variables, we formulated the above econometric model as follows:

$$FDI = \alpha_0 + \alpha_1 Sg_{it} + \alpha_2 Lspr_{it} + \alpha_3 Sm_{it} + \alpha_4 Ftrade_{it} + \alpha_5 Reg_{it} + \alpha_6 Gdp_growth_{it} + \alpha_7 Nat_resource_{it} + \alpha_8 Infrac_{it} + \alpha_9 democracy_{it} + \delta_i + \gamma_t + \epsilon_{it} \quad (2)$$

The components of EF are as follows: *Sg* (size of government); *Lspr* (legal system and property rights); *Sm* (sound money); *Ftrade* (freedom to trade with the rest of the world); and *Reg* (regulation of the business, labor, and credit markets). The vector of control variables is composed by the following: *GDP_growth*, the GDP growth as a proxy for market size; *Ressource*, the total natural resources rents (percentage of GDP); *Infrac*, infrastructure; δ , the unobserved country-specific fixed effects; γ , the time fixed effects; and ϵ , the error term. The last item comprises the other variables that may influence FDI but are not considered in the model.

1. Dependent variable

Following the literature, our dependent variable is FDI inflows as a percentage of GDP. To measure investment inflows as a percentage of GDP made by foreign investors to acquire lasting stakes (10%)¹²⁾ in host country firms. We used FDI inflows, which mitigates the nonstationarity problem associated with stock FDI data, which can lead to a spurious correlation (Mina, 2020).

data (temporal dimension). Hence, they allow us to study not only each individual's behavior (in this case countries) but also their behavior over time. Moreover, panel data control for unobserved heterogeneity.

12) By convention, for this investment to be counted as FDI, the investor must hold at least 10% of the voting rights of the foreign target firm.

2. Variables of interest

In addition to the synthetic index, we use the five components to better understand each dimension's effect on FDI inflows.

3. Control variables

We based our selection of the control variables on the empirical literature. These variables have been shown to be key determinants of FDI in a country.

GDP Growth captures the market size. Relatively large markets suggest the host country's degree of development, encouraging horizontal FDI¹³). This is usually captured by GDP, GDP growth, and real GDP per capita. All of these measures have been studied in empirical research. Previous studies using log GDP as a measure of market size found a positive relationship, particularly in developing countries (Asiedu, 2006). GDP growth has been found to positively influence FDI inflows (Aziz, 2017; Bailey, 2017). Other researchers have shown that real GDP per capita is also positively associated with FDI (Ajide and Raheem, 2016; Gossel, 2018). We used GDP growth as a measure of market size. We also expected a positive result.

Natural resources are measured by the share of natural resource exports (i.e., sum of oil rent, natural gas rent, coal rent (hard and soft), mineral rent, and forestry rent) (% of GDP). Some studies suggest that natural resources (i.e., the sum of oil, minerals, and forestry rent and metals) are positively related to FDI inflows (Asamoah et al., 2016; Ghazalian and Amponsem, 2018). On the contrary, others have found a negative effect of natural resources on FDI (Jadhav, 2012; Okafor et al., 2015). Therefore, we could not anticipate the result.

Infrastructure, particularly physical infrastructure, is crucial in attracting FDI to a country. Different types of proxies capture the quality of infrastructure. Asiedu (2006)¹⁴) highlights the role of good infrastructure, measured by the number of telephone lines per 1,000 inhabitants, in promoting FDI in Africa. In this study, we use the number of telephone lines per 1,000 inhabitants as a proxy for infrastructure quality in SSA. We expected a positive result.

Democracy is a factor measured by political rights. This is mostly used to proxy for democracy in a country. Apart from EF, political freedom is considered a crucial dimension that contributes to the economic development of a country. This variable was taken from Freedom House. The data was ranked on a scale of 1 to 7, indicating that competition between political parties and lack of political rights, respectively, exists. Asiedu and Lien (2011) found that democracy captured by political rights favored FDI on a panel of 112 countries. We anticipated as positive result.

13) Horizontal type FDI. This would be because some investors have objectives to produce and serve for the local market of the host country.

14) The latter highlights that investors seeking market share want to maximize their profit and minimize their costs. This can only be achieved through the availability of good quality infrastructure that supports investors.

B. Data

This study uses an annual unbalanced panel of 41 SSA countries over 2000-2020. Data for the variables of interest, including EF and its five components, are primarily sourced from the Fraser Institute database¹⁵⁾ (the Index of EF in the World). The index consists of 26 components with subcomponents, resulting in 44 variables. Each component and subcomponent is scaled from 0 to 10 based on the underlying data distribution. Subcomponent ratings are averaged to derive the component rating. Component ratings within each area are then averaged to derive ratings for each of the five areas. To derive the summary rating for each country, we then averaged the five area ratings. These five major areas are: size of government, legal system and property rights, sound money, freedom to trade internationally, and regulation (Gwartney et al., 2020). This index has been widely used in research on the impact of EF on economic development (Stroup, 2007; Farhadi et al., 2015; Angulo-Guerrero et al., 2017; Bennett et al., 2017). Data for dependent variable are from the UNCTAD database. Data for control variables are from the World Bank World Development Indicators (WDI) database.

Table 1. *Descriptive Statistics*

Variables	Observation	Mean	Standard deviation	Min	Max
FDI	856	4.45	6.81	-6.37	70.35
Economic freedom	763	6.06	0.815	3.26	8.26
Size of government	859	6.66	1.18	1.87	9.26
Legal system & property rights	861	4.12	1.19	1.66	6.94
Sound money	763	7.09	1.42	1.25	9.77
Freedom to trade	762	5.96	1.05	1.83	8.82
Regulation	775	6.36	1.04	3.95	8.62
GDP growth	860	4.03	4.89	-36.39	33.62
Infrastructure	853	49.87	43.02	0	185.55
Natural resource	858	0.12	0.45	0	4.38
Political rights	820	4.235	1.78	1	7

(Source) Fraser Institute data (Gwartney et al., 2020) and World Bank (2022).

In the period 2000-2020, SSA experienced an average FDI inflows ratio of 3.77% as a percentage of GDP, with a maximum of 40.88% and a minimum of -6.9%. Negative values indicate disinvestment by foreign investors exceeding new capital investments. The region's average annual GDP growth is low at 4.03%, with a maximum of 33.62% and a minimum of -36.39%. Negative GDP growth may be attributed to economic recession caused by declining

15) The Fraser Institute rates economies on a scale of 0 to 10, that is, less free economy and more free economy, respectively.

raw material prices. The aggregate index of EF and some components show average scores relatively higher than 5 on a scale of 0 to 10.

C. Estimation method

Panel data econometrics can address unobserved heterogeneity. Two types of models can control unobserved individual effects specific to each country, as presented in Equation 2. The fixed-effects model utilizes a country-specific constant variable correlated with explanatory variables. On the other hand the random effects model assumes uncorrelated and randomly distributed country-specific factors contained in the error term. The choice between these models requires the Hausman (1978) specification test.

The panel data structure may suffer from endogeneity bias¹⁶⁾ originating from three sources (omitted variables, simultaneity bias, and measurement error). First, despite the presence of control variables and variables of interest in the Model (2), we may omit other relevant variables capable of explaining FDI. Second, a simultaneity bias (i.e., the direction of causality may not be unidirectional) may also occur. Indeed, if EF can explain FDI on the one hand, FDI into a country can also push its authorities to undertake reforms in favor of foreign investors on the other hand. Finally, we based the construction of the index of EF based on opinion survey data from various sources. These include, for example, the World Economic Forum's *Global Competitiveness* Reports, the World Bank's *Doing Business* reports, etc. These data are both qualitative and quantitative, complicating the measurement of both the quality and quantity of economic institutions and policies covered by the index. Consequently, subjectivity and imprecision are inevitable when constructing the index (de Haan, 2003)¹⁷⁾. Therefore, the risk of measurement error remains a concern, especially in developing countries, particularly in SSA, where the availability of information remains lacking.

To address possible endogeneity issues, instrumental variable methods like the two-stage least squares (2SLS) estimation for panel data can be used. This estimation method makes obtaining unbiased and consistent estimators possible through an exogenous variable considered as an instrument. However, three conditions must be met prior to choosing a valid instrument. Firstly, the instrument must be correlated with the endogenous explanatory variables (in our study, EF). Secondly, it must be uncorrelated with the error term. Thirdly, given the problem of omitted variables, the instrument must not directly explain the dependent variable (FDI) except through the endogenous explanatory variable, posing challenges in finding suitable instruments.

La Porta et al. (1998) suggest that the two sources of legal systems¹⁸⁾ would explain the

16) Endogeneity denotes the existence of a correlation between the explanatory variables and the error term.

17) Moreover, he highlights that the construction of an indicator of economic freedom raises three questions: which elements should included, how these will be quantified, and how these different elements are to be combined into an index.

difference in institutional quality, size, and scope of the financial market between countries. Therefore, this would explain why some countries attract foreign investment more easily than others. Legal origin, distinguishing civil law (French, Scandinavian, and German countries) and common law (English countries), has been identified in the literature as an external instrument to resolve endogeneity issues. For instance, Faria and Montesinos (2009) and Feldmann (2017) have used the origin of the legal framework or legal system to instrument EF. Buchanan et al. (2012) used it to control endogeneity bias (reverse causality) between institutional quality¹⁹⁾ and FDI.

The literature has also employed the so-called internal instrument. This instrument involves that lagging all endogenous explanatory variables. Lagged values are employed to overcome potential endogeneity biases resulting from simultaneity (reverse causality). Utilizing lagged values ensures the exogeneity of EF concerning current FDI (Islam, 2018). Bénassy-Quéré et al. (2007) highlight that when panel data are used, the presence of country fixed effects precludes the use of external instruments (e.g., the latitude and longitude of a country, the origin of the legal system). Moreover, these authors selected the 5-year lagged institutional quality as an instrument panel data. For instance, Li et al. (2018) used a two-period lagged value of the (*Transparency International*) corruption perception index as an instrumental variable. Feldmann (2017) argues that using lags increases the likelihood of capturing the influence of EF on the explanatory variable rather than the reverse causality. To address endogeneity bias (e.g., double causality), we adopted the two-stage least squares (2SLS) estimation method. In this study, we employed the three-period lagged values of the synthetic index and its five components as internal instruments.

V. Results and Discussion

This section presents the results of the regressions using the fixed-effects model and the two-stage least squares (2SLS) estimation method. Before delving into the estimations' outcomes, it is important to mention that we conducted some preliminary tests. To measure the degree of relationship between the variables, we performed a correlation test (Appendix Table A1). We conducted the specification test of Hausman (1978), revealing that the fixed-effects model outperforms the random effects model (Table 2). The Wooldridge (2002) error autocorrelation test indicated serial correlation of errors at the first order, which rejects the null hypothesis

18) These are reflected in the protection of investors and their property from expropriation through the strict contract enforcement.

19) They measured institutions by the World Bank's six governance indicators, namely, citizen voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

of no serial correlation at the 1% level. Additionally, the Wald test results indicate heteroscedasticity of the errors (with probabilities lower than zero), leading to the rejection of the null hypothesis of homoscedasticity at the 5% level (Appendix Table A2).

Table 2. *Estimated Effects of EF on FDI*

Variables	Fixed effects model					
	Dependent Variable: FDI inflows (% GDP)					
GDP growth	0.0647 (0.0731)	-0.0133 (0.106)	-0.0289 (0.106)	0.0730 (0.0754)	0.0682 (0.0717)	0.113 (0.0879)
Infrastructure	-0.00621 (0.00906)	0.00366 (0.00813)	0.00324 (0.0121)	0.000153 (0.00782)	-0.000999 (0.00878)	0.000606 (0.00900)
Natural resource	-0.113 (0.0927)	0.0115 (0.110)	-0.0162 (0.110)	-0.135 (0.0921)	-0.134 (0.0941)	-0.122 (0.101)
Political rights	0.452 (0.367)	0.0634 (0.397)	0.244 (0.408)	0.319 (0.376)	0.344 (0.381)	0.411 (0.413)
Economic freedom	1.656** (0.719)					
Size of government		1.002*** (0.328)				
Legal system & property rights			0.999 (1.083)			
Sound money				-0.0817 (0.388)		
Freedom to trade					0.280 (0.454)	
Regulation						-0.572 (0.776)
Constant	-7.433* (4.019)	-3.432 (2.941)	-1.371 (5.444)	3.504 (3.326)	1.218 (2.770)	5.770 (5.428)
Observations	712	804	806	712	711	724
Number of countries	41	41	41	41	41	41
Countries Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
F-Statistic	3.699	3.203	2.386	3.732	3.623	3.371
P-values	0.000	0.000	0.008	0.000	0.0002	0.000
Hausman test (χ^2)				24.77		
Probability (χ^2)				0.0032		

Note. Robust standard errors are in parentheses and imply heterogeneity in error variances. The Hausman test rejects the null hypothesis (H_0) that the individual fixed effect (time invariant) is not correlated with the explanatory variables because the probability (0.0032) is less than 5%. Hence, the fixed effects model is more convergent than the random effects model. We have considered that the country and time fixed effects characterizes heterogeneity between countries. Moreover, the individual (here country) heterogeneity in the form of fixed effect is confirmed by the F-statistic P-values which are all less than 10%. *** ** * indicates 1%, 5% and 10% represents the level of significance, respectively.

Moreover, we examined other statistics to assess the validity of our instruments employed in the 2SLS estimation method. First, we tested for under-identification (*rk* LM), by Kleibergen and Paap (2006), to assess the relevance of the instruments. This helps to confirm whether they are correlated with the endogenous explanatory variables (Table 3). Second, the Cragg-Donald Wald F-statistical test to verify whether the instruments are weakly identified. Essentially, we tested whether the instruments are weakly correlated with the endogenous explanatory variables. These test values were compared to the critical values calculated by Stock and Yogo (2005) (Table 3). Finally, we conducted Hansen's (1982) overidentifying restriction test. This test examines whether or not the instruments are correlated with the error term (Table 3). Furthermore, we conducted a robustness test to assess if the results change with alternative measures of the dependent and explanatory variables. Thus, we replaced the dependent variable FDI as a percentage of GDP by FDI per capita. We also replaced the political freedom (political rights) variable of Freedom House by Polity2 from the democracy index published in Polity IV.

Table 2 presents the results of the estimation of the fixed-effects model. The aggregate index of EF significantly and positively affected FDI inflows at the 5% level. The analysis shows that an improvement of 1% in the aggregate index of EF leads to a 1.67% increase in FDI (Table 2). An environment characterized by EF offers foreign investors opportunities to expand their productive activities, thus attracting more FDI. Economou (2019) found a similar positive impact of EF on FDI in South European economies.

Particularly, the positive relationship is driven by the size of government component, which significantly impacts FDI at the 1% level. A 1% increase in government size (public spending) leads to a 1% increase in FDI. Thus, by providing desirable public services, a government can support foreign investors. For example, public spending on infrastructure construction, human capital formation etc. In addition, governments in SSA countries can incentivize FDI through tax exemptions. Our results are in line with Yuan et al. (2010), who reported that increasing government size positively impacts FDI. Additionally, this effect is more significant in developing countries.

Table 3 presents the results of the instrumental variable model using the two-stage least squares (2SLS) estimation method. Apart from the aggregate index, the components—size of government and legal system and property rights protection—are significantly positive at the 5% and 10% levels, respectively. Using the 2SLS method, we observe that a 1% improvement in the synthetic index of EF leads to a 1.98% increase in FDI.

Regarding the size of government, a 1% increase in government spending results in a 0.98% increase in FDI. The legal system result indicates that enhancing property rights protection through a robust legal system increases FDI by 1.39% (Table 3). A reliable legal system based on the rule of law and impartial judiciary provides foreign investors with better guarantees against expropriation and contract enforcement. Countries with such systems attract foreign

investors who feel secure in engaging in productive activities without risking expropriation of the fruits of their investment. Foreign investors aim to establish themselves in countries

Table 3. *Estimated Effects of EF on FDI.*

Variables	Two-stage least squares (2SLS) method					
	Dependent variable: FDI inflows (% GDP)					
GDP Growth	0.045 (0.039)	-0.019 (0.111)	-0.039 (0.110)	-0.011 (0.327)	0.053 (0.0412)	0.096* (0.0517)
Infrastructure	-0.010 (0.00927)	0.0005 (0.00942)	0.0002 (0.0179)	-0.011 (0.327)	-0.0114 (0.0137)	-0.0148 (0.0148)
Natural resource	-0.126* (0.0726)	0.00481 (0.0737)	0.0146 (0.0726)	-0.011 (0.327)	-0.102 (0.0640)	-0.0660 (0.0668)
Political rights	0.417* (0.221)	0.243 (0.394)	0.840*** (0.320)	-0.011 (0.327)	0.415** (0.192)	0.504** (0.206)
Economic freedom	1.984** (0.911)					
Size of government	0.984* (0.512)					
Legal system & property rights	1.392* (0.837)					
Sound money	-0.011 (0.327)					
Freedom to trade	0.0374 (0.369)					
Regulation	-0.595 (1.037)					
Observations	630	723	685	630	589	602
Number of countries	41	41	41	41	41	41
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk	72.54	106.2	123.8	53.01	57.65	75.97
Kleibergen-Paap rk (P-values)	0.000	0.000	0.000	0.000	0.000	0.000
Cragg-Donald	337.5	247.6	430.2	278.2	198.4	94.57
Stock-Yogo's CV (10%)	22.30	22.30	22.30	22.30	22.30	22.30
Hansen (P-values)	0.280	0.532	0.523	0.468	0.764	0.813

Note. Kleibergen-Paap is a test of under-identification that aims to determine whether the equation is identified. Hypothesis (H_0) assumes that the instruments are irrelevant (equation is underidentified), or uncorrelated with the endogenous explanatory variables. All P-values are below 5%, leading to the rejection of H_0 . Therefore, the instruments (lagged values of economic freedom and its five components) are relevant, and the equation is well identified. The Cragg-Donald test checks whether the instruments are weakly correlated with the endogenous variables (H_0 : the instrument is weakly identified). The Cragg-Donald t-statistics are well above the critical values of Stock and Yogo (à 10%). Hence, the hypothesis H_0 was rejected, the instruments are not weak. The choice of 10% corresponds to the maximum size of the 2SLS method, with a number of instrument lags equal to three. Hansen's P-values are all less than 10%; hence, the instruments were valid. *** ** * indicates 1%, 5%, and 10% represents the level of significance, respectively.

that have a relatively good legal framework that guarantees them against expropriation of their assets. For instance, Mauritius, Cape Verde, and South Africa, with average scores of 6 in the legal system and property rights protection, serve as examples. Despite this significance, SSA countries should strive to enhance their legal frameworks, similar to Europe and Asia, where legal frameworks are more developed. This will require a strengthening of the independence of the judiciary and political stability in the region. Uddin et al. (2018) found that legal structure and strong property rights have strong positive effect on FDI inflows.

In contrast, sound money, freedom to trade internationally, and regulation of business, labor, and credit markets do not significantly affect FDI. These results contradict the theoretical prediction mentioned above in the literature review. Notably, the sign of the sound money variable, while not significant, is negative. Level of inflation indicated macroeconomic environment. The negative sign may indicate, to some extent, high inflation, macroeconomic instability, or uncertainty, which negatively affects investors' decisions and discourages FDI. Freedom to trade reflects the degree of openness of the region to the economies of other continents. This is measured by trade policy through both tariff and non-tariff barriers. This suggests that foreign investors will prefer countries with lower tariffs and transportation costs. Therefore, if SSA has received less FDI compared to other regions, it might be due to the latter being more open. Finally, regulation, although not significant, also has a negative sign. An indicator of this dimension is the business regulation, including administrative procedures, bureaucratic costs, and licensing for business startups. SSA countries tend to underperform in this area, given the high level of corruption prevalent in the region. Excessive bureaucracy often leads to corrupt practices involving bribes in exchange for services. Corruption has negative effects as it increases transaction costs, potentially discouraging foreign investment.

Regarding the control variables, GDP growth and democracy (measured by political rights) are significantly and positively associated with FDI (Table 3). GDP growth indicates market size and thus reflects the host country's economic development. Certain firms' presence in specific SSA countries can be attributed to economic dynamics and potential demand arising from an emerging middle class in these countries. Cleeve et al. (2015) found that GDP growth positively affect FDI in SSA.

Democracy in a country signifies credibility, political stability, less conflict, and lower corruption. To this end, to foreign investors, democratic countries offer more favorable political guarantees. Hence, SSA countries that have democratic institutions tend to promote FDI. Regardless, SSA is not a good example. However, there are exceptions, such as Botswana, Mauritius, Cape Verde, and the Seychelles, which serve as benchmarks in this regard. In the same way, Bailey (2017) reported that democracy attract FDI.

Contrary to the general belief that FDI decisions in developing countries are driven by the presence of natural resources, the natural resource control variable (captured by the total share

of natural resources as a percentage of GDP) has a significant negative effect on FDI (Table 3). This result can be explained by conflicts between armed groups over the management of natural resources in countries like the Central African Republic and the Democratic Republic of Congo, causing political instability and increasing the risk of economic activity, thus negatively affecting foreign investment. Moreover, the appreciation of the local currency following a rise in raw material prices makes exports expensive and less competitive compared to other products, further impacting investments negatively. Similarly, Okafor et al. (2015) found that natural resources deter FDI in SSA. They explained this negative effect by appreciating the local currency because of the increased rent generated by the resources. No significant effect of infrastructure was found on FDI. The inadequate and poor-quality roads, telecommunications, and power lines in the region contribute to these challenges.

A. Robustness test

In this section, we performed a sensitivity test to ensure our results robustness. Hence, the dependent variable FDI as a percentage of GDP has been replaced by FDI per capita. Appendix Table A3 shows the results. The results obtained are similar to those in Table 3. Additionally, we find positive influences not only from the aggregate index of EF, the size of government, and the legal system but also from sound money and freedom to trade internationally. Furthermore, we replaced the control variable political right from Freedom House with "polity" from the Polity IV index as a measure of political competition and democracy. The results obtained remain the same (see Appendix Table A4).

VI. Conclusion

This study examines the effect of EF on FDI in a panel of 41 SSA countries during the period 2000-2020. Hence, we applied data from the Fraser Institute's Index of EF (Gwartney et al., 2020), net FDI inflows from the UNCTAD database, and control variables from the World Bank's WDI database. Our estimation methods included the fixed-effects model and two-stage least squares (2SLS) estimation method. Our results show that EF has a positive effect on FDI in SSA countries. This finding aligns with the existing empirical literature, which suggests that the level of EF, as reflected in the QIs, attracts FDI. The results indicate that specific components of the index, such as the size of government and the legal system protection of property rights, positively influence FDI.

Based on these results, it is recommended that SSA governments enhance EFs to improve the institutional environment's quality and attract more FDI. Consolidating public spending on

infrastructure construction and improving the quality of spending on human capital formation is necessary. SSA countries should strengthen their legal frameworks by ensuring the presence of a rule of law and functional justice to protect investors' rights against any risk of expropriation. In this study, we have not focused on Greenfield or M&A FDI. Thus, further investigations may focus on how these institutions affect two types of FDI. Similarly, future research can explore FDI by considering industry sectors.

Data Availability

I declare that the data that support the findings of this study are available from the corresponding author, Ibrahima Dia, upon reasonable request.

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Appendix

Table A1. *Correlation matrix.*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) FDI	1.000										
(2) Economic freedom	0.025	1.000									
(3) Size of government	0.047	0.375	1.000								
(4) Legal system	0.033	0.716	-0.016	1.000							
(5) Sound money	0.007	0.832	0.208	0.412	1.000						
(6) Freedom to trade	0.069	0.819	0.170	0.496	0.669	1.000					
(7) Regulation	-0.065	0.785	0.028	0.628	0.561	0.573	1.000				
(8) GDP growth	0.052	0.085	-0.004	0.085	0.048	0.098	0.078	1.000			
(9) Infrastructure	0.124	0.424	-0.006	0.390	0.334	0.370	0.402	-0.065	1.000		
(10) Natural resource	0.151	-0.487	-0.216	-0.390	-0.440	-0.323	-0.330	0.058	-0.156	1.000	
(11) Political rights	-0.007	-0.506	-0.165	-0.568	-0.328	-0.404	-0.324	-0.064	-0.183	0.408	1.000

Table A2. *Diagnostic Tests*

FDI	Homoscedasticity ^a (Probability)	Serial correlation ^b (Probability)
Economic freedom	0.0024	0.0000
Size of government	0.0025	0.0000
Legal system & property rights	0.003	0.0000
Sound money	0.002	0.0000
Freedom to trade	0.0019	0.0000
Regulation	0.0002	0.0000

^a Modified Wald test for groupwise heteroskedasticity; the null hypothesis is homoscedasticity. The Wald test's results for panel heterogeneity indicated that the null hypothesis of homoscedasticity is rejected at the 5% level.

^b Wooldridge tests for autocorrelation in panel data; the null hypothesis is that no autocorrelation exists. The Wooldridge test of serial correlation results indicated the rejection of the null hypothesis of no serial correlation at the 1% level.

Table A3. *Estimated Effects of Economic Freedom on FDI Per Capita*

Variables	Two-stage least squares (2SLS) method					
	Dependent variable: FDI in inflows per capita					
GDP growth	0.0332*** (0.0105)	0.0245** (0.0104)	0.0237** (0.0113)	0.0348*** (0.00992)	0.0305*** (0.0100)	0.0259** (0.0114)
Infrastructure	0.00284 (0.00304)	0.0128*** (0.00109)	0.00204 (0.00305)	0.00349 (0.00314)	0.00905*** (0.00176)	-0.000894 (0.00361)
Natural resource	-0.00457 (0.00775)	0.00529 (0.00721)	-0.00497 (0.00767)	-0.00441 (0.00845)	-0.0154* (0.00804)	-0.00746 (0.00908)
Political rights	0.0368 (0.0621)	-0.0462 (0.0686)	0.0786 (0.0633)	0.0163 (0.0616)	0.00506 (0.0612)	0.0149 (0.0624)
Economic freedom	0.728*** (0.208)					
Size of government	0.144* (0.0820)					
Legal system	0.487*** (0.132)					
Sound money	0.201** (0.0857)					
Freedom to trade	0.234* (0.132)					
Regulation	0.220 (0.139)					
Observations	567	693	655	567	566	501
Number of countries	41	41	41	41	41	41
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk	57.02	97.19	119.1	41.89	53.72	58.97
Kleibergen-Paap rk (P-values)	0.000	0.000	0.000	0.000	0.000	0.000
Cragg-Donald	180.7	238.7	392.3	148.9	199.2	53.37
Stock-Yogo's CV (10%)	22.30	22.30	22.30	22.30	22.30	22.30
Hansen	0.532	0.310	0.610	0.766	0.853	0.454

Table A4. *Estimated Effects of Economic Freedom on FDI inflows*

Variables	Two-stage least squares (2SLS) method					
	Dependent Variable: FDI inflow (% GDP)					
GDP growth	0.0193 (0.0472)	-0.0411 (0.118)	-0.0801 (0.114)	0.0325 (0.0449)	0.0225 (0.0469)	0.0667 (0.0487)
Infrastructure	-0.00232 (0.00819)	4.77e-06 (0.00810)	-0.00541 (0.0123)	0.00269 (0.00677)	0.00425 (0.00762)	0.00432 (0.00779)
Natural resource	-0.109* (0.0648)	0.0272 (0.0765)	-0.0377 (0.0819)	-0.167** (0.0788)	-0.127* (0.0654)	-0.144* (0.0772)
Polity2	-0.0664 (0.0715)	0.0445 (0.121)	0.0343 (0.114)	-0.0221 (0.0753)	-0.0477 (0.0713)	-0.0357 (0.0772)
Economic freedom	1.629* (0.927)					
Size of government	0.938* (0.564)					
Legal system & property rights	1.657* (1.005)					
Sound money	-0.0447 (0.331)					
Freedom to trade	0.162 (0.415)					
Regulation	-0.179 (1.036)					
Observations	545	665	667	585	544	594
Number of countries	39	40	40	40	39	40
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk	57.20	90.53	126.1	57.43	54.27	75.17
Kleibergen-Paap rk (P-values)	0.000	0.000	0.000	0.000	0.000	0.000
Cragg-Donald	195.1	220.5	699.9	343	181.7	114.1
Stock-Yogo's CV (10%)	22.30	22.30	22.30	22.30	22.30	22.30
Hansen (P-values)	0.893	0.788	0.224	0.654	0.750	0.700

Table A5. Average Values of Economic Freedom Components and FDI by Country: 2000-2020

Country	FDI (% GDP)	Economic freedom index	Size of government	Legal system	Sound money	Freedom to trade	Regulation
Angola	2.10	5.10	6.61	3.30	5.22	5.11	5.29
Benin	1.90	6.08	7.57	3.78	6.89	5.74	6.42
Botswana	2.54	7.17	5.66	5.92	8.87	7.57	7.85
Burkina Faso	1.31	5.96	5.97	3.98	6.80	5.88	6.80
Burundi	0.27	5.62	6.49	3.38	7.41	4.32	6.50
Cabo Verde	7.63	7.12	6.88	6.32	8.56	6.73	6.99
Cameroon	1.67	5.70	6.98	2.96	7.02	5.29	6.26
Central African Republic	1.39	5.23	6.45	3.01	6.66	4.89	5.16
Chad	6.50	5.40	7.93	2.85	6.25	5.00	4.99
Congo, Dem. Rep	4.96	5.08	7.24	2.25	5.83	5.17	4.89
Congo, Rep.	13.84	4.74	4.84	3.29	5.08	5.19	5.30
Cote d'Ivoire	1.51	5.82	7.08	3.28	6.87	5.67	6.21
Eswatini	1.70	6.10	4.59	3.40	7.90	6.18	7.49
Ethiopia	3.01	5.43	5.45	4.41	5.40	4.99	6.33
Gabon	4.56	5.58	6.20	2.97	6.05	5.75	6.94
Gambia	3.55	7.14	6.69	4.94	8.97	7.50	7.09
Ghana	3.79	6.56	7.98	5.17	6.68	6.26	6.69
Guinea	3.32	5.56	6.13	3.00	7.34	5.07	6.35
Guinea-Bissau	1.82	5.14	5.98	2.16	6.25	6.00	5.30
Kenya	1.79	7.00	7.36	4.68	8.89	6.80	7.29
Lesotho	3.57	6.40	5.62	4.48	7.87	6.14	7.41
Liberia	21.04	6.52	7.83	4.07	8.89	6.11	5.84
Madagascar	4.59	6.11	7.66	3.04	7.61	6.33	5.90
Malawi	2.24	5.77	6.44	5.17	5.34	5.59	6.31
Mali	3.10	5.80	6.62	3.58	6.79	6.09	5.91
Mauritania	8.70	6.01	6.55	3.44	6.78	5.94	6.88
Mauritius	2.66	7.76	7.78	5.68	9.48	8.11	7.75
Mozambique	14.82	5.75	5.69	3.93	7.21	6.13	5.50
Namibia	4.92	6.62	6.52	6.43	6.41	5.93	7.80
Niger	4.45	5.49	6.75	3.34	6.83	5.05	5.46
Nigeria	1.55	6.23	7.94	3.43	6.95	5.67	7.16
Rwanda	2.36	6.74	5.47	5.61	8.34	6.51	7.78
Senegal	2.12	5.88	6.76	3.82	7.04	6.28	5.48
Seychelles	12.95	7.49	6.29	5.17	9.04	8.16	7.03
Sierra Leone	6.50	5.76	7.42	3.87	6.73	5.49	5.29
South Africa	1.51	6.87	6.33	6.20	7.98	6.53	7.32
Tanzania	3.28	6.48	6.73	5.32	7.80	5.90	6.66
Togo	2.84	5.80	7.46	3.84	6.81	5.80	5.09
Uganda	3.16	7.21	7.70	4.23	8.83	7.50	7.80
Zambia	5.08	7.07	7.56	5.27	8.31	7.50	6.69
Zimbabwe	1.32	4.69	6.01	3.83	4.38	4.11	5.10
Mean	4.44	6.10	6.66	4.12	7.18	6.00	6.40